CATALOG ISSUE

1961-62

Oregon State University

BULLETIN

CORVALLIS • OREGON

OREGON STATE SYSTEM
OF HIGHER EDUCATION

Explanation of Code Numbers

Course Numbering System

0–49	Non-credit courses or credit courses of a terminal or semiprofessional nature.
50–99	Credit courses of a basic, preparatory, subfreshman level.
100–299	Courses for freshmen and sophomores.
300–399	Courses for juniors and seniors.
400–499	with (g) or (G) undergraduate courses that may be taken for graduate credit.
500–599	Graduate Courses.

Class Meetings per Week

The symbols that accompany each course description in this Catalog refer to the number and duration of the class periods each week. For example, 3 ① means that the class meets three times a week for one hour. 2 ③ means that the class has two 3-hour meetings each week.

See pages 26 and 27 for other definitions, more details of the numbering system, and an explanation of the grading system.

OREGON STATE UNIVERSITY BULLETIN

Number 90 **May 1961**

Published monthly (except in February, June, August, October, December) by the Oregon State Board of Higher Education at Oregon State University, Corvallis, Oregon. Entered as second-class matter March 28, 1950, at the post office at Corvallis, Oregon, under authority of the act of August 24, 1912, as amended by the act of August 4, 1947 (Sec. 34.21 PL & R).

Oregon State University

CATALOG

1961-62

Corvallis, Oregon

Contents

Oregon State University Calendar

Summer Session 1961

June 19, *Monday*.....Registration
June 20, *Tuesday*.....Classes begin
July 4, *Tuesday*.....Independence Day—holiday
August 10-11, *Thursday-Friday*.....Final examinations
August 11, *Friday*.....End of Summer Session

Fall Term 1961

September 14, *Thursday*.....Faculty Day
September 18-23, *Monday-Saturday*.....New Student Week
September 22-23, *Friday-Saturday to 3:00 p.m.* Registration
September 25, *Monday*.....Classes begin
October 7, *Saturday*.....Latest day for registering or adding courses
October 21, *Saturday*.....End of fourth week (reports of unsatisfactory progress)
November 4, *Saturday*.....Latest day to drop a course
November 18, *Saturday*.....End of eighth week
November 18, *Saturday*.....Latest day to withdraw from college without responsibility for grades
November 23-26, *Thursday-Sunday*.....Thanksgiving vacation
December 9, *Saturday*.....Classes end
December 11-16, *Monday-Saturday*.....Final examinations
December 16, *Saturday*.....End of fall term

Winter Term 1962

January 2-3, *Tuesday a.m. and p.m., Wednesday a.m.*.....Registration
January 3, *Wednesday, 1:00 p.m.*.....Classes begin
January 16, *Tuesday*.....Latest day for registering or adding courses
January 30, *Tuesday*.....End of fourth week (reports of unsatisfactory progress)

June 1961

S	M	T	W	T	F	S
....	....	....	....	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	....

July 1961

S	M	T	W	T	F	S
....	....	....	....	....	....	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31	....	....	....	....	....

August 1961

S	M	T	W	T	F	S
....	....	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	....	....

September 1961

S	M	T	W	T	F	S
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3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

October 1961

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	....	....	....	....

November 1961

S	M	T	W	T	F	S
....	....	....	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	....	....

December 1961

S	M	T	W	T	F	S
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10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31	....	....	....	....	....	....

January 1962

S	M	T	W	T	F	S
....	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	....	....	....

February 13, *Tuesday*.....Latest day to drop a course
February 17, *Saturday*.....Latest day to withdraw from college without responsibility for grades
March 10, *Saturday*.....Classes end
March 12-17, *Monday-Saturday*.....Final examinations
March 17, *Saturday*.....End of winter term

Spring Term 1962

March 26-27, *Monday a.m. and p.m. Tuesday a.m.*.....Registration
March 27, *Tuesday, 1:00 p.m.*.....Classes begin
April 9, *Monday*.....Latest day for registering or adding courses
April 23, *Monday* .....End of fourth week (reports of unsatisfactory progress)
May 7, *Monday*.....Latest day to drop a course
May 12, *Saturday*.....Latest day to withdraw from college without responsibility for grades
May 26, *Saturday* .....Close of work for graduating students; grades due
May 30, *Wednesday*.....Memorial Day—holiday
June 2, *Saturday*.....Classes end
June 3, *Sunday*.....Baccalaureate Service
June 4, *Monday*.....Commencement
June 4-9, *Monday-Saturday*.....Final examinations
June 9, *Saturday*.....End of spring term

Summer Session 1962

June 18, *Monday*.....Registration
June 19, *Tuesday*.....Classes begin
July 4, *Wednesday*.....Independence Day—holiday
August 9-10, *Thursday-Friday*.....Final examinations
August 10, *Friday*.....End of summer session

Fall Term 1962

September 16, *Sunday, 7 p.m.*.....Opening of New Student Week
September 24, *Monday*.....Classes begin

February 1962

S	M	T	W	T	F	S
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11	12	13	14	15	16	17
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March 1962

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11	12	13	14	15	16	17
18	19	20	21	22	23	24
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April 1962

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May 1962

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13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	....	....

June 1962

S	M	T	W	T	F	S
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10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

July 1962

S	M	T	W	T	F	S
1	2	3	4	5	6	7
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15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	....	....	....	....

August 1962

S	M	T	W	T	F	S
....	....	....	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	....

September 1962

S	M	T	W	T	F	S
....	....	....	....	....	....	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	....	....	....	....	....	....

Oregon State System of Higher Education

THE Oregon State System of Higher Education, as organized in 1932 by the State Board of Higher Education following a survey of higher education in Oregon by the U. S. Office of Education, includes all the state-supported institutions of higher education. The several institutions are elements of an articulated system, parts of an integrated whole. The educational program is so organized as to distribute as widely as possible throughout the State the opportunities for general education and to center on a particular campus specialized, technical, and professional curricula closely related to one another.

The institutions of the State System of Higher Education are Oregon State University at Corvallis, University of Oregon at Eugene, Portland State College at Portland, Oregon College of Education at Monmouth, Southern Oregon College at Ashland, Eastern Oregon College at La Grande, and Oregon Technical Institute at Klamath Falls. University of Oregon Medical School and University of Oregon Dental School are located in Portland. General Extension Division, representing all the institutions, has headquarters in Portland and offices in Ashland, Corvallis, Eugene, La Grande, Monmouth, and Salem.

At Oregon College of Education, Southern Oregon College, and Eastern Oregon College, students may complete major work in teacher education or general studies or enroll in a preprofessional program.

Portland State College offers major work in general studies and selected liberal arts and professional fields as well as certain preprofessional programs.

At University of Oregon and Oregon State University, major curricula, both liberal and professional, are grouped on either campus in accordance with the distinctive functions of the respective institutions in the unified State System of Higher Education.

Terminal courses in technical and semi-professional areas are offered at Oregon Technical Institute.

An interstitutional booklet, *Your Education,* which outlines the curricula of the several institutions and contains other information is available from the Division of Information, Board of Higher Education, P. O. Box 5175, Eugene, Oregon.

Six summer sessions are offered by the institutions of the Oregon State System of Higher Education. For a brochure describing the sessions, write P.O. Box 1491, Portland 1, Oregon.

State Board of Higher Education*

	Term Expires
A. S. GRANT, Baker	1962
CHERYL S. MACNAUGHTON, Portland	1963
J. W. FORRESTER, JR., Pendleton	1963
ALLAN HART, Portland	1964
DOUGLAS MCKEAN, Beaverton	1964
WILLIAM E. WALSH, Coos Bay	1965
RALPH E. PURVINE, Salem	1965
HENRY F. CABELL, Portland	1966
CHARLES R. HOLLOWAY, JR., Portland	1967

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WILLIAM E. WALSH.....Vice President

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JOHN R. RICHARDS, Ph.D., Chancellor

EARL M. PALLETT, Ph.D., Secretary of Board

Office of the State Board of Higher Education
Post Office Box 5175
Eugene, Oregon

* Board members are appointed to six-year terms by the Governor of Oregon with confirmation by the State Senate.

Oregon State System of Higher Education

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assigned to the State Board of Higher Education

EARL M. PALLETT, Ph.D. ..... Chairman
High School-College Relations Committee

FRANCIS B. NICKERSON, D.Ed. ..... Executive Secretary
High School-College Relations Committee

Former Chancellors
Oregon State System of Higher Education

WILLIAM J. KERR, D.Sc., LL.D. 1932-1935

FREDERICK M. HUNTER, Ed.D., LL.D. 1935-1946

PAUL C. PACKER, Ph.D., LL.D. 1946-1950

CHARLES D. BYRNE, Ed.D. 1950-1955

Oregon State University

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DAN WILLIAMS POLING, D.Ed.....Dean of Men
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CHARLES OWENS WILSON, Ph.D.....Dean of Pharmacy
FRANKLIN ROYALTON ZERAN, Ph.D.....Dean of Education
Director of Sumer Session

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THOMAS FRANCIS ADAMS, B.S.....Director of Dormitories
EDWARD CHRISTOPHER ALLWORTH, B.S., LL.D.....Manager, Memorial Union
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IRWIN CECIL HARRIS, M.S.J.....Manager of Educational Activities
ROBERT PAUL KNOLL, B.S.....Director of Alumni Relations
CHARLES ERNST KREMER, M.D. .....Director of Health Service
GEORGE YOULLE MARTIN, B.S.....Director of Printing

Charter of Oregon State University

FEDERAL LAND-GRANT ACT (FIRST MORRILL ACT), JULY 2, 1862

. . . Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That there be granted to the several States, for the purposes herinafter mentioned, an amount of public land, to be apportioned to each State . . . And be it further enacted, That all moneys derived from the sale of lands aforesaid, by the States . . . shall constitute a perpetual fund . . . the interest of which shall be inviolably appropriated by each State . . . to the endowment, support and maintenance of at least one college, where the leading object 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. . . . No State shall be entitled to the benefit of this act unless it shall express its acceptance within two years. . . .

MORRILL ACT PROVISIONS IRREVOCABLY ACCEPTED BY OREGON LEGISLATURE, OCTOBER 9, 1862

. . . each and all of the propositions in said act of Congress offered to the State of Oregon are hereby irrevocably adopted, with all the conditions and obligations therein contained. . . .

CORVALLIS COLLEGE INCORPORATED AUGUST 22, 1868

The name . . . Corvallis College . . . is not limited in duration . . . The object of this incorporation is to . . . endow, build up, and maintain an institution for educational purposes and to confer all such honors, distinctions, and degrees usual in colleges . . . provided such college shall be strictly a literary institution.

CORVALLIS COLLEGE (OREGON STATE UNIVERSITY) DESIGNATED THE LAND-GRANT INSTITUTION OF OREGON, OCTOBER 27, 1868

J. F. Miller, J. H. Douthit and Joseph C. Avery are hereby constituted a board of commissioners . . . To locate all the lands to which the state is entitled by act of congress for the purpose of establishing an agricultural college . . . Until other provision can be made, the Corvallis college is hereby designated and adopted as the agricultural college, in which all students sent under the provisions of this title shall be instructed in all the arts, sciences, and other studies, in accordance with the requirements of the acts of congress making such donation . . .

OCTOBER 27, 1868 ACTION MADE PERMANENT, OCTOBER 1870

Corvallis College, in Benton County, is herby designated and permanently adopted as the Agricultural College of the State of Oregon, in which all students sent under the provisions of law shall be instructed in accordance with the requirements of the Act of Congress. . . .

DESIGNATED OREGON STATE UNIVERSITY, MARCH 6, 1961

ORS 352.230 is amended to read: Any reference to Oregon State College in the laws of Oregon is intended to be and shall be deemed to be a reference to Oregon State University.

Organization and Facilities

History

THE CORVALLIS COMMUNITY started an academy, incorporated as Corvallis College, in 1858. College-level study began about the time the Reverend W. A. Finley became president in 1865. By 1870, two men and one woman had fulfilled requirements for the baccalaureate degree and became the first graduates.

Oregon had made an earlier attempt—before statehood—to establish a public university. In 1851 the legislature of Oregon Territory, comprising the vast area from California to Canada and from the Rocky Mountains to the Pacific Ocean, designated Corvallis (then called Marysville) as the site of the territorial university. Building materials were assembled on the selected site (where Extension Hall now stands), but before construction began the legislature of 1855 changed the location of the university to Jacksonville and ordered the building materials sold.

Oregon as a state began its support of higher education on October 27, 1868, when it designated Corvallis College "the agricultural college of the State of Oregon" and began making appropriations to maintain the institution. In taking this action the legislature accepted the provisions of the First Morrill Act, which President Lincoln had signed on July 2, 1862. This Act provided grants of land to be used by the states for the sole purpose of endowing, supporting, and maintaining publicly controlled colleges. The Congress defined the purpose of the land-grant institutions in these words: "The leading object 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 order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life." The Oregon legislature directed that "all students sent under the provisions of this Act shall be instructed in all the arts, sciences, and other studies in accordance with the Act of Congress."

Another event makes the year 1868 especially significant. In August of that year Corvallis College was again incorporated, this time on a basis "not limited in duration but perpetual." This institution, maintained by the Methodist Episcopal Church, South, was partly state supported from 1868 to 1885, when the State assumed complete control.

Subsequent Federal legislation—notably the Hatch Act of 1887, the Second Morrill Act of 1890, and the Smith-Lever Act of 1914—provided further for the teaching function of the institutions and also for programs of research and extension.

Corvallis College originally occupied a site at Fifth and Madison Streets. A 35-acre farm, part of the present campus, was purchased in 1870. The College moved to the present campus, occupying Benton Hall, a gift of the citizens of Benton County, in 1889.

The curriculum of Corvallis College, typical of the liberal arts colleges of the period, provided a classical course leading to the bachelor of arts degree and a scientific course leading to the bachelor of science degree. The curriculum began to expand under the impetus of the land-grant act. Agriculture, largely conducted in the Department of Chemistry, was added in 1869. Four professor-

ships (commerce, 1880, agriculture, 1883, household economy, 1889, and engineering, 1889) grew into departments and resulted in the establishment in 1908 of four professional schools: Agriculture, Commerce, Engineering, and Home Economics. Schools added later included Forestry, 1913; Mines, 1913; Pharmacy, 1917; Education, 1918; Basic Arts and Sciences, 1922; and Health and Physical Education, 1931. The first Summer School was held in 1918. Extension work had its beginnings in 1889 when farmers' institutes were held at four places in the State.

In organizing the State System of Higher Education in 1932 the State Board of Higher Education established freshman and sophomore work in liberal arts and sciences on a parallel basis at Oregon State College and the University of Oregon. Beyond the lower division years and in professional fields, the two institutions were differentiated. At Corvallis the School of Science was established offering undergraduate and graduate work in the biological and physical sciences and mathematics. Other departments of the School of Basic Arts and Sciences were incorporated into the Lower Division. The School of Health and Physical Education became the Division of Physical Education. Mining courses were incorporated into the School of Engineering. The School of Commerce was discontinued. The School of Business and Technology was established (first as a "Division") in 1943, the School of Humanities and Social Sciences in 1959.

The first advanced degree (AM) was awarded in 1876. The first Ph.D. degrees were conferred in 1935. A committee on advanced degrees appointed in 1910 was the precursor of the Graduate School.

General research is centered in the Graduate School. Other research divisions have been established as follows: Agricultural Experiment Station, 1888; Engineering Experiment Station, 1927; Science Research Institute, 1952; Forest Experiment Station, 1954 (consolidated with Agricultural Experiment Station, 1957). The Oregon Forest Products Laboratory, established in 1954 and expanded into the Oregon Forest Research Center in 1957, is adjacent to the campus.

Presidents of the institution since its founding are: W. A. Finley, 1865-72; B. L. Arnold, 1872-92; John M. Bloss, 1892-96; H. B. Miller, 1896-97; Thomas M. Gatch, 1897-1907; William Jasper Kerr, 1907-32; George Wilcox Peavy, 1934-40; Frank Llewellyn Ballard, 1940-41; Francois Archibald Gilfillan (acting), 1941-42; August Leroy Strand, from 1942.

By an act of the Oregon legislature signed by Governor Mark Hatfield on March 6, 1961, the name of Oregon State College was changed to Oregon State University.

Accreditation

Oregon State University is accredited by the Northwest Association of Secondary and Higher Schools. The departments of Chemistry and Chemical Engineering are approved by the American Chemical Society. The School of Business and Technology received full accreditation by the American Association of Collegiate Schools of Business in 1960. Also in 1960, the School of Education was granted full accreditation of its program for preparation of elementary teachers, secondary teachers, and school service personnel (guidance counselors) with a doctor's degree as the highest degree approved. Six curricula in the School of Engineering are approved by the Engineers' Council for Professional Development. The School of Forestry is one of the 27 schools accredited by the Society of American Foresters. The School of Pharmacy has

been accredited since 1929 and is rated as a class A school by the American Council on Pharmaceutical Education.

Income

The State law creating the Board of Higher Education specified that this body was to "control the use, distribution, and disbursement of all funds, appropriations and taxes, now or hereafter in possession, levied and collected, received or appropriated for the use, benefit, support and maintenance of institutions of higher education." By virtue of this act, and beginning July 1, 1931, the board has administered all funds for State-supported higher educational activities, including Oregon State University, on the basis of a unified budget.

Funds for the support of higher education in Oregon are derived primarily from the following sources: State appropriations for the operations of the institutions; specified sums from the National Government assigned for definite purposes by Congressional acts; income from student tuition and fees; and other sources such as gifts, grants, sales, service charges, etc.

Forest and Farm Lands

For research and instruction in agriculture, the State owns and leases lands including the main campus and adjoining areas consisting of approximately 4,000 acres. The Agricultural Experiment Station, including the thirteen branch stations utilizes approximately 24,000 acres, much of which is owned by the counties or the Federal Government.

The School of Forestry owns and administers a total of about 14,300 acres of forest land included in Peavy Arboretum, McDonald Forest, and the Adair, Blodgett, and Spaulding tracts. Peavy Arboretum and McDonald Forest are located seven miles north of the campus and provide easily accessible areas for instruction and research. Laboratory classes in many forest management and forest engineering courses are held on these adjacent forest lands. Research studies are also in progress on these areas.

Library

The William Jasper Kerr Library contains 390,000 volumes housed in a central stack unit, the Main Reference Room, and four divisional Reading Rooms. Books in the pure and applied sciences, numbering 69,000 volumes, are easily available in an attractive open-shelf arrangement in the Science Room. The Engineering and Applied Technology collection of 41,000 volumes and the Agriculture collection of 50,000 volumes are similarly arranged on open shelves in a separate reading room. The Beaver Book Room, also in an open-shelf arrangement, houses all the books in the various literatures, as well as a representative browsing collection. Books in which required readings are assigned are housed in the Reserve Reading Room. The reading rooms seat 650 persons.

In the Mary J. L. McDonald Room the Library has a collection of fine and rare editions, numbering 3,138 volumes. This collection and the attractively decorated and furnished room which houses it came to the Library as a gift from Mrs. McDonald.

Collections. The books in the Library, and the 16,000 or more volumes added annually, are closely coordinated with teaching and research. The col-

lections are therefore primarily technical and scientific, but sufficient books in the humanities and the social sciences are owned to give the Library a good cultural and literary balance. Subjects in which special strength has been developed are textiles, costume design, nutrition, mathematics, and the history of horticulture. Collections of some distinction are also being built up in biology, food technology, chemistry, plant pathology, mycology, and entomology. Over 3,300 periodicals are received currently and a large portion of the Library's holdings are consequently bound journal volumes.

The Library is a designated depository for publications of the United States Government, Carnegie Institute of Washington, U. S. Atomic Energy Commission, Atomic Energy Research Establishment of Great Britain, Rand Corporation of Santa Monica, California, and official publications of the State of Oregon. It is also a depository for U. S. Army maps and has a total map collection of over 54,600 items. The picture collection includes 71,000 pieces. Newspapers received currently, some of which are on microfilm, total 122.

All books, numbering 1,346,000 volumes, in the libraries of the several state institutions of higher education are available, through unified administration, to the students and faculty of Oregon State. In addition, chiefly through the facilities of the Pacific Northwest Bibliographic Center, books are borrowed from and lent to other libraries in the Pacific Northwest and throughout the nation.

Books may be taken for home use by anyone connected with Oregon State and by others on permission. Students may keep books for two weeks, with privilege of renewal. Faculty members may borrow for more extended periods. Graduate students and seniors are admitted to the stacks.

Unified Facilities. Library facilities of the State institutions of higher education in Oregon are coordinated through a Director of Libraries. The director is also librarian of Oregon State University at Corvallis, where central offices of the library system are located.

The collections at the several institutions are developed to meet special needs on each campus; but the book stock of the libraries, as property of the State, circulates freely to permit the fullest use of all books. A combined author list of all books and periodicals in the State System is maintained in the central office to facilitate a better distribution of the book stock and to eliminate unnecessary duplication of material.

Museums and Collections

Special exhibits and loan collections are displayed frequently in the Memorial Union, Kidder Hall, Kerr Library, Home Economics Building, and Horner Museum. Permanent museums and collections include the following:

The Horner Museum of the Oregon County (LULA MARY STEPHENSON, curator) contains valuable collections of historic, scientific, and artistic interest. Located on the ground floor of the Coliseum, the displays include, for example, the famous Hank Monk stagecoach and many weapons and tools of pioneer Oregon, displays of antique glass and china, objects of art from foreign countries, Indian artifacts, mineral collections, mounted birds and animals, a replica of the U. S. Capitol, and many other types of exhibits, approximately 13,000 articles in all. Visitors to the Museum exceed 40,000 each year.

The William Henry Price Memorial Collection of Paintings includes 53 paintings, chiefly western landscapes and marines, by the late William Henry Price. All but two of these distinctive paintings are on permanent display within the Memorial Union.

The Entomological Collection (FRANK F. HASBROUCK, curator) contains approximately 275,000 specimens of insects, about 75% of them from Oregon, and most of them on pins. The collections includes 4,100 microscope slides and life histories of many economically important insects in 480 glass-topped Riker mounts. The collection is housed in Cordley Hall.

The Geological Collection, housed in Education Hall, includes minerals, ores, rocks, invertebrate fossils, some vertebrate fossils, and a large number of fossil plants. More than 2,400 mineral specimens are arranged according to Dana classification, and ore samples are arranged according to the Lindgren classification of ores. A paleontological collection in the Paleontology Laboratory supplements the other collections.

The Herbarium (KENTON CHAMBERS, curator) housed on the fourth floor of Cordley Hall, contains about 152,000 named specimens of seed plants, ferns, mosses, and fungi. Among the special items contributing to the usefulness of the herbarium are a seed collection of 2,800 numbers, and 250 photographs of types of Northwest vascular plants.

The Natural History Collection (ROBERT M. STORM, in charge) includes nearly 34,000 specimens of terrestrial vertebrates and nearly 800 mounts of birds and mammals. Housed in the Natural History Building, the collection includes the Braly Ornithological Collection, the Currier Bird Egg and Nest Collection, the Alex Walker Waterfowl Collection, the Oregon State Game Commission Collection, and the Grace McCormac French collection of ornithological notes and literature.

Official Publications

Through its Office of Publications, Oregon State University publishes:

OREGON STATE UNIVERSITY BULLETIN (Catalogs, Newsletters, and other announcements—seven issues a year)

MONOGRAPHS, including studies in bacteriology, botany, economics, education and guidance, entomology, geology, history, literature and languages, mathematics and statistics, political science, and zoology, and MONOGRAPH REPRINTS

BIOLOGY COLLOQUIUM PROCEEDINGS (annually)

IMPROVING COLLEGE AND UNIVERSITY TEACHING (quarterly)

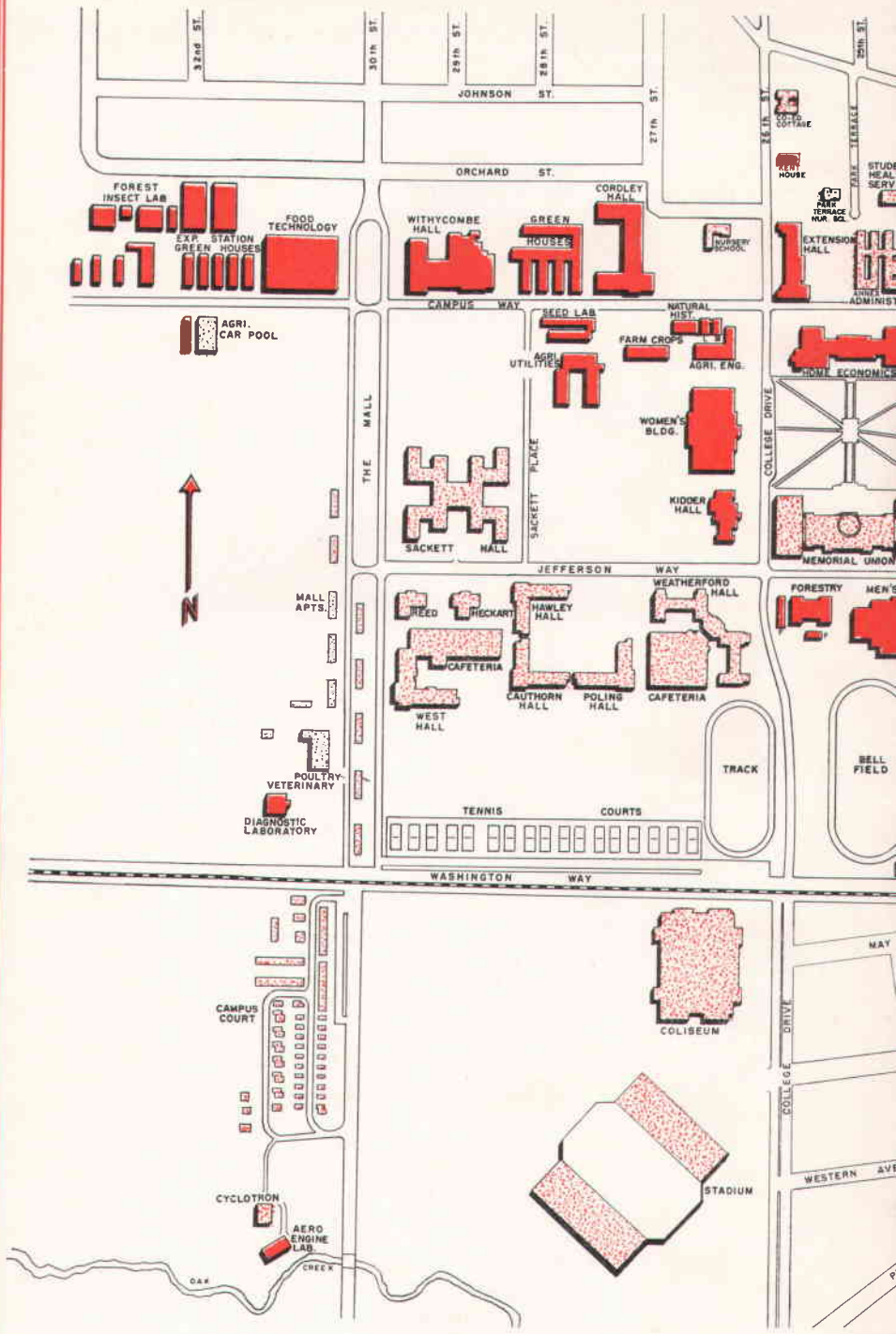
BULLETINS and CIRCULARS of the Engineering Experiment Station.

BULLETINS, TECHNICAL BULLETINS, and CIRCULARS of the Agricultural Experiment Station.

OREGON'S AGRICULTURAL PROGRESS (quarterly)

BULLETINS, CIRCULARS, OUTLOOK CIRCULARS, and 4-H Club Publications of the Federal Cooperative Extension Service.

CIRCULARS and other publications of the School of Forestry.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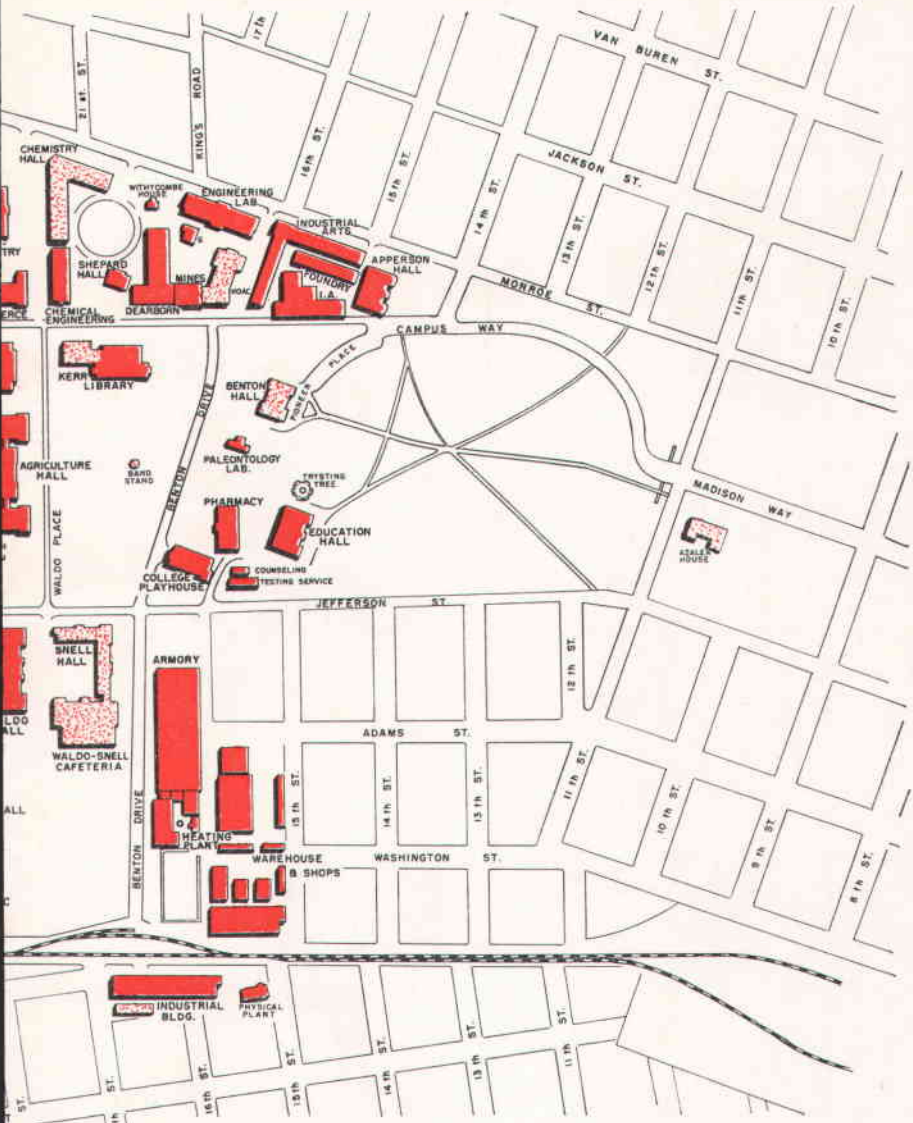
30th ST.
29th ST.
28th ST.
JOHNSON ST.
27th ST.
ORCHARD ST.
25th ST.
PARK TERRACE
FOREST INSECT LAB
EXP. STATION GREEN HOUSES
FOOD TECHNOLOGY
WITHYCOMBE HALL
GREEN HOUSES
CORDLEY HALL
NURSERY SCHOOL
CAMPUS WAY
AGRI. CAR POOL
THE MALL
SEED LAB
AGRI UTILITIES
NATURAL HIST.
FARM CROPS
AGRI. ENG.
WOMEN'S BLDG.
KIDDER HALL
SACKETT PLACE
SACKETT HALL
COLLEGE DRIVE
HOME ECONOMICS
EXTENSION HALL
MEMORIAL UNION
JEFFERSON WAY
MALL APTS.
REED
HECKART
HAWLEY HALL
WEATHERFORD HALL
CAFETERIA
WEST HALL
CAUTHORN HALL
POLING HALL
CAFETERIA
FORESTRY
TRACK
BELL FIELD
POULTRY-VETERINARY
DIAGNOSTIC LABORATORY
TENNIS COURTS
WASHINGTON WAY
CAMPUS COURT
COLISEUM
COLLEGE DRIVE
STADIUM
CYCLOTRON
AERO ENGINE LAB
OAK CREEK
WESTERN AVE



Campus Map

Oregon State University

Corvallis, Oregon

Built with State appropriations $12,980,000 (cost)

Built with other than State funds $12,986,000 (cost)

Campus

See map on pages 16-17

Corvallis (population 21,253), is situated in the heart of the Willamette Valley between the Cascade Mountains and the Coast Range, 80 miles south of Portland and 60 miles from the Pacific Ocean. The climate is equable, the average annual temperature being about 52° F. Rainfall, occurring mostly during the winter months, averages about 39 inches annually.

Development of the campus during the past forty years has been in accordance with a plan prepared by consulting landscape architects of national recognition (John C. Olmsted in 1908, A.D. Taylor in 1925 and 1945). Buildings are arranged first as colleges or schools, and further are grouped in quadrangles, so planned that expansion can take place without injury to established buildings and campus areas. Each quadrangle is planted with ornamental trees and shrubs, which serve as living laboratory material for students engaged in landscape and horticultural studies.

The area from 9th Street to 14th Street, known as the East Campus, provides a recreation park and outdoor laboratory. Directly west are the East Quadrangle and Engineering Quadrangle, the West Quadrangle, the Men's and Women's Quadrangles, and the Mall (30th Street), with farms beyond. The area within the prescribed boundaries of the campus now amounts to 397.5 acres.

Present buildings, with dates of original erection and later additions or remodeling are given below. For temporary buildings the dates indicate either date of erection or date acquired by Oregon State.

Administration (1947)
Administration Annex (1948)
Aero Engine Laboratory (1953)
Agricultural Car Pool (1954)
Agricultural Engineering (1912, 1939)
Agricultural Utilities (1909)
Agriculture Hall (1909, 1913)
Apperson Hall (1898, 1920, 1950)
Armory (1910, 1911)
Azalea House (1953)
Benton Hall (1889)
Cafeteria (1957)
Cauthorn Hall (1957)
Chemical Engineering Building (1955)
Chemistry Hall (1939)
Coliseum (1950)
College Playhouse (1899, 1950)
Commerce Hall (1922, 1958)
Cordley Hall (1957)
Covell Hall (1928, 1960)
Cyclotron (1952)
Dearborn Hall (1949)
Dormitory Service Building (1961)
Education Hall (1902, 1940)
Engineering Laboratory (1920)
Engineering Service (1947)
Extension Hall (1921, 1951)
Farms Crops (1919, 1924, 1951)
Food Technology (1951)
Forestry (1917)
Foundry (1899)
Greenhouse (1928, 1951, 1954, 1957)
Hawley Hall (1959)
Heating plant (1923, 1949, 1953, 1960)
Heckart Lodge (1954)
Home Economics (1914, 1920, 1952)
Industrial Arts (1908, 1949)
Industrial Research (1947, 1958)
Kent House (1924)
Kerr Library (1918, 1941)
Kidder Hall (1892, 1936)
Memorial Union (1928, 1960)
Men's Gymnasium (1915, 1921, 1953)
Mines (1913)
Natural History (1948)
Navy ROTC Armory (1946, 1954, 1959)
Orchard Street Nursery School (1939)
Paleontology Laboratory (1899)
Park Terrace Nursery School (1918)
Pharmacy (1924)
Physical Plant Warehouse (1948, 1952)
Physics-Chemistry (1959, 1961)
Poling Hall (1957)
Poultry-Veterinary (1927)
Reed Lodge (1954)
Sackett Hall (1954)
Shepard Hall (1908)
Snell Hall (1959)
Social Science Hall (1912, 1951)
Stadium (1953)
Student Health Service (1936, 1961)
Veterinary Diagnostic Laboratory (1952)
Waldo Hall (1907, 1959)
Waldo-Snell Dining Hall (1959)
Weatherford Hall (1928)
West Hall (1960)
West Dining Hall (1960)
Withycombe Hall (1952)
Withycombe House (1918)
Women's Building (1926)

Procedures and Requirements

ACADEMIC PROCEDURES and requirements affect all students. Most of the requirements are printed in the Schedule of Classes, a copy of which is available to each student at the Registrar's Office. Students should familiarize themselves early with these printed academic standards and registration routines.

Admission Procedure

Applications for admission and questions regarding admission should be addressed to:

OFFICE OF ADMISSIONS
Administration Building
Oregon State University
Corvallis, Oregon

Application blanks are available at all Oregon high schools or from the Office of Admissions. In requesting an application, the applicant should state briefly the amount of high school and college training he has had and the general field of academic work he wishes to pursue. Records of courses taken and grades received on all previous academic work should be submitted in duplicate; one copy for the official file, and one for the adviser. Applications, along with all academic records, should reach the Office of Admissions directly from the college Registrar or the high school Principal at least a month before the applicant expects to register. A $10 fee is charged for fall term applications filed after August 31.

Admission Requirements

Oregon State accepts students of good moral character who provide evidence of suitable preparation for work at the college level.

Admission to Freshman Standing. Requirements for Oregon and out-of-state students are basically the same but do differ in certain detail.

A. **Oregon residents** being admitted as freshmen:
   1. Must have completed the following uniform entrance requirements approved by the institutions of higher education in Oregon.
      Graduation from a standard high school with required units including 3 in English, 2 in social science, 1 in mathematics, and 1 in the natural sciences.
   2. Must have achieved one of the following:
      (a) A "C" average or above in all high school subjects taken toward graduation, or
      (b) A score of 880 or higher on the Scholastic Aptitude Test of the College Entrance Examination Board.*

* Information concerning scheduled examination dates and examination centers may be obtained from the College Entrance Examination Board. P.O. Box 27896 Los Angeles 27, California, or P.O. Box 592. Princeton, New Jersey. Official scores are submitted by Educational Testing Service upon student request.

(c) A minimum grade-point average of 2.00 ("C") on 12 term hours of college-level course work, or on 9 term hours in a prescribed program in a regular collegiate summer session, including a course in English composition and two or more courses from the fields of literature, social science, or science.

B. **Out-of-State** residents graduated from high school and registering as freshmen:
   1. Must have completed the distribution of subject matter required for Oregon residents.
   2. Must have achieved a 2.50 (B–) grade-point average or above in all high school subjects taken toward graduation, or may qualify (a) by test (see 3 below) or (b) by achievement of a minimum grade-point average of 2.00 (C) on 12 term hours of college-level course work.
   3. Must present certified results of the College Entrance Examination Board's Scholastic Aptitude Test. If entrance is based upon this test, the applicant must present a combined score of 887 or higher.

C. **Early Honors Admission Application.** A high school senior applying for admission as a freshman may submit his application at any time during his senior year. All applications received will be evaluated and a Certificate of Admission will be granted an applicant who has earned a B or better average, since the college assumes that final graduation grades will be consistent with the record at the date of application. Applicants with less than a B average will be granted tentative admission or advised of further steps necessary for eligibility.

D. **College Board Examinations.** Oregon State is a member of the College Entrance Examination Board and requires the Scholastic Aptitude test scores for every out-of-state applicant. All Oregon residents who take the College Board tests also are required to have their scores submitted to the Office of Admissions. For further information about College Board scores see PLACEMENT EXAMINATIONS.

E. **Advanced Placement Program.** Entering freshmen who have satisfactory grades in examinations administered by the Advanced Placement Program of the College Entrance Examination Board may be granted advanced placement of credit toward the bachelor's degree. Any student on campus may petition for waiver of a course by examination. Under certain conditions he may petition for college credit by examination. If the examination is passed satisfactorily, college credit or waiver of the course is granted.

F. **Honors Sections.** Honors work is provided by the departments of English, Chemistry, Physics, Mathematics, and certain biological sciences for all qualified and interested students, including entering freshmen. Seminars, research projects, honors papers, independent study and special honors courses are among the challenging opportunities offered through honors sections.

Admission of Transfer Students. Transfers from other colleges, regardless of residence, are required to present a 2.00 ("C") grade-point average and evidence of eligibility to return to colleges previously attended. A student transferring fewer than 12 term hours must satisfy the entrance requirements for both transfers and entering freshmen.

The Admissions Office evaluates records to determine eligibility for entrance. The schools and departments evaluate transferred records in terms

of specific degree requirements. Upon arrival on campus, each transfer student is assigned an adviser with whom he plans his course. See Placement Examinations for further information about required tests.

Transfer students are required to file complete official records of all school work beyond the eighth grade. College records must be certified by the Registrar of the institution where the work was undertaken. If the high school record is adequately shown on his college transcripts, he need not obtain another record direct from his high school. Records must be filed in duplicate.

Admission with Graduate Standing. A student applying for entrance to the Graduate School must present to the Office of Admissions official transcripts of all undergraduate and graduate academic work. The application, Form A, must be submitted in duplicate. Eligibility for admission to graduate study is dependent upon: (a) achievement of a 4-year bachelor's degree from an accredited institution, (b) achievement of a minimum 2.50 grade-point average on all work taken, and (c) suitable preparation for the intended field of study.

Admission of Foreign Students. A foreign student is admitted according to standards established for each country by the Admissions Committee. Basically such a student must (1) be qualified to enter his own university and (2) must have achieved a superior scholastic record on the basis of his own grading system. A student with a 3-year or "pass" degree, or with a diploma, certificate, or title not accepted as equivalent to a bachelor's degree, may not enter Graduate School but may apply for admission as an undergraduate.

All records in a foreign language must include the originals accompanied by a certified English translation. A complete description of all schooling from primary or elementary school to present level of training is needed to permit better understanding of academic preparation. Certified English proficiency is required of each foreign student.

Admission to Summer Session. The only requirement for admission to the Summer Session is ability to do the work. Those persons who expect to attend regular sessions or who desire to receive credit toward a degree at Oregon State must, however, satisfy regular admission requirements.

Admission as a special student. The Admissions Committee may admit to the college as a special student:

(1) A person who is unable to satisfy requirements for regular admission but who submits evidence which clearly establishes his qualifications to do satisfactory work in the curriculum in which he wishes to enroll.
(2) A person qualified for admission but who does not desire to work toward a degree at Oregon State.
(3) A high school senior with a B or better grade-point average who is recommended by his principal.

Credit earned by a special student will be recorded in the standard manner but a special student will need to qualify according to academic regulation 18 (see Schedule of Classes) as a regular student and must satisfy regular admissions procedures and regulations if he wishes to earn a degree at Oregon State.

Admission from Unaccredited Institutions. Admission from an unaccredited institution is determined by the appropriate Admissions Committee. Students admitted from nonaccredited colleges are on probation until they have achieved a satisfactory record at Oregon State. Upon completion of 45

term hours of satisfactory work, undergraduate transfers from nonaccredited colleges may petition for acceptance of credit desired for transfer. A total of 15 term hours of satisfactory work is required of graduate students prior to petition for recognition of credit. Validation examinations may be required.

Credit for Military Experience. Veterans may receive some credit for military experience but not for service schooling or tests. Application should be made to the Registrar during the first term of attendance at Oregon State University.

Placement Examinations

High school seniors planning to enter Oregon State should take the Scholastic Aptitude Test and the English Composition and Intermediate Mathematics Achievement Tests of the College Entrance Examination Board. See footnote on page 19.

These three tests, together with the high school record, provide the academic adviser with valuable information about the student's educational development, abilities, and aptitudes.

Use of the College Boards for placement examination purposes allows the student to be examined under more normal and familiar circumstances than possible during the opening of a college year. Completion of such tests in the spring will permit more individualized course planning prior to the opening of school. Entering freshmen who have not completed the tests in advance may take them on campus at the opening of the term.

Transfer students also present results of the Scholastic Aptitude Test. In addition the English Composition and Intermediate Mathematics Achievement Tests are required unless advanced standing credit has been granted for college-level work in these fields. The achievement tests and the aptitude test are offered through the College Entrance Examination Board. See footnote on page 19. Delays in registration can be avoided if placement examinations have been completed during regularly scheduled examination dates.

The **aptitude test** gives an indication of ability to do college work. Since the results are used in planning the student's educational and vocational programs, it is required of all undergraduate students.

The **English examination** covers the fundamental principles of grammar, and it tests the student's ability to apply these principles in writing. Students who make the best scores in this examination are enrolled in honors sections (Wr 111-H, 112-H, and 113-H). Students who reveal the need for more training are expected to take two hours of instruction in addition to the regular Wr 111 course. No credit or grades are given for this extra work. This test is required unless a student's Advanced Standing Report shows college credit for English composition.

The **mathematics examination** covers the fundamentals of elementary algebra. Students whose scores are sufficiently high on this test take extra tests in advanced algebra and trigonometry for possible advanced placement. Students whose scores are unsatisfactory on the intermediate algebra test take one in arithmetic. Results of these tests normally take precedence in course placement over units or credits earned. This test is required of all entering students except those whose Advanced Standing Report shows college credit for trigonometry, analytical geometry, or calculus.

Other placement examinations may be required in certain majors. Engineering students whose placement test scores indicate a deficiency in mathematics will be classified as "preengineering" and registered in mathematics courses compatible with the test results. Forestry students may receive similar special consideration.

The medical examination required of all students entering Oregon State University for the first time includes tuberculin test, vaccination against smallpox, and other tests. It provides a scientific basis for adjustment of the students's physical education to his individual needs. It also provides a safeguard both to the student and to the institution. For the student, it may result in the discovery and correction of defects which, if allowed to continue, might seriously impair his health; for the institution it may result in the prevention of epidemics which might develop from undiagnosed cases of contagious disease.

New Student Week

A program of orientation required for entering undergraduate students is held annually the first week of fall term. By means of general assemblies, group lectures and discussions, individual conferences, and examinations and tests, an effort is made to assist every new student in getting the best possible start in his new life. During New Student Week students become acquainted with ideals and traditions, aims of higher education, principles of wise use of time and money, and methods of study. Directions concerning New Student Week and registration are sent four weeks before the term opening to each new student accepted for admission.

Degrees and Certificates

Oregon State University offers curricula leading to junior standing upon completion of two years' work, and to the following baccalaureate and graduate degrees:

Humanities and Social Sciences, *B.A., B.S.*
Science, *B.A., B.S., M.A., M.S., Ph.D.*
Agriculture, *B.S., B. Agr., M. Agr., M.S., Ph.D.*
Business and Technology, *B.A., B.S.*
Education, *B.A., B.S., Ed.B., M.A., M.S., Ed.M., Ed.D.*
Engineering and Industrial Arts, *B.A., B.S., M.A., M.S., A.E., Ch.E., C.E., E.E., I.E., M.E., Min.E., Ph.D.*
Forestry, *B.S., B.F., M.S., M.F., Ph.D.*
Home Economics, *B.A., B.S., M.A., M.S., M.H.Ec., Ph.D.*
Naval Science, *B.A., B.S.*
Pharmacy, *B.A., B.S., M.A., M.S., Ph.D.*
Physical Education (through School of Education), *B.A., B.S., Ed.B.*

Air Science, Military Science and Tactics, or Naval Science may be taken by men as a comajor in any school.

Work leading to the degree of *Master of Arts (General Studies)* is offered under the direction of the Graduate School.

Lower division work leading to certificates (see page 25) is offered in liberal arts and sciences, in the professional and technical fields listed above, and in architecture and allied arts, journalism, and music. Approved preparation is

offered also for the degree curricula in medicine, dentistry, and nursing at University of Oregon Medical School and University of Oregon Dental School in Portland.

Requirements for Bachelor's Degree

To earn the Bachelor of Arts degree (B.A.) or Bachelor of Science degree (B.S.), a student must complete three sets of requirements: (1) general institutional requirements, (2) institutional graduation requirements, and (3) requirements of the department and school. Curricular and departmental requirements are listed elsewhere in this Catalog. Institutional requirements follow:

General Requirements (Institutional)

A student is expected to fulfill the following requirements during his first six terms:

a. English Composition: 9 term hours. (Exclusive of Wr 49.)

b. Physical Education: Five terms in activity courses.

c. General Hygiene: One term.

d. Military Science: Six terms for men.
   (1) A veteran may receive exemption from the military requirement and partial exemption from the physical education requirement by submitting to the Registrar a copy of his separation paper—D214.)
   (2) NROTC students take five terms of Naval Science and one term of Psy 201 or 212.

Graduation Requirements (Institutional)

a. Term Hours: Minimum, 192 [in Engineering and Forestry, 204; in Pharmacy (5-year curriculum), 240]. The minimum must include:
   (1) Hours in upper division courses: Minimum, 45.
   (2) Hours in major: Minimum, 36, including at least 24 in upper division courses.
   (3) Hours after receipt of senior standing: Minimum, 45, including credits reserved.

b. Distribution of hours for baccalaureate degrees:
   (1) Bachelor of Arts: 36 hours in general humanities, English (except Wr 49,111,112,113), philosophy, speech, and foreign languages (including at least 9 hours of review grammar and literature at the second-year or higher level).
   (2) Bachelor of Science: 36 hours in science, or 36 hours in social science, or 45 hours in science and social science together.
   (3) Professional bachelor's degree (Ed.B., B.F., B.Agr.): Fulfillment of all school requirements.

c. Grade-Point Average: Minimum of 2.00 on all of the following:
   (1) All college work.
   (2) All work taken in residence at this institution (exclusive of General Extension Division courses).
   (3) Last 45 hours for which registered.
   (4) In at least two of the terms during which the last 45 hours are completed.

d. Residence: Minimum, 45 term hours (normally the last 45). Classroom work taken through the General Extension Division is considered as resident work. A student qualifying for his degree by study through the General Extension Division must satisfactorily complete a minimum of 12 term hours while registered as a full-time Oregon State student.

e. Dean's certification of fulfillment of all requirements of major school. (For details see school advisers or deans.)

f. Restrictions:
(1) Correspondence study: Maximum, 60 term hours.
(2) Law or Medicine: Maximum, 48 term hours.
(3) Music: Individual and group instruction: Maximum, 12 term hours.

g. Application for degree: To become a candidate for a degree a student must have achieved senior standing and must make formal application for the degree. The student must file his application with the Registrar during the first week of the term preceding the term in which he expects to complete requirements for a degree.

Concurrent Degrees

A student may receive two or more baccalaureate degrees (for example, B.A. or B.S. with same or different majors) at the same or subsequent graduation exercises provided that (1) he meets the requirements of the curricula represented by the degrees; (2) he completes for each additional degree a minimum of 32 term hours more than the 192 term hours or 204 term hours required by the first degree (the additional term hours may be taken concurrently with 192 or 204 term hours); (3) he is registered during last three terms before his graduation at least one term in each appropriate school or department.

Requirements for Certificates

These certificates may be granted on completion of approved programs:

Junior Certificate, granted on application and completion of requirements for junior standing and with dean's approval.

Certificate in Agriculture, granted on application and completion of 2-year curriculum and with approval of dean.

Certificate in Engineering, granted on application and completion of 2-year curriculum and with approval of dean.

Requirements for Advanced Degrees

For advanced degree requirements see GRADUATE SCHOOL section of this Catalog. Students who take courses they wish to apply toward an advanced degree before they have received baccalaureate degrees may have a limited number of credits by petition. See "Reserving Credits" under GRADUATE SCHOOL.

Definitions

Academic Year: three terms of approximately 12 weeks each.

Summer Session: an 8-week session from late June to mid-August.

Course: A subject, or an instructional subdivision of a subject, offered through a single term.

Sequence: closely articulated courses extending through more than one term.

Prerequisite: preparation expected for proper continuation in a course, expressed in specific course or courses, by academic classification, or by stated circumstances.

Curriculum: an organized program of study arranged to provide integrated cultural or professional education.

Term Hour: the unit of credit, representing three hours of the student's time each week for one term. This time may be assigned to work in classroom or laboratory or to outside preparation. The number of meetings per week for any course may be found in the course descriptions in this Catalog or in the separately published *Schedule of Classes.*

Period: a class meeting for discussion, lecture, laboratory, etc., and may be for one or more hours.

The number of class meetings per week for each course in this Catalog is indicated by use of symbols indicating length of periods. ① indicates a 1-hour period, ② a 2-hour period, ③ a 3-hour period, etc. For example: 2 ① 1 ③ indicates *two 1-hour periods and one 3-hour period.*

Grading System

Grades. The grading system consists of four passing grades, *A, B, C, D,* and of others listed below. *A* denotes exceptional work accomplished; *B,* superior; *C,* average; *D,* inferior.

A student who has done acceptable work to the time of the final examination but does not take it will receive an *E.* The *E* may be removed upon presentation to a faculty committee of an acceptable reason for not taking the final examination. An *E* not removed within the first term after the student's return to the institution will be changed to an *F.* For failure in a course, the grade of *F* is given. When the quality of the work is satisfactory, but some minor but essential requirement of the course has not been completed for reasons acceptable to the instructor, a report of *I* may be made and additional time granted. Students may withdraw from a course by filing the proper blanks at the Registrar's Office in accordance with OSU regulations; in such cases a report of *W* is made. A student who discontinues attendance in a course without official withdrawal receives a grade of *F* in the course.

Points. Grade points are computed on the basis of 4 points for each term hour of *A* grade, 3 points for each term hour of *B,* 2 points for each term hour of *C,* 1 point for each term hour of *D,* and 0 points for each term hour of *F.*

Marks of *I*, *W*, and *E*, are disregarded in the computation of points. The grade-point average (GPA) is the quotient of total points divided by total term hours in which *A*, *B*, *C*, *D*, and *F* are received.

Course Numbering System

Throughout the State System of Higher Education, courses follow this basic course numbering system:

0- 49. Non-credit courses or credit courses of a terminal or semiprofessional nature not applicable toward degree requirements.

50- 99. Credit courses applicable toward degree requirements but of a basic, preparatory, subfreshman level, such as the first year of a foreign language or fundamental mathematics courses.

100-299. Courses on the lower division level.

300-499. Courses on the upper division level.
400-499, with designation (G) or (g). Upper division courses which may be taken for graduate credit. Courses which may be taken for graduate *major* credit are designated (G); courses which may be taken for graduate *minor* credit only are designated (g).

500-599. Graduate courses. Seniors of superior scholastic achievement may be admitted on approval of instructor and department head concerned.

600-699. Professional courses which may be applied toward a professional degree but not toward an advanced academic degree.

Reserved Numbers.

100-110, 200-210. Survey or foundation courses, including "group courses," at the freshman and sophomore levels.

400-410, 500-510. Reserved numbers. Certain of the numbers in these blocks have been assigned as repeating numbers to specific courses which may be taken for more than one term under the same number, credit being granted according to the amount of work done. Reserved numbers at Oregon State include the following:

301, 401, 501. Research

303, 403, 503. Thesis.

305, 405, 505. Reading and Conference. (Individual reading reported orally to instructor.)

306, 406, 506. Projects

307, 407, 507. Seminar

308, 408, 508. Workshop

Scholarship Regulations

The faculty Committee on Academic Deficiencies has discretionary authority to suspend or place on probation any student not achieving satisfactory progress toward graduation (a minimum grade-point average of 2.00 or "C" for both the term and cumulative records). Application of this rule results in the following practices:

PROBATION. Any student achieving a grade-point average below 2.00, either for the term or cumulative, will be placed or continued on probation (unless subject to suspension).

SUSPENSION. A student is subject to suspension whenever he is in danger of accumulating a grade deficiency great enough to make his future graduation difficult if not impossible. Most suspensions occur when a student is 12 or more grade points deficient (formula used is hours taken times 2 subtracted from grade points earned). If other factors indicate it is advisable, a student may be suspended with fewer than 12 points deficiency. Also, a student 12 or more points deficient during his most recent course work may be suspended even though he has a cumulative average above 2.00, if other factors so indicate. (This applies to both resident and transfer students of sophomore, junior, or senior standing.)

RELEASE FROM PROBATION. Any student on probation may return to good standing by earning both term and cumulative 2.00. This statement applies to resident plus transfer credit as well as to resident credit alone.

Fees and Deposits

Students at Oregon State, Portland State, and the University of Oregon pay the same tuition, fees, and deposits. The State Board of Higher Education reserves the right to make changes in rates quoted without notice.

Regular Tuition Fees

Undergraduate students pay regular fees each term as follows: tuition, $10; laboratory and course fee, $46; incidental fee, $22; and building fees, $12, a total of $90 per term—$270 a year.

Payment of these fees entitles a student to all services maintained by Oregon State for the benefit of students. These services include: use of the Library; use of laboratory and course equipment and materials; medical attention and advice at the Student Health Service; use of gymnasium equipment, including gymnasium suits and laundry service; a subscription to the student newspaper; admission to athletic events; and admission to concerts and lectures. No reduction in fees is made to students who may not desire to use some of these privileges.

Nonresident Fee

Under the regulations of the Oregon State Board of Higher Education, a minor student whose parents are bona fide residents of Oregon qualifiies for enrollment under the resident fee; a student whose domicile is independent of his father qualifies for enrollment under the resident fee if he presents convincing evidence that he established his domicile in Oregon three months prior to his first registration and that he has not been a student at a collegiate institution during this period.

All other students are required to pay the nonresident fee, with the following exceptions:

a. A student who holds a degree from an accredited college or university. (However, a nonresident student with a bachelor's degree enrolled in a curriculum at the University of Oregon Medical or Dental Schools leading to the degree of Doctor of Medicine or Doctor of Dental Medicine is required to pay the nonresident fee.)

b. A student attending a summer session.

c. A student paying part-time fees.

d. A student who has been a resident of Hawaii or Alaska for the major portion of the two years immediately preceding the term for which exemption is granted in accordance with provisions of Oregon law.

A student who has been classified as a nonresident may be reclassified as a resident:

a. In the case of a minor, if his nonresident parents have moved to Oregon and have established a bona fide residence in the state, or

b. In the case of a student whose domicile is independent of that of his father, if the student presents convincing evidence that he has established his domicile in Oregon and that he has resided in the state for at least twelve consecutive months immediately prior to the term for which reclassification is sought.

A student whose official record shows a domicile outside of Oregon is prima facie a nonresident and the burden is upon the student to prove that he is a resident of Oregon. If his scholastic record shows attendance at a school outside of Oregon, he may be required to furnish further proof of Oregon domicile.

If any applicant has questions concerning the rules governing the administration of these policies, he should consult the Office of Admissions.

Graduate Fees

Graduate students registered for 7 term hours of work or more pay tuition and fees of $90 a term. Graduate students do not pay nonresident fee. Graduate or research assistants or fellows pay $34 per term. Graduate students registered for 6 hours of work or less pay the regular part-time fee. Payment entitles the student to all services maintained by Oregon State for the benefit of students.

Deposits

Persons who enroll for academic credit (except staff members) must make a deposit of $10, payable once each year at the time of first registration. This is required as a protection against loss or damage of institutional property such as laboratory equipment, military uniforms, library books, locker keys, or dormitory equipment. If at any time charges against this deposit become excessive, the student may be called upon to reestablish the original amount.

Refund. The deposit, less any deductions, is refunded about one month after close of academic year. Students who discontinue work before end of year may receive refunds upon petition to the Business Office.

Special Fees

Special fees are paid by students under the conditions indicated:

Part-Time and Auditor's Fees ..... per term hour, $11.00

Undergraduate and graduate students enrolled for 6 term hours or less pay, instead of the regular fees, a part-time fee in accordance with the following scale: 1-2 term hours, $22; 3 term hours, $33; 4 term hours, $44; 5 term hours, $55; 6 term hours, $66. Nonresident fee does not apply. Payment of fee entitles students to all usual services and use of facilities of Oregon State. An auditor, a person who has obtained permission to attend classes without receiving credit, pays the auditor's fee at time of registration. He is entitled to attend classes but has no other institutional privileges. Regularly enrolled students may be granted auditor's privileges without payment of auditor's fee. Maximum for auditors is $90.

Staff Fee ..... per term hour, $3.00

On approval of the President's Office, staff members may register for courses at a $3-per-term-hour rate. Full-time staff are limted to a maximum of 5 hours per term. Academic staff who have appointments with full-time equivalent of .50 or more (but less than full-time) may take up to 10 hours a term at this rate. Payment of fee entitles member to instructional and library privileges only.

Late-Registration Fee ..... per day, $1.00

Students registering after scheduled registration dates of any term pay a late-registration fee of $1 a day. Part-time students pay $1 a week. Auditors are not required to pay late-registration fees.

Return-of-Check Fee ..... per day, $1.00

If institutional charges are met by a check which is returned because of any irregularity for which student is responsible, a fine of $1 per business day will be charged. Maximum penalty: $5.

Change-of-Program Fee $1.00
The student pays this fee for each change in his official program after the scheduled last day for adding courses.

Reinstatement Fee $2.00
If for any reason a student has his registration canceled during a term for failure to comply with the regulations of the institution, but is later allowed to continue his work, he must pay the reinstatement fee.

Special-Examination Fee ..... per term hour, $1.00
A student pays a fee of $1 per term hour for the privilege of taking an examination for advanced credit, or other special examinations.

Registration-in-Absentia Fee ..... per term hour, $11.00
Minimum fee $22.

Transcript Fee ..... $0.50 and $1.00
Charge for first copy at any one time is $1; charge for each additional copy furnished simultaneously is 50 cents.

Late Application Filing Fee $10.00
May be assessed on applications for fall term enrollment received after August 31.

Counseling and Testing Service Fee $5.00

College Board Test and Aptitude Achievement Test Fees ..... $4.00 to $10.00

Graduate Qualifying Examination Fee ..... $1.00 to $15.00

Microfilming Doctoral Thesis $20.00

Placement Fee (See SCHOOL OF EDUCATION). Initial registration . . . no charge
Reregistration ..... per year, $5.00

Applied Music Fees (See MUSIC) ..... per term, $20.00 to $50.00

Horseback Riding Fee ..... per term, $20.00

Fee Refunds. Students who withdraw from college and who have complied with regulations governing withdrawals are entitled to certain refunds of fees paid, depending on time of withdrawal. Refund schedule established by the State Board of Higher Education is on file in the Registrar's Office.

Any claim for refund must be made in writing before the close of the term in which the claim originated. Refunds are calculated from date of application for refund and not from date when the student ceases attending classes, except in unusual cases when formal withdrawal has been delayed through causes largely beyond the control of the student.

Student Interests

A STUDENT attending Oregon State has an opportunity for wholesome growth in congenial, stimulating surroundings. All faculty members participate in some measure in the process of student development. In addition, certain members of the faculty, certain offices, and several committees serve in special ways.

The Dean of Women and the Dean of Men seek to promote high standards of student life and welfare. They help coordinate social and activity programs; they provide housing and employment services. They work closely with student organizations and councils in developing sound student leadership and participation in student self-government. They counsel students on matters of both general and personal welfare. The Foreign Student Counselor has an office in Commerce Hall or may be reached through the office of the Dean of Men.

Each school has a Head Counselor and a number of specially selected Advisers. The Advisers assist students in their courses and programs of study. When asked to do so Advisers and Head Counselors aid in finding solutions to personal problems. Both groups work closely with the Academic Deficiencies Committee to learn causes for poor student accomplishment and to promote policies and procedures for improvement of student scholarship. The Personnel Coordinator assists in developing an efficient student personnel service in each school and in coordinating various advising and counseling agencies.

The Counseling and Testing Center, when requested to do so, conducts personal interviews and various tests to help students determine interests and aptitudes for different vocational fields, ability to do college work, and causes of difficulties they may have in course work. For some of its services the Center charges a nominal fee.

Sometimes a student needs assistance in addition to that provided by regular advisers and counselors. The following agencies offer clinical or advisory services: Student Health Service, Departments of Psychology, Religion, Speech, English (remedial reading), Family Life and Home Administration (marriage and family life problems), and the School of Education (methods of study).

The Committee on Student Life, a student-faculty group, (1) administers those regulations pertaining to students who are referred to it by the OSU administration and (2) acts as a subcommittee of the Student Senate concerned with setting standards and policies in regard to activities of living groups, classes, clubs, societies, and certain student functions. The Committee on Student Housing assists in making adjustments relative to housing and boarding. The Committee on Religious Activities coordinates campus religious agencies and serves as the connecting link between campus and churches. The Committee on Educational Activities promotes and supervises student activities.

As a student nears the end of his curriculum, the school in which he is registered helps him find appropriate employment. As a service both to the professions and to its graduates, each school maintains a placement office which tries to get the right man into the right job.

Student Living

Oregon State provides to the extent possible comfortable, healthful, and congenial living conditions for all students. All students have opportunity to belong to some social organization. Each living group on the campus, including

residence halls, cooperatives, sororities and fraternities, has its own self-government and social activities.

All living arrangements must be approved by the Dean of Men or the Dean of Women. The student may expect to hear regarding housing from the Dean of Men, the Dean of Women, or the Director of Dormitories. The latter supervises the operation of all residence halls and their facilities.

College Residence Halls

Hall	For men or women	Capacity	Living groups or clubs	Approximate multiple room and board charges			
				Fall term	Winter term	Spring term	Year total
Cauthorn	Men	313	5	$240.00	$224.00	$220.00	$684.00
Hawley	Women	313	5	240.00	224.00	220.00	684.00
Poling	Men	313	5	240.00	224.00	220.00	684.00
Sackett A & B	Women	230	2	240.00	224.00	220.00	684.00
Sackett C & D	Men	230	2	240.00	224.00	220.00	684.00
Snell	Women	366	5	240.00	224.00	220.00	684.00
Waldo	Men	302	5	225.00	209.00	205.00	639.00
Weatherford	Men	429	7	225.00	209.00	205.00	639.00
West	Women	315	5	240.00	234.00	220.00	684.00

Single rooms are $40 more per term in Cauthorn, Hawley, Poling, Sackett, Snell, and West Halls and $32.50 more per term in Waldo and Weatherford Halls. Board and room rates are subject to change by the State Board of Higher Education as circumstances demand.

Each of the halls has a lounge, recreation rooms, and laundry facilities. Most of them have snack kitchens, and several have sun decks. The halls provide for each occupant a single bed (some double or triple decked), mattress, mattress pad, two sheets, two single blankets, pillow, pillowcase, study table, chair, and dresser or wardrobe. Bed linen is laundered without additional charge. Occupants are responsible for care and cleanliness of rooms at all times and must furnish their own study lamps, towels, extra blanket, clock, water glass, and any other equipment to meet individual needs and preferences.

Room and board charges are due the first day of each month. Students paying after the first are charged a late fee of $1 for the first day and $1 for each additional day up to a maximum of $5. In exceptional cases, extension of time may be given by Director of Dormitories, if application is made before first day of the month. If bill is not paid by 10th of the month, student's registration may be canceled.

Special food service for students living in college dormitories who require dietary help is available upon recommendation of the Student Health Service. There is an additional charge for this service. All students may consult with the Health Service staff at any time on special dietary problems.

Reserving a Room

To reserve a room in a residence hall, a student should obtain an application blank from the Office of Admissions or Director of Dormitories and send it filled out and accompanied by a deposit of $50 to the Business Office. Money orders or checks should be made payable to Oregon State University.

Reservations should be made early, even though official admission may be delayed. If a student is found ineligible for admission after he has made the $50 deposit, it will be returned to him. After he is admitted, $35 of the deposit will be applied to the initial charge for board and room, and $15 will be retained as a deposit.

When a student makes a $50 deposit to reserve a room, he is holding that room for one term and is responsible for paying rent unless he cancels his reservation by the cancellation date. If he withdraws from college before the close of the term, he forfeits the deposit.

Cancellation, Assignment, and Refunds

Cancellation of a room reservation (or transfer of deposit to a later term) must be made before August 15 for fall term and not later than 14 days before the opening of winter or spring terms. If cancellation is made within the proper time limit, the deposit will be refunded. If the depositor registers and has not canceled his reservation as indicated above, he will be required to live in the residence hall. If he does not register and has not canceled his reservation, the entire $50 deposit is forfeited. Requests for cancellation or transfer should be made to the Dormitory Office.

The $15 deposit will be used for unpaid hall dues or for repair bills resulting from damaged fixtures for which the student is responsible. Any balance remaining after all charges are deducted will be returned in about six weeks after termination of occupancy. If the student withdraws before the end of the term, the $15 room deposit is forfeited.

Assignment to a particular hall for fall term will be sent between July 1 and August 15. After August 15, assignments are made as reservations are received and deposits made after this date may not be canceled without penalty. Assignment for winter and spring term is made about one month before the beginning of the term.

Board refunds may be made for absences of 10 or more consecutive full days when the student is absent from Corvallis, but none will be made for shorter periods. No refunds are made for the examination period. Room rents are not refunded regardless of length of absence.

Sororities and Fraternities

Affiliation with fraternities and sororities is by invitation. The standards of scholarship maintained by these groups require study conditions that will promote achievement in academic growth. Board and room charges in these living groups approximate those of the residence halls. Cost of membership, social fees, and sometimes building fees are extra. Both fraternities and sororities have specified times during the year when "rushing" (selection of prospective members) takes place. Both groups "rush" at the beginning of fall term and at later periods.

Sororities provide supervised living accommodations for sophomore and upperclass women. Freshmen women, even though pledged, do not live in chapter houses. Pledges living outside sorority houses should plan on financial obligations to the social group in addition to obligations incurred where they live. A pamphlet on sororities may be obtained from the Panhellenic Council, Memorial Union, Oregon State University.

Sororities at Oregon State: Alpha Chi Omega, Alpha Delta Pi, Alpha Gamma Delta, Alpha Omicron Pi, Alpha Phi, Alpha Xi Delta, Chi Omega, Delta Delta Delta, Delta Gamma, Delta Zeta, Gamma Phi Beta, Kappa Alpha Theta, Kappa Delta, Kappa Kappa Gamma, Pi Beta Phi, Sigma Kappa, Zeta Tau Alpha.

Phrateres is a national social society for college women.

Fraternities provide comfortable, supervised accommodations for men. Freshmen men pledged to a fraternity may live in the chapter house; in fact, if they do not have other housing arrangements they are expected to live in the house. If, however, a pledge has made other housing commitments he must fulfill them before moving into the fraternity house. The booklet, *Is It Greek to You?* is available from the Dean of Men, 111 Commerce Hall.

Fraternities at Oregon State: Acacia, Alpha Gamma Rho, Alpha Kappa Lambda, Alpha Sigma Phi, Alpha Tau Omega, Beta Theta Pi, Chi Phi, Delta Chi, Delta Sigma Phi, Delta Tau Delta, Delta Upsilon, Kappa Delta Rho, Kappa Sigma, Lambda Chi Alpha, Phi Delta Theta, Phi Gamma Delta, Phi Kappa Theta, Phi Kappa Psi, Phi Kappa Sigma, Phi Kappa Tau, Phi Sigma Kappa, Pi Kappa Alpha, Pi Kappa Phi, Sigma Alpha Epsilon, Sigma Chi, Sigma Nu, Sigma Phi Epsilon, Sigma Pi, Tau Kappa Epsilon, Theta Chi, Theta Xi.

Cooperatives

In cooperative houses students achieve desirable group and social life for about $15 a month less than in other types of living groups. Students share all housework responsibilities. Each house has a hostess and a cook. Room rent for the year at all cooperatives is about $195 and total board and room for a year is estimated at $505 for men and from $455 to $500 for women. Rules on keeping reservations, making cancellations, or moving apply in cooperatives as in other living organizations.

Women's Cooperative Houses. Azalea House and Coed Cottage on-campus house 58 and 40 women respectively. Three off-campus units, Jameson House, The Pines, and Winston House, are administered by Co-Resident Women, Inc. Applications should be made to the Dean of Women. A folder is available.

Men's Cooperative Houses. Reed and Heckart Lodges located on campus, house 60 men each. Each lodge requires its residents to spend approximately four hours per person each week at kitchen work and housekeeping. Applications should be made to the Dean of Men. Four off-campus cooperatives, Beaver Lodge, Campus Club, Davenport House, and Hawthorne Manor, provide additional housing for men. For folder or information contact the Dean of Men.

Rooms in Private Homes

Listings of approved private homes are maintained by the Dean of Men. The Housing Committee urges that a written agreement be made between student and householder. Blank contract forms may be obtained from the Dean of Men. Such agreements, if properly filed by householder, will be binding upon both householder and student for one term and will be enforced by the Housing Committee. Housing agreements whether oral or written are for one school term and will be enforced when satisfactory facilities are provided.

Agreements may be terminated: (a) If the student properly withdraws from college; (b) upon mutual agreement and satisfaction to the student and householder with written notice to the Dean of Men by the householder; or (c) by action of the Housing Committee. Since it is mutually beneficial for householder and student to meet each other before commitments are made, reserva-

tions in private homes are not made by Oregon State. Housing in a private home for fall term should be arranged soon after June 15. Costs in private homes are comparable to those in residence halls. Permission to live in private homes is rarely given to women students. Special cases will be given consideration by the Dean of Women.

Housing for Married Students

Oregon State maintains a number of furnished apartments for married students. Rentals range from $30 to $80 per month with water and garbage disposal service furnished. Apply to the Director of Dormitories.

Off-Campus Apartments. A married student wishing to find living accommodations off campus should consult the Housing and Employment Secretary, 108 Commerce Hall.

Housing Regulations

Each student is responsible for knowledge of housing regulations and for arranging individually for acceptable housing accommodations.

a. Living arrangements must be approved by the Dean of Men (men students) or the Dean of Women (women students), normally at the time of registration. Reservations in acceptable housing made by new students are tentative until official admission to Oregon State University has been granted.

b. All unmarried undergraduate students under 23 years of age must live in acceptable housing. Hotels, motels, and apartments are not approved housing for unmarried students. Students may petition the Housing Committee for exceptions to this rule.

c. All living arrangements in acceptable housing are for one full college term. Students making duplicate housing arrangements and not making proper cancellation are financially responsible for such arrangements.

d. Prior to any change of address or residence, approval must be obtained from the Dean of Men or the Dean of Women.

e. Should a request to move during the term be granted by the Housing Committee, the student must expect to pay a term's rent for a room reserved but not occupied.

f. Established rules regarding student conduct apply to all housing, on or off campus.

For more detailed information see the official pamphlet "Student Housing, Regulations and Information" available from the Director of Dormitories.

Student Health Service

The Student Health Service safeguards the health of students through health education, preventive medicine, detection of incipient diseases, medical treatment of acute diseases, and maintenance of hygienic living conditions.

Students registered for credit who pay the Student Health Service fee may receive general medical attention and advice at the Student Health Service during dispensary hours. The Health Service does not provide house-call service at any time or medical service outside of dispensary hours or during vacation periods. Students who desire such attention should employ private physicians at their own expense. This does not apply to those who are already under care of the Health Service as Infirmary in-patients. Limited hospital facilities are maintained for emergency cases which require hospitalization for general medical care. Such patients are admitted only upon advice of Health Service physicians. Maximum period of hospitalization for a student in any one academic year is 15 days. Extra charges are made to cover costs of such items as overtime in the Infirmary and special medications.

All expenses connected with surgical operations, fractures, specialized medical care, and special nursing must be met by the student who requires such attention. In no case will the Health Service pay or be responsible for bills from private physicians or private hospitals.

Health Service privileges are not available to members of the faculty or members of the student's family.

Activities pertaining to medical care of students are centered in the Student Health Service building. The dispensary, including physicians' offices, examining rooms, X-ray and clinical laboratories, and drug room, occupies the second floor. On the third floor are semi-private patient rooms for students requiring confinement for general medical care or isolation for communicable diseases. The Health Service staff includes physicians, registered nurses, a laboratory technician, and an X-ray technician.

Medical examination. A medical examination is required of all entering students. It includes tuberculin test, to be done at the Health Service at the time of registration, vaccination against smallpox, and other tests deemed necessary to protect the health of the student body.

Vaccination. The State Board of Higher Education requires that students, as a condition to entering any State System institution, satisfy the institutional physician of immunity to smallpox (by evidence of having had the disease or successful vaccination within the last five years). Exception is made, however, for students who decline vaccination because of religious convictions. Such students may be admitted, but only on the condition that they or, in case of minor or dependent students, their parents or guardians present a written statement expressing religious grounds for declining and agree in writing to assume all expenses incident to their care or quarantine, should they fall ill with smallpox while students at the institution.

Student Automobiles

Students may operate cars on campus only by permission obtained through registration with Campus Police and payment of yearly fees. Parking is restricted to certain assigned areas, and cars must carry stickers on windshields indicating areas assigned.

Students are responsible for knowing regulations pertaining to operation of a motor vehicle on-campus and will be held responsible for any violation of these regulations in which a vehicle registered to them is involved regardless of who operates it. Specific information on parking and traffic regulations can be obtained in the leaflet *Your Car On The Campus,* available from the Campus Police Office.

Since campus traffic and parking are becoming overly congested and almost all living accommodations are within walking distance of the campus, students are urged to leave their cars at home.

Student Expenses

The table below gives estimated *average expenses* for the first term and the first year. Board and room costs are based on charges in the halls of residence. Incidental items vary greatly with the individual. Cost of clothing is not included. Some courses of study require more expensive books and

supplies than others. Drawing instruments and slide rule for engineering students cost about $75.

Average expenses per month may vary from $100 to $145, but a student meets large financial demands in the first two weeks of college. He pays registration fees for the whole term, room rent for at least half a term in advance, board a month in advance, and he must buy books at the beginning of the term. For this reason students from Oregon, including veterans whose first subsistence check will arrive at a late date, should come prepared for an initial expense of at least $280. Out-of-state students should be prepared for an initial outlay of at least $365. Personal checks in the exact amount provide the most convenient and safest method of payment.

First Year Expenses

Expenses	First term	First year
Tuition and regular fees		
Tuition $10.00		
Laboratory and course fee 46.00		
Incidental fee 22.00		
Building fee 12.00	$ 90.00	$ 270.00
Deposit to cover breakage (returnable at end of year)	10.00	10.00
Books, supplies, etc. (estimates)	45.00	90.00
Board and room (average)	240.00	684.00
Incidentals	50.00	150.00
Total for residents of Oregon, Alaska, and Hawaii	$ 435.00	$1,204.00
Out-of-state tuition	85.00	255.00
Total for nonresident students	$ 520.00	$1,459.00

Opportunities for Employment

To assist students desiring to find work, the Dean of Men conducts an Employment Bureau for Men in 108 Commerce Hall and the Dean of Women conducts a similar service for women in 114 Commerce Hall.

Some men and women living in residence halls find employment in cafeterias or dining rooms, where they earn most of their board and room. For information on this type of employment contact the Director of Dormitories.

Some men and women earn a large part of their expenses working for room and board in private homes. They give their employer approximately three hours work per day. For information contact the Dean of Men or Dean of Women.

Student Loan Fund

The Student Loan Fund, a perpetual, revolving trust fund established for the purpose of lending money to worthy students attending Oregon State University, is administered by the Student Loan Fund, a membership organization, incorporated under the laws of the State of Oregon. Trustees are appointed by the President of OSU. This fund has arisen through the generosity of friends of the institution and through the accumulation of interest on loans.

The purpose, as expressed by one of the donors, is "not to induce students to attend school by providing money that can be obtained easily, but rather to aid those who are determined to secure an education and are paying the cost wholly or in part from their own earnings." Students are eligible to loan aid for necessary college expenses after attending Oregon State *at least one term.*

In making loans the trustees follow these fundamental principles: Care in the selection of student character as a credit basis; detailed budgeting of expenses and receipts to assure that the sums borrowed are not disproportionate with the student's capacity to pay; insurance against loss by a Contract of Guaranty signed by the parent or guardian; and effective follow-up system in collections.

Loans to students are also made under the provisions of the National Defense Education Act of 1958. Special consideration is given to students in the fields of education, science, mathematics, engineering, and modern foreign languages. Eligibility for NDEA loans requires an accumulative grade-point average of 3.25 for high school seniors, 2.75 for college undergraduates, and 3.00 for graduate students.

Applications for loans should be made at the Student Loan Office, 102 Memorial Union, where additional information is available.

Other Loan Funds administered by the trustees of the Student Loan Fund: the CIVIL ENGINEERING LOAN FUND for students in civil engineering; HARDING MCKINNEY FUND for juniors and seniors in electrical engineering; OREGON FEED AND SEED DEALERS for juniors and seniors in agriculture; GEORGE W. PEAVY MEMORIAL LOAN FUND for students in forestry; JAMES AND DELMER SHAVER LOAN FUND for senior men and women; OREGON STATE PHARMACEUTICAL ASSOCIATION EDUCATIONAL FUND; E. B. LEMON LOAN FUND; and ALVA W. BLACKERBY MEMORIAL LOAN FUND, for students in forestry.

The trustees also cooperate in the administration of the J. T. Apperson EDUCATIONAL FUND (administered by the State Land Board), CRAWFORD LOAN FUND (administered by the U. S. National Bank, Portland), FRED A. ROSENKRANZ LOAN FUND (administered by First National Bank, Portland—application made through Student Loan Office, OSU), BEN SELLING SCHOLARSHIP LOAN FUND (administered by First National Bank, Portland).

Scholarships

The scholarship program is coordinated through the College Committee on Scholarships. Most scholarships require evidence of ability, promise, and reasonable need for help in meeting minimum college expenses. Students who apply to the committee will be considered for all scholarships for which they qualify.

Application blanks are available from the Office of the Registrar or from any Oregon high school principal. Applications, including transcripts of all academic work to date of application, should be forwarded to the Office of the President by March 1 of each year. Exceptions to these procedures will be noted for certain of the scholarships administered by other agencies.

All-Campus

AMERICAN-MARIETTA CUSTOMERS SCHOLARSHIPS: Two $250 scholarships annually to entering freshmen of outstanding scholastic ability interested in chemistry, chemical engineering, forestry, or high school teaching in science or mathematics.

ASSOCIATED INDEPENDENT STUDENTS: Tuition and fees for one term for each of three non-affiliated undergraduates. Application through Committee on Scholarships or by invitation of AIS.

ASSOCIATED WOMEN STUDENTS SCHOLARSHIP: Tuition and fees to a junior woman in recognition of outstanding campus service and high scholarship.

BASH SCHOLARSHIP: $270 provided by the Portland chapter of the Oregon State Mothers Club for an outstanding freshman woman from an Oregon high school in memory of the late Dean of Women, Mary Bash.

CENTURY CLUB SCHOLARSHIP: $100 a year for four years provided by the Century Club of OSU faculty for a student in Science.

COLLEGE FOLK CLUB SCHOLARSHIP: Tuition and fees to undergraduate student who demonstrates outstanding ability and financial need; recipients chosen by College Folk Club with approval of OSU Scholarship Committee. Available to residents of Oregon.

COLLINS SCHOLARSHIPS: Scholarships provided as a memorial to James Harrison Collins for graduates of Columbia County high schools. Each awardee must be in top 15% of his graduating class, be of excellent character, have an outstanding record of service to school and community, and show promise of future meritorious achievement.

DALY SCHOLARSHIPS: A limited number of scholarships awarded annually to worthy young men and women of Lake County by the Bernard Daly Educational Fund, established through the will of the late Dr. Bernard Daly of Lakeview, Oregon. Fund is administered by a board of trustees including a representative of OSU. Selections are made on the basis of a qualifying examination held in Lake County.

DELTA DELTA DELTA SCHOLARSHIP: One or more schlorships given by Delta Delta Delta, national sorority, to worthy undergraduate women.

DOUGLAS COUNTY HOME EXTENSION SCHOLARSHIP: Annual tuition and fee scholarship awarded to a worthy man or woman graduating from a Douglas County high school and planning to enter freshman class at Oregon State. Application through high school principal with approval of local unit extension officers.

HOLMES SCHOLARSHIP: About $300 awarded annually to a worthy male graduate of a Jackson County high school; provided by Harry and David Holmes of Medford.

INTERFRATERNITY COUNCIL SCHOLARSHIPS: $100 each to five Oregon high school seniors for their freshman year in college, recipients chosen from top 15% of class on basis of character, leadership, and scholarship; final selection by Interfraternity Council from nominations by Committee on Scholarships.

INTERHALL SCHOLARSHIP: Fall term tuition provided by the residents of women's halls for a resident of the halls, selected by the Committee on Scholarships from nominations made by a special committee. Recipient must be 50% self-supporting, have a grade-point average of at least 2.50, and demonstrate service to the campus.

LEONORA H. KERR-FOLK CLUB SCHOLARSHIP: $270 to outstanding freshman woman from an Oregon high school; provided by a fund established as a tribute to Mrs. William Jasper Kerr and supplemented by the College Folk Club.

MORTAR BOARD SCHOLARSHIP: Financial aid to one or more outstanding women students.

NAVAL ROTC SCHOLARSHIPS: Tuition, textbooks, laboratory and other instructional fees, and $50 per month living expenses for twelve months per year for four years, provided by United States Navy.

OREGON STATE COLLEGE EDUCATIONAL FOUNDATION, INC. SCHOLARSHIPS: Partial and full tuition scholarships annually for two or three outstanding students in need of financial assistance.

OREGON STATE COLLEGE FOUNDATION: Partial and full-tuition scholarships as made available through contributions to the OSC Foundation.

OREGON STATE DADS CLUB SCHOLARSHIPS: Tuition and fees to men and women nominated by Dean of Men and Dean of Women and approved by Committee on Scholarships. Recipients must have good grades and must be in need of financial aid.

OREGON STATE MOTHERS CLUB SCHOLARSHIPS: Tuition and fees to men and women selected by Mothers Club Scholarship Committee with approval of Dean of Men and Dean of Women. Recipients must need financial aid, must be of high character, must have average or above grades. Honor scholarships will be given to a man and a women with grade-point averages above 3.00. If a woman recipient marries, she relinquishes the scholarship.

PAPER INDUSTRY MANAGEMENT ASSOCIATION SCHOLARSHIP: $222 annually to an outstanding undergraduate who may enter chemical engineering, chemistry, or forestry, provided by the Pacific Division of the American Pulp and Paper Mill Superintendents Association. Award made on the basis of scholarship, adaptability, and financial need.

PHI SIGMA KAPPA FRATERNITY SCHOLARSHIP: $100 annually to a male high school senior for his freshman year in college. Recipients selected by Phi Sigma Kappa fraternity on basis of scholarship, character, and financial need, without regard to academic major, or resident status, from nominations by Committee on Scholarships. Applicants write to Oregon State Chapter of Phi Sigma Kappa.

SCABBARD AND BLADE SCHOLARSHIPS: Three $75 annual scholarships to seniors, one from each ROTC Service Unit provided by local company of Scabbard and Blade society. Selection by Scabbard and Blade from nominations from each service unit. Selection confirmed by Committee on Scholarships.

STATE SCHOLARSHIPS: Under law created by the State legislature partial tuition and fee scholarships are awarded by the State Scholarship Commission equal in number to 2½% of the enrollment in State-supported institutions. Entering freshmen are eligible to apply if ranked in upper one-half of their high school class. College students may apply if they have achieved a term and cumulative GPA of 2.50 or better. Applications may be made to Scholarship Committee of the State institution student desires to attend or to State Scholarship Commission.

In addition, the State Scholarship Commission will award annually one scholarship for each Oregon county and one for each State legislative seat. The Commission accepts nomination for these awards from State legislators and others. Recipients may attend the State institution of their choice.

VARSITY "O" SCHOLARSHIPS: $75 annually to a male high school senior planning to enter OSU. Selection on basis of leadership, citizenship, scholarship, and proficiency in athletics, specifically in golf, tennis, wrestling, or swimming.

School of Humanities and Social Sciences

CORVALLIS ELKS LODGE SCHOLARSHIP FOR INSTRUMENTALISTS: Two full-tuition scholarships to students participating on the Oregon State band and/or orchestra who have at least 2.50 grade-point average on a minimum of 12 hours.

KAPPA PI SCHOLARSHIP: $100 annually provided by Kappa Pi, national art honorary, to OSU students participating in the Oregon State band and/or orchestra who have at least 2.50 or above. Application through the society or head of Art Department.

MUSIC STUDY SCHOLARSHIPS: Five annual scholarships of $60 to $90 each, established by friends of Music Department, to cover special fees for individual instruction in piano, organ, voice, stringed instruments, and wind instruments. Open to all students. Application through Music Department.

School of Science

BOEING SCHOLARSHIPS: Two $150 scholarships to undergraduates in the School of Science, one majoring in mathematics and one majoring in physics. Selections made by the Committee on Scholarships from nominations made by the School of Science.

CENTURY CLUB PRE-MEDICAL SCHOLARSHIP: Full tuition and fees for two years to an outstanding student in premedicine.

COPSON SCHOLARSHIP: Approximately $200 annually from a gift of June Seeley Copson '15 to establish a scholarship in memory of her husband Godfrey Vernon Copson '11, formerly head of the Bacteriology Department. Recipient must be a junior or senior with outstanding promise in School of Science.

CROWN ZELLERBACH FOUNDATION SCHOLARSHIP IN HONOR OF DR. LEO FRIEDMAN: $1,000 to an upper division student in chemistry, preferably wood or pulp and paper chemistry. A memorial to Dr. Leo Friedman, for many years on the chemistry faculty, a pioneer in wood chemistry in Oregon.

GENERAL PETROLEUM CORPORATION SCHOLARSHIP: $400 plus tuition and fees to an outstanding senior or graduate student in geology or geophysics. Applications to the Committee on Scholarships may be presented through the Department of Geology.

LONGVIEW FIBRE COMPANY PULP AND PAPER SCHOLARSHIP: $255 to a sophomore and $255 to a junior in chemistry. Recommendations of chemistry faculty confirmed by Committee on Scholarships. Final selection by donor.

PAPER INDUSTRY MANAGEMENT ASSOCIATION SCHOLARSHIP: (See Undergraduate Scholarships.)

SIMMONS SCHOLARSHIP: Established by the widow and friends of the late Professor Joseph E. Simmons, formerly head of Bacteriology Department, for a worthy, promising junior in bacteriology, in need of financial assistance for the senior year.

TEXACO SCHOLARSHIPS: Financial assistance for upper division male U. S. citizens majoring in chemistry, physics, mathematics, or geology, and qualified for careers in petroleum industry. Awards based on scholastic ability, qualities of leadership, financial need, and sound health. Selection by Committee on Scholarships from nominations by departments.

School of Agriculture

BORDEN SCHOLARSHIP: $300 provided by the Borden Company Foundation, for a senior in agriculture who has completed six term hours in dairying and who among all similarly eligible students has the highest grade-point average.

P. M. BRANDT MEMORIAL SCHOLARSHIP: $1,000 over a 4-year period provided by Oregon Dairy Industries to an entering freshman in Dairy Technology; either a man or a woman. Applicants use state system forms in applying through Committee on Scholarships.

CROWN ZELLERBACH FOUNDATION SCHOLARSHIP IN FISH AND GAME MANAGEMENT: $500 annually to a junior or senior in Fish and Game Management, preferably fisheries. Selection will be made by the Committee on Scholarships from nominations made by the Department of Fish and Game Management.

H. H. GIBSON MEMORIAL SCHOLARSHIP: Approximately $250 provided annually as a memorial to Professor Gibson by his family, for an Oregon high school graduate in Vocational Agriculture.

JACOBS FOUNDATION SCHOLARSHIP: $250 annually to sophomore in agriculture who ranks in upper third of class; application through dean of Agriculture.

MCKENZIE SCHOLARSHIP: $150 provided as a memorial to Gary McKenzie by his parents, for a freshman in agriculture who has been an active member of Future Farmers of America.

MILWAUKIE ROD AND GUN CLUB SCHOLARSHIP: $150 annually for two outstanding seniors in fisheries or wildlife management. Recipients nominated by Department of Fish and Game Management with preference given qualified students from Milwaukie area. Selection based on scholastic ability, leadership, career interest in fish and game management, and financial need.

MULTNOMAH HUNTERS AND ANGLERS CLUB SCHOLARSHIP: $150 for a male student, junior or senior, majoring in fish and game management to assist him in continuing his studies in wildlife conservation and management.

OREGON FEDERATION OF GARDEN CLUBS SCHOLARSHIPS: Two $200 grants-in-aid for sophomore or upperclassman, one in landscape architecture and one in ornamental horticulture. Committee on Scholarships selects from nominations by horticulture faculty.

PACIFIC NORTHWEST PLANT FOOD ASSOCIATION SCHOLARSHIP: $100 to an outstanding junior or senior in School of Agriculture majoring in soils.

RALSTON PURINA COMPANY SCHOLARSHIPS: $500 each, annually, to outstanding seniors in agriculture in land-grant colleges of the United States. Oregon State seniors in this field, who rank in the upper 25% of the class and who have financial need, may apply through dean of Agriculture.

SEARS ROEBUCK SCHOLARSHIPS: $4,200 provided by Sears Roebuck Foundation for men in agriculture who have been reared in Oregon. Recipients must show good character, scholastic attainment, leadership ability through participation in 4-H Club, Future Farmer, or community activities.

VAN WATERS & ROGERS, INC. SCHOLARSHIP: $200 annually to a junior man in Agriculture on the basis of leadership, scholarship, and interest in wholesale selling. Selection made by Committee on Scholarships on nomination by School of Agriculture.

VAUGHAN SCHOLARSHIPS: $500 annually, a memorial to Sarah Rehnborg Vaughan, for one or more juniors or seniors in fish and game management; provided by Nutrilite Foundation of California.

WADE FOUNDATION SCHOLARSHIP: $200 annually for a junior or senior majoring in agricultural education.

G. H. WILSTER SCHOLARSHIP: Full tuition and fees for sophomore year provided by Oregon Dairy Industries to an outstanding freshman in dairy technology. Applicants use state system application blanks in applying through dean of Agriculture or Department of Food and Dairy Technology.

School of Business and Technology

BOEING SCHOLARSHIPS: Two $150 scholarships annually to undergraduates in business administration with emphasis on accounting, finance, business statistics, and production. Selections made by the Committee on Scholarships from nominations made by the School of Business and Technology.

School of Education

PARENT-TEACHER SCHOLARSHIPS: $270 annually to encourage capable young people to enter elementary teacher training in Oregon. Open to freshmen, sophomores, and juniors; award based on scholarship, character, personality, leadership, school citizenship, and sound health. Apply through the Oregon Congress of Parents and Teachers, Education Center Building, Portland.

School of Engineering and Industrial Arts

ALCOA FOUNDATION UNDERGRADUATE SCHOLARSHIPS: Two $500 scholarships annually to juniors and seniors in electrical, mechanical, industrial, and chemical engineering. Provided by Aluminum Company of America Foundation.

ASSOCIATED GENERAL CONTRACTORS OF AMERICA SCHOLARSHIP: Annual scholarships of $200 each to juniors and seniors in civil. electrical, or mechanical engineering. Provided by Portland chapter of Associated General Contractors of America, Inc. Application through dean of Engineering.

BECHTEL CORPORATION SCHOLARSHIP: $1,500 annually for four seniors in engineering; recipients must be under 26 years of age, and anticipating careers in private industry.

BOEING SCHOLARSHIPS: Two $200 scholarships annually to undergraduates majoring in the School of Engineering. Selection made by the Committee on Scholarships from nominations made by the School of Engineering.

COLLINS RADIO COMPANY SCHOLARSHIP: $1,500 annually to an outstanding senior in electrical or mechanical engineering for research project related to major field of study.

COVERT SCHOLARSHIP: Approximately $150 to a student in Chemical Engineering; provided by Mr. Lloyd W. Covert. Award made on basis of scholarship, ability, and potential leadership.

FEIGHTLINER SCHOLARSHIPS: Two scholarships of $500 each provided by the Freightliner Corporation of Portland to a junior and a senior, one in civil engineering and one in mechanical engineering. Application through the School of Engineering.

GENERAL ELECTRIC COMPANY SCHOLARSHIPS: $650 each to two engineering students selected from Northwestern institutions including Oregon State, Montana State, Washington State, University of Washington, and University of Idaho.

HERMANN SCHOLARSHIP: Approximately $300 annually to an outstanding senior in civil engineering in memory of the late Otto Hermann, graduate of School of Engineering. Nominations made to Committee on Scholarships by faculty in Civil Engineering.

LONGVIEW FIBRE COMPANY PULP AND PAPER SCHOLARSHIPS: $255 each to two sophomores, two juniors, and two seniors in mechanical or chemical engineering. Recommendations of engineering faculty confirmed by Committee on Scholarships; final selection by donor.

PAPER INDUSTRY MANAGEMENT ASSOCIATION SCHOLARSHIP: (See All-Campus Scholarships.)

RAYIONER INCORPORATED SCHOLARSHIPS: Two $250 scholarships annually to undergraduates in the School of Engineering, one in Chemical Engineering, and one from among the departments of Mechanical, Electrical, or Civil Engineering. Candidates must be U. S. citizens. Applications through the School of Engineering.

STANDARD OIL COMPANY OF CALIFORNIA UNDERGRADUATE SCHOLARSHIP: $750 provided by the Standard Oil Company of California for an undergraduate scholarship to a student in Chemical Engineering. Selection made by Committee on Scholarships on nomination by head of the department.

TEXACO SCHOLARSHIPS: Financial assistance for upper division majors in chemical engineering qualified for careers in the petroleum industry; awards based on scholarship ability, qualities of leadership, financial need, and sound health. Selection by Committee on Scholarships from nominations by Department of Chemical Engineering.

WESTERN ELECTRIC COMPANY SCHOLARSHIP: $400 to a student in electrical or mechanical engineering above the freshman level, preferably a junior.

WESTERN ELECTRONIC MANUFACTURERS' ASSOCIATION SCHOLARSHIP: $750 to students in electrical engineering, preferably an incoming freshman, sophomore, or junior transfer.

School of Forestry

AUTZEN FOUNDATION SCHOLARSHIP: $500 provided for an outstanding student in forestry.

COLE, CLARK, AND CUNNINGHAM, INC. SCHOLARSHIP: $400 to an outstanding senior in forestry.

CROWN ZELLERBACH FOUNDATION SCHOLARSHIP: $500 provided by Crown Zellerbach Foundation for two outstanding juniors or seniors in forestry who are citizens of the U. S. and have not previously held scholarships sponsored by the Foundation.

EVANS PRODUCTS COMPANY UNDERGRADUATE SCHOLARSHIP: $750 annually for an outstanding student in forestry.

HART SCHOLARSHIP: Income from an endowment fund, a memorial to Floyd Hart, prominent Oregon lumberman, for a senior in forestry.

PAPER INDUSTRY MANAGEMENT ASSOCIATION SCHOLARSHIP: (See Undergraduate Scholarships.)

SLATER MEMORIAL SCHOLARSHIP: Income from an endowment fund, a memorial to Durward F. Slater, class of 1952; to an upper division forestry student.

SNELLSTROM SCHOLARSHIPS INCOME from endowment fund, a memorial to John R. Snellstrom, prominent Oregon lumberman and legislator, for outstanding forestry student nominated by forest faculty.

SOUTH SANTIAM EDUCATIONAL AND RESEARCH PROJECT SCHOLARSHIPS: $2,500 annually, provided by Louis W. and Maud Hill Family Foundation for at least five Oregon students in forestry in the sophomore, junior, or senior years.

TUCKER SCHOLARSHIP: Three $1,000 scholarships, provided by the will of Max D. Tucker, for Oregon students in forestry.

VAUGHAN SCHOLARSHIPS: $500 annually, a memorial to Sarah Rehnborg Vaughan, for one or more juniors or seniors in conservation; provided by Nutrilite Foundation of California.

School of Home Economics

BORDEN SCHOLARSHIP: $300, provided by the Borden Company, for a senior in home economics who has completed two or more courses in foods and nutrition and who, among all similarly eligible students, has the highest grade-point average.

LEONE ELLIOTT COVERT SCHOLARSHIP: Approximately $150 to a student in Home Economics; provided by Mrs. Covert. Award made on basis of scholarship, ability, and potential leadership.

ELECTRICAL WOMEN'S ROUND TABLE OF PORTLAND SCHOLARSHIP: $150 to a junior, awarded on basis of financial need, scholarship, and interest and aptitude in electrical equipment.

FHA SCHOLARSHIP: $200 for a home economics student provided by the Oregon Association of Future Homemakers of America for graduate of an Oregon high school.

SEARS ROEBUCK SCHOLARSHIPS: Four $300 freshman scholarships for study in home economics, provided by the Sears Roebuck Foundation, awarded on merit to Oregon farm-reared girls who would otherwise not be able to attend college.

School of Pharmacy

A. K. BERMAN PHARMACY SCHOLARSHIP: $50 annually to a deserving upper division pharmacy student selected by the faculty of the School.

MARTHA BAKER DIXON SCHOLARSHIP: $100 annually to a student in pharmacy for superior scholarship and need of financial assistance.

LANE COUNTY REGISTERED PHARMACISTS SCHOLARSHIP: $150 annually to a deserving student in pharmacy from Lane County or surrounding area.

OREGON STATE PHARMACEUTICAL ASSOCIATION SCHOLARSHIP: $100 to an upperclassman in pharmacy who has demonstrated scholastic ability, who is a resident of Oregon, and who will benefit most from the financial support.

PAYLESS DRUG STORES SCHOLARSHIP: $300 annually to a junior or senior who shows promise in pharmacy and will benefit from financial support.

REXALL CLUB SCHOLARSHIP: $300 annually to a junior or senior who is a resident of Oregon and exhibits excellence in pharmacy courses.

STANLEY DRUG PRODUCTS SCHOLARSHIP: $300 annually to a junior and a senior who show aptitude and scholarship in manufacturing pharmacy.

WOMEN'S AUXILIARY, OREGON STATE PHARMACEUTICAL ASSOCIATION, SCHOLARSHIP: One year's full tuition for a junior or senior girl in pharmacy who is a resident of Oregon; based on merit and need.

Also:
$100 given annually to a deserving woman student in pharmacy.

For Foreign Students

The following scholarships and fellowships, both undergraduate and graduate, are available to assist foreign students attending Oregon State.

BUSINESS AND PROFESSIONAL WOMEN'S CLUB SCHOLARSHIP: $1,500 annually to a student from the Orient with senior or higher standing in home economics, provided by the Oregon Federation of Business and Professional Women's Clubs.

INTERFRATERNITY SCHOLARSHIPS: Room and board for one academic year provided for two undergraduate foreign students (men) selected on the basis of scholarship and need; provided by fraternities.

INTERHALL SCHOLARSHIP: Room for one academic year provided for one undergraduate foreign student (man) selected on the basis of scholarship and need; provided by men's residence halls.

INTERNATIONAL FRIENDSHIP SCHOLARSHIP: Provided by the House Economics Club for an upper division or graduate student from a foreign country to study home economics at Oregon State.

MILAM FELLOWSHIP: For an undergraduate or graduate woman foreign student in home economics, established in tribute to Ava B. Milan Clark, dean of the School of Home Economics 1917-1950.

PANHELLENIC SCHOLARSHIP: Room and board for one academic year provided for two undergraduate foreign students (women) selected on the basis of scholarship and need; provided by sororities.

STATE SCHOLARSHIPS FOR FOREIGN STUDENTS: Tuition and course fees for a limited number of students from foreign countries attending institutions of the Oregon State System of Higher Education. Student pays building fee and incidental fee ($34).

Administered by Other Agencies

AUXILIARY TO PROFESSIONAL ENGINEERS OF OREGON SCHOLARSHIP: $270 to a Portland State College student transferring into professional engineering at Oregon State University. Application through Portland State College Scholarship Committee.

CONSOLIDATED FREIGHTWAYS, INC. SCHOLARSHIP: $500 to an outstanding Oregon high school graduate to be used at State institution selected by recipient.

CROWN ZELLERBACH FOUNDATION SCHOLARSHIP: $500 per year for four years to students in education.

EASTERN STAR SCHOLARSHIPS: Scholarships provided by the Grand Chapter of Oregon of the Order of Eastern Star for members or daughters of members completing the junior year in Oregon colleges and in need of financial assistance for the senior year. Application through Committee on Scholarships.

4-H, FUTURE FARMERS OF AMERICA, AND FUTURE HOMEMAKERS OF AMERICA SCHOLARSHIPS: Members should make inquiries to teachers and club leaders regarding local scholarship opportunities.

GILBRETH SCHOLARSHIP: $500 to a junior or senior woman in egnineering; selection based on scientific aptitude, character, financial need, personality, and citizenship. Application through Society of Women Engineers, 29 W 39th St., New York 18, New York.

INSTITUTE OF FOOD TECHNOLOGISTS UNDERGRADUATE SCHOLARSHIP: $300 annually to a freshman in field of food technology. Application made on official form to head of department. Selection by Committee on Education, Institute of Food Technology.

IRON FIREMAN MANUFACTURING COMPANY SCHOLARSHIP: Tuition and fees to graduates of Oregon high schools in upper one-third of their class. Awarded on basis of scholarship and a 500-word written discussion of "Modern Heating Methods." State System application blank must be completed and mailed with theme by May 5, to Scholarship Committee, Iron Fireman Manufacturing Co., 3205 S.E. 13th Avenue, Portland, Oregon.

MARIA C. JACKSON-GENERAL GEORGE A. WHITE STUDENT-AID FUND FOR CHILDREN OF WAR VETERANS: Two $750 scholarships annually (one to a man, one to a woman) to children of war veterans; selection based on need and scholarship. Application through United States National Bank of Portland.

KAPPA DELTA PI SCHOLARSHIP: $75 annually to a junior or senior in School of Education who has shown scholastic ability and an interest in the profession.

MCCLINTOCK MEMORIAL SCHOLARSHIP: $150 to an outstanding junior in animal husbandry or range management; provided through funds established by the Oregon Farm Bureau Federation as a memorial to Mr. L. A. McClintock, well known Oregon stockman. Recipients selected by the Board of Directors of the Oregon Farm Bureau Federation.

NORTHWEST CANNERS AND FREEZERS ASSOCIATION SCHOLARSHIP: $100 annually to an outstanding junior majoring in food technology.

OREGON HOME ECONOMICS ASSOCIATION SCHOLARSHIP: $500 over a 4-year period awarded a senior in an Oregon high school for enrollment in an Oregon college granting a degree in home economics. Application through high school teacher of home economics.

OREGON NISEI VETERANS AWARDS: Two $150 awards annually through office of State Superintendent of Public Instruction, in memory of World War II deaths.

OREGON STATE EMPLOYEE'S ASSOCIATION SCHOLARSHIPS: Three $300 scholarships to students whose parent is a member of O.S.E.A. Selection based upon scholastic achievement and financial need.

OREGON STATE PHARMACEUTICAL CONTINUING SCHOLARSHIPS: Two Oregon high-school graduates awarded $50 per year for a period of five years while registered in the School of Pharmacy at Oregon State College. Selection based upon excellent grades, leadership, and need.

P.E.O. SCHOLARSHIPS: Provided by Oregon State Chapter of P.E.O. for Oregon junior or senior women, outstanding and worthy of financial assistance. Application through Committee on Scholarships.

PEPSODENT PRESIDENTIAL SCHOLARSHIP: $100 a year for freshman in pharmacy to be continued for five years if scholarship is maintained. Awarded on basis of scholastic ability and financial need. Selection by Oregon State Pharmaceutical Association.

PORTLAND HOME ECONOMICS IN EDUCATION SCHOLARSHIP: $150 to a freshman majoring in home economics in an Oregon college.

PORTLAND ROSE FESTIVAL SCHOLARSHIP: Tuition and fees for members of the royal court who enroll at Oregon State.

ST. REGIS PAPER COMPANY SCHOLARSHIP: $800 a year for two years, provided by St. Regis Paper Company for a junior at either Oregon State University or University of Washington, including opportunity for work at company plant over the summer.

UNION PACIFIC RAILROAD SCHOLARSHIPS: $200 each for study of agriculture or home economics to an outstanding 4-H Club member in each county in Oregon served by Union Pacific Railroad.

WAR ORPHANS EDUCATIONAL ASSISTANCE ACT OF 1956: A student whose parent died from causes incurred in World War I, World War II, or the Korean Conflict, who is between the ages of 18 and 23, and who has completed high school, may apply for 36 months of education and training at Oregon State. The act provides $110 per month for full-time training. Eligible students should apply to the Veterans Administration.

WESTERN ROD AND REEL CLUB SCHOLARSHIP: Tuition and fees for one year to an outstanding junior or senior in wildlife management or fisheries.

Honors and Awards

High scholarship is recognized at Oregon State in several ways:

Junior Honors, presented at the end of a student's sophomore year.

Senior Honors, presented at the time of graduation.

Election to membership in various honor societies.

Personal awards, which may take the form of certificates, plaques, money prizes, or items of intrinsic value.

General honors and awards may be won by students in any school or curriculum. Other awards are open only to students in particular schools or departments. Oregon State students compete for awards provided by national and regional sponsors in many fields as well as for essay and oratorical prizes, awards for proficiency in special fields, and awards for all-around distinction in college life.

JUNIOR HONORS: Conferred by the Oregon State Chapter of Phi Kappa Phi on students who have completed at least 45 term hours of sophomore work at Oregon State with a grade-point average of at least 3.50.

SENIOR HONORS: Conferred each year by the Faculty Senate upon those members of the graduating class, candidates for a bachelor's degree, who through their entire college course have maintained a grade-point average of at least 3.25. Recipients must have attended Oregon State for two regular academic years. Limited to 10% of graduating seniors in each school.

LIPMAN WOLFE AWARDS: Presented in the proportions of $50, $30, and $20 respectively to the man or woman of highest standing in the senior, junior, and sophomore classes based on: (a) scholarship, (b) qualities of manhood and womanhood with special emphasis on unselfishness and kindness. (c) qualities of leadership, and (d) contribution to campus welfare.

CHI OMEGA AWARD: An annual award of $50 to the senior woman who is adjudged by a college committee on honors and awards to approach most nearly an ideal of intellect and spirituality and to have exerted the most wholesome influence upon her associates.

CUMMINGS AWARDS: Presented each spring in the proportions of $50, $30, $20, and $10 respectively to the man of highest standing in the senior, junior, sophomore, and freshman years; based on (a) scholarship, (b) success in student activities, (c) qualities of manhood, and qualities of leadership; a memorial to Edward A. Cummings.

DELTA DELTA DELTA AWARDS: Yearly awards of $75 each made to two women students judged to have exerted, through personal resourcefulness and unselfish effort, the most constructive influence on their associates during the academic year.

DUBACH AWARDS: Presented annually by Oregon State chapter of Blue Key to five graduating senior men outstanding in perpetuation of high ideals and unselfish service to Oregon State University; in honor of Dr. U .G. Dubach, dean of men 1913-1947; names are inscribed on plaque in foyer of Library.

FRIENDS OF THE LIBRARY BOOK AWARDS: Two prizes of books donated annually by the Oregon State University Cooperative Association to students judged to possess the most outstanding personal libraries.

HAMILTON AWARDS: $50 each to a freshman and a sophomore (man or woman) who are one-half self-supporting and are making most purposeful progress toward useful and active citizenship; a memorial to Beatrice Hamilton, mother of W. D. Hamilton, '15.

MACKENZIE-BLUE KEY MEMORIAL AWARD: In memory of Donald Wilson MacKenzie, class of 1953, to any man student who exhibits outstanding qualities and ability as a student leader and in service and loyalty to the institution. Cash and plaque.

SMITH AWARD: Income from $500 to the senior woman having highest scholastic standing during the eight terms preceding her selection for this award; not given to any student who receives another award during same year; a memorial to Drucilla Shepard Smith, formerly of Polk County, established by her son, Mr. John E. Smith, '02.

WALDO AWARDS: Presented each spring in the proportions of $40, $30, $20, and $10 respectively to the woman student of highest standing in the senior, junior, sophomore, and freshman years; based on (a) scholarship, (b) success in student activities, (c) qualities of womanhood, and (d) qualities of leadership; a memorial to Clara H. Waldo.

School of Humanities and Social Sciences

ALPHA CHI OMEGA CUP: Awarded to the woman student of music who has rendered the greatest service to the campus.

BAROMETER AD TROPHY: Awarded to *Daily Barometer* advertising solicitor who has contributed most to financial health of student newspaper.

BAROMETER AWARD: Trophy to the freshman student who has contributed most to general welfare and improvement of the *Daily Barometer*, student newspaper.

INGALLS AWARD: Trophy given annually to the senior who has contributed most to welfare of student publications; award is recorded on a plaque, a memorial to Claude E. Ingalls, formerly editor of the Corvallis *Gazette-Times*.

"PROF MAC" MEMORIAL PLAQUE: Awarded annually to the day and night editors of the *Daily Barometer* who have excelled in typographical proficiency and have contributed most to general news excellence. Provided by Dr. Charles D. Byrne in memory of the late C. J. McIntosh, founder of journalism at Oregon State and staff member 28 years.

SIGMA DELTA CHI CITATION: Certificate awarded by national organization to outstanding male senior interested in journalism.

SIGMA DELTA CHI SCHOLARSHIP AWARD: Certificate awarded by national organization in recognition of high scholastic standing in all college work.

SIGMA DELTA PI SPANISH AWARD: A Spanish masterpiece and the medal of the American Association of Teachers of Spanish given annually to the advanced student of Spanish who has made the greatest progress during the academic year.

School of Science

AMERICAN INSTITUTE OF CHEMISTS AWARD: Engraved metal awarded to an outstanding senior in chemistry, in recognition of leadership, character, and excellence in scholarship.

MERCK AND COMPANY AWARDS: Chemical books valued at $15 awarded to two seniors for high academic standards and leadership qualities in chemistry.

PHI LAMBDA UPSILON AWARD: Certificate of merit to an outstanding junior in chemistry and chemical engineering; recipient's name engraved on plaque in Chemistry Hall.

PHI SIGMA AWARDS: Two certificates to the outstanding undergraduate and graduate students who have shown creative interest in biology.

PI MU EPSILON-DEPARTMENT OF MATHEMATICS AWARD: $35 for first place and $20 for second place in a mathematics competition for freshmen and sophomores; winners name to be engraved on plaque.

SIGMA PI SIGMA AWARD: Junior membership in American Association of Physics Teachers to the outstanding sophomore in physics.

School of Agriculture

ALPHA GAMMA RHO FRESHMAN AWARD: Rotating trophy to student in agriculture who has completed 45 term hours with a grade-point average of at least 2.75 and who is enrolled for his fourth term in college; purpose to promote scholarship, develop leadership and character.

ALPHA ZETA SCHOLARSHIP CUP: Awarded during the first term of the sophomore year to the student in agriculture receiving the highest grade average in the freshman class.

BURPEE AWARD IN HORTICULTURE: $100 to an outstanding student in horticulture majoring in floriculture or vegetable crops.

DANFORTH AWARD IN AGRICULTURE: Expenses for two weeks in St. Louis, Missouri, and two weeks in a Michigan summer camp; provided by the Danforth Foundation and Ralston-Purina Mills of St. Louis, for outstanding agriculture students.

HANSON AWARD: An annual award of $100 to a student in agriculture demonstrating outstanding achievement or interest in poultry husbandry.

JACOBS FOUNDATION AWARD: $250 to a deserving sophomore in agriculture in the upper one-third of his class scholastically; provided by the Ralph and Adolph Jacobs Foundations.

LENDERKING AWARD: $500 to a student in food technology who makes a real contribution toward improving the quality of frozen food; provided by Mr. William R. Lenderking.

NORTHWEST CANNERS AND FREEZERS ASSOCIATION AWARD: $100 to an outstanding junior in food technology.

RODENWOLD AWARDS: Medals awarded each year to the members of the 5-man team representing Oregon State in the intercollegiate livestock judging contest at the Pacific International Livestock Show in Portland; a memorial to Ben W. Rodenwold.

ERNEST H. WIEGAND AWARD: $100 and name of outstanding senior in food technology inscribed on plaque in foyer of Food Technology Building. Selection by Oregon section and student chapter of Institute of Food Technologists.

School of Business and Technology

BUSINESS AND TECHNOLOGY CLUB AWARD: Inscription on Business and Technology Honor Plaque of names of outstanding man and woman graduates determined by representatives of Business and Technology Club and faculty of Departments of Business Administration, Business Education, and Secretarial Science.

PHI CHI THETA AWARD: For women in business and technology: (a) a prize of $5 to the freshman having the highest scholastic standing, (b) a senior key.

UBEA-SMEAD AWARD: Certificate of merit, leather magazine holder, and 1-year membership in United Business Education Association to outstanding senior in business education provided by Smead Manufacturing Company. Selection made by departmental faculty.

WALL STREET JOURNAL AWARD: Medallion and subscription to best all-round man or woman graduate in business and technology as determined by the business administration faculty based on scholarship and leadership abilities.

School of Education

KAPPA DELTA PI AWARD: $75 annually to a junior or senior in education who is outstanding scholastically, has great promise as a teacher, and has need for financial assistance.

School of Engineering and Industrial Arts

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS CERTIFICATE OF MERIT: Certificate of merit and pin awarded to the junior student member of the chapter judged the outstanding student during preceding academic year.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS AWARD: $10 and certificate plus travel allowance.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS AWARDS: Awards of $20, $15, $10, and $5 are given annually for the best papers prepared and delivered in the student branch of the society.

AMERICAN SOCIETY OF METALS: Cash awards of $50, $25, and $15 for the best papers prepared by student members of the society.

ETA KAPPA NU AWARD: Certificate of merit to the outstanding student in the sophomore electrical engineering class; name engraved on a bronze plaque in Dearborn Hall.

HAMILTON WATCH COMPANY: $100 Hamilton watch for a senior in engineering attaining highest academic accomplishment in humanistic-social science subjects as combined with scholastic accomplishment.

INSTITUTE OF AERONAUTICAL SCIENCES AWARDS: Certificate of merit and 1-year membership ($10) in the Institute to the senior or graduate student attaining the best scholastic record and to student presenting best lecture to regular meeting of student branch. Additional award of $25 from student branch for best lecture.

PI TAU SIGMA AWARD: One mechanical engineering handbook presented to the outstanding student in the sophomore mechanical engineering class.

DELROY F. RYNNING AWARD: Initiation fee and half-year's junior membership dues to A.I.Ch.E. to a graduating member of the student chapter judged by his classmates to become most valuable member to the society. A memorial to the late Delroy F. Rynning established by his friends and associates.

SIGMA TAU AWARD: A medal awarded each year to the sophomore student in engineering who as a freshman was the most outstanding student.

TAU BETA PI LOCAL AWARDS: Award of $5 for the best essay submitted in the student chapter of the society. Certificates of merit are also awarded to freshmen in engineering having the highest scholastic standing during the first two terms of the year.

School of Forestry

ANNUAL CRUISE CUP: Revolving cup to staff member of the *Annual Cruise*, School of Forestry yearbook, who is judged to have contributed most to success of the publication.

WILLIAM M. ESKEW MEMORIAL AWARD: Dedicated to memory of William Eskew and awarded annually for outstanding performance in Forestry Orientation Day contest competition.

KELLY AXE AWARD: Presented by Kelly Axe Company to the senior in forestry who has contributed most to the success of the School of Forestry.

PACK FORESTRY AWARD: Income from a gift of $2,000 made by Mr. Charles Lathrop Pack of New Jersey awarded annually to the student in forestry who produces the most interesting, logical, and technically significant paper for publication.

XI SIGMA PI PLAQUE: Awarded each year to the student in forestry who has maintained the highest grade average during the sophomore year.

School of Home Economics

ELECTRICAL WOMEN'S ROUND TABLE OF PORTLAND AWARD: $100 to a home economics junior. Awarded on the basis of financial need, good scholarship, and interest and aptitude in electric equipment studies.

HOME ECONOMICS FRESHMAN AWARD: An award of $10 to promote scholarship and leadership in home economics, the recipient being selected by a committee representing Omicron Nu and the faculty in home economics.

JOHNSON AWARD: $40 annually as a memorial to Miss A. Grace Johnson, professor of household administration (1915-1933), for a home economics junior or sophomore whose grade-point average is above student body average.

LATHROP AWARD: An annual award of $50 by the Oregon Home Economics Extension Council to a junior or senior in home economics in memory of K. and Ethel Lathrop.

LEE AWARD: $40 annually as a memorial to Mrs. Minnie E. Lee and Mr. J. B. Lee, awarded each year to a junior in home economics who has shown improvement in her college work, stability and meritorious record in all her activities, and general all-round worthiness.

OMICRON NU PLAQUE: Awarded each year to the senior woman who has best lived the teachings of home economics throughout her college career.

School of Pharmacy

BRISTOL LABORATORIES AWARD: A personalized copy of the Modern Drug Encyclopedia, awarded annually to a senior who has achieved notably during his academic residence.

KAPPA PSI AWARD: An advanced reference in pharmacy or pharmacology given each year to the senior student who, in opinion of his classmates, has most outstandingly displayed qualities of character, leadership, and service.

LAMBDA KAPPA SIGMA SCHOLARSHIP KEY: Awarded annually to the senior member of Lambda Kappa Sigma, women's honorary in pharmacy, who has maintained the highest scholastic average.

MCKESSON AND ROBBINS AWARD: $50 awarded annually by the Portland Branch of the company to the senior student scoring highest in a comprehensive examination in pharmacy.

MERCK AWARDS: Two sets of reference books awarded annually to senior students having highest scholastic averages in pharmacy and in pharmaceutical chemistry.

RHO CHI AWARD: An advanced reference in pharmacy or related field awarded each year to junior student having achieved highest scholastic rating in professional studies.

WOMEN'S AUXILIARY, OREGON STATE PHARMACEUTICAL ASSOCIATION AWARD: $100 annually to a deserving woman student in pharmacy.

Oregon State University Student Affiliates of National Professional Societies

American Association of Health, Physical Education, and Recreation
American Chemical Society
American Foundryman's Society
American Guild of Organists
American Institute of Chemical Engineers
American Institute of Electrical Engineers
American Institute of Industrial Engineering
American Meteorological Society
American Pharmaceutical Association
American Society of Agricultural Engineers
American Society of Agronomy
American Society of Civil Engineers
American Society of Mechanical Engineers
American Society of Tool and Manufacturing Engineers
Associated Western Forestry Clubs (West)
Institute of the Aeronautical Sciences
Institute of Radio Engineers (OSU Branch)
National Education Association
Oregon Education Association
Pacific Northwest Personnel Management Association
Semper Fidelis Society (Marines)
Society for the Advancement of Management
Society of American Military Engineers
Society of Automotive Engineers

Honor Societies*

Organization	Men or women	Date established nationally	Date established at Oregon State	Type or field of interest
General Honor Societies				
Alpha Lambda Delta	W	1924	1933	Freshman scholarship
Mortar Board	W	1918	1933	Senior leadership
Omicron Nu	W	1912	1919	Home Economics
Phi Eta Sigma	M	1923	1949	Freshman scholarship
Phi Kappa Phi	Both	1897	1924	Scholarship
Sigma Tau	M	1904	1913	Engineering
Sigma Xi	Both	1886	1937	Science Research
Tau Beta Pi	M	1885	1925	Engineering
Xi Sigma Pi	M	1908	1921	Forestry
Departmental Honor Societies				
Beta Alpha Psi	Both	1919	(1923) 1959	Accounting
Eta Kappa Nu	M	1904	1921	Electrical Engineering
Iota Sigma Pi	W	1900	1960	Chemistry
Kappa Delta Pi	Both	1911	1928	Education
Pi Tau Sigma	M	1916	1941	Mechanical Engineering
Rho Chi	Both	1908	1922	Pharmacy
Sigma Delta Pi	Both	1919	1959	Spanish
Sigma Pi Sigma	Both	1921	1934	Physics
Men's Professional Fraternities				
Alpha Delta Sigma	M	1913	1926	Advertising
Alpha Zeta	M	1897	1918	Agriculture
Gamma Theta Upsilon	M	1928	1956	Geography
Kappa Psi	M	1879	1912	Pharmacy
Sigma Delta Chi	M	1909	1920	Journalism
Women's Professional Fraternities				
Lambda Kappa Sigma	W	1913	1930	Pharmacy
Phi Chi Theta	W	1924	1924	Commerce (Secretarial Science)
Theta Sigma Phi	W	1909	1925	Journalism
Recognition Societies				
Alpha Phi Omega	M	1925	1946	Service (Boy Scouts of America)
Arnold Air Society	M	1947	1951	Air Science
Blue Key	M	1924	1934	Service (Seniors)
Delta Sigma Rho	Both	1906	1926	Forensics
Epsilon Pi Tau	M	1927	1929	Industrial Arts
Kappa Kappa Psi	M	1919	1922	Band
Kappa Pi	Both	1911	1949	Art
National Collegiate Players	Both	1922	1923	Dramatics
Pershing Rifles	M	1894	1925	Military (Army)
Phi Lambda Upsilon	M	1899	1928	Chemistry
Phi Sigma	Both	1915	1933	Biology
Pi Mu Epsilon	Both	1914	1933	Mathematics
Scabbard and Blade	M	1904	1920	Military
Local Honor Societies				
Euterpe	W	.....	1920	Music
Masque and Dagger	Both	.....	1917	Dramatics
Mu Beta Beta	Both	.....	1928	4-H Club
Orange O	W	.....	1922	Physical Education
Orchesis	W	.....	1930	Dancing
Parthenia	W	.....	1929	Physical Education
Silver Wings	M	.....	1956	Air Science

* As classified by *Baird's Manual*, 1957.

Activities

Oregon State recognizes the value of student activities. Leadership experience through self-governed clubs and societies encourages the formation of habits of civic responsibility. Activities enhance cultural development by fostering participation in the intellectual and esthetic life of the campus. Because of their close relationship to the educational program, many activities are cocurricular rather than extracurricular.

Memorial Union

The Memorial Union located near the center of campus is the hub around which student activity revolves. It provides the campus center for democratic fellowship among students, faculty, alumni, and friends of Oregon State. Every day hundreds of students flow through its social rooms, bookstore, and post office. They study, relax, and visit in the comfortable lounges; they hold committee meetings and social hours in the club and game rooms; they pause between classes at the counter or in the booths of the coffee shop, or in the impressive Commons dining hall.

The building contains offices for student organizations and activities. It provides a tearoom and a cafeteria open to the public, a telegraph office, a barber shop, a ballroom, and new bowling lanes. From the roof the carillonic bells ring out the changing of classes and the close of the day.

The president of the Memorial Union is a student; other students share actively in its management and in organizing the social program.

The Memorial Union honors the memory of the men and women who gave their lives in the service of their country in the Spanish-American War, World War I, World War II, and the Korean conflict. The building was financed from funds provided by students, alumni, faculty members, and other friends of OSU.

Student Self-Government

The Associated Students of Oregon State University (ASOSU) is the voice of the students organized to participate in campus government. Among its many activities it sponsors and coordinates all campus-wide student programs such as Homecoming, Dads Weekend, Mothers Weekend, Campus Chest Drive, and special emphasis weeks.

Associated Women Students, a group within the general student body organization, coordinates, sponsors, and supervises activities of all women students' organizations.

Class organizations, formed by each entering class, retain their identity throughout the four undergraduate years. Class reunions are held regularly after graduation by alumni. Graduating classes usually leave a gift to the institution. Classes returning after twenty-five years for their silver anniversary jubilee also make gifts as an expression of their loyalty to their alma mater.

The **Associated Independent Students** unifies independent students for participation in campus life and government.

Women's Councils which are related to living groups and which play important roles in student self-government include the House Presidents' Council, Panhellenic Council, Interhall Council, and Co-Resident Council.

Men's Councils which are related to living groups and which provide opportunity for campus-wide experience in student leadership include the Interfraternity Council, Interdormitory Council, and Co-op Council.

Other Activities

Art and Music. Exhibits, lectures, concerts, and recitals sponsored by the Art and Music departments, the Associated Students, and student musical and art organizations play a central part in the cultural life of the community. Under the patronage of the Memorial Union Student Committee and the Art Department, exhibitions in the Memorial Union stimulate interest in architecture, painting, sculpture, and related arts. They give the student acquaintance with the best of his historical inheritance and knowledge of contemporary art movements throughout the world. Student and faculty exhibits of art work are shown in the Kidder Hall galleries throughout the year.

Membership in the student musical organizations is open to all students after consultation with the directors concerned. Honor societies also promote art and music interests on the campus.

The Symphony Orchestra and Concert Band each play one major concert on the campus annually and make a number of such appearances in other communities; they perform frequently for other major campus events. The Men's Glee Club and the Women's Madrigal Club present seasonal concerts both as separate choruses and as one large choir, the Chorus. The Choralaires, selected from the membership of the Chorus, is the traveling group, making several off-campus appearances annually.

In cooperation with Corvallis and OSU Music Association, the Educational Activities Board brings artists of international fame to the campus for concerts and recitals. Advanced music students and faculty also give public recitals during the year. Several dance recitals are given each year under the auspices of the Division of Physical Education, Orchesis, and other organizations.

Forensics, Dramatics, and Radio and Television. Speech activities have intellectual and cultural value for both the participants and the campus community. Oregon State is a member of the Pacific Forensic League and the Intercollegiate Forensic Association of Oregon. Special student organizations, such as Masque and Dagger, the Telemike Club, the Campus Puppeteers, and chapters of Delta Sigma Rho and National Collegiate Players, also provide outlets for forensic and dramatic talent.

Training and experience in acting, play production, and stagecraft are provided by the Speech Department. Each season, seven major plays and groups of one-act plays are presented in the College Playhouse in connection with course work. The well-equipped radio and television studios in Shepard Hall afford practical training in the mass media of communication. Radio programs are written and broadcast over local radio stations; television programs are prepared and telecast over a closed-circuit system. The Forensic Division of the Associated Students sponsors a full schedule of forensic activities for both men and women students, including debate, oratory, extempore speaking, after-dinner speaking, and discussion—all under direction of the Speech Department. Each year, thirty to forty students compete in eight state intercollegiate speaking contests and at least a half dozen regional and national forensic tournaments. Many students are also given an opportunity to speak or read before service clubs, lodges, granges, and other groups. For participation in these activities, a student may earn regular credit.

Lectures. Frequent public lectures by faculty members and visiting scholars and persons prominent in national affairs supplement the regular curriculum. Campus sponsors of lectures include the Committee on Concerts and Lectures, Faculty Men's Club, American Association of University Women, Faculty Women's Club, College Folk Club, Lower Division Faculty, Com-

mittee on Religious Education, Round Table, Associated Students, Associated Women Students, Phi Kappa Phi, Sigma Xi, and others.

Sports and Athletics. In addition to intercollegiate athletics, a comprehensive program of intramural sports is closely correlated with instruction in physical education. Stimulation and recognition of achievement in athletics and sports are provided through the Division of Physical Education, honor societies in physical education, and a variety of sports interest groups.

Student Publications. Student publications include the following: *The Oregon State Daily Barometer* (four days a week); *The Beaver* (yearbook issued in May); *Oregon State Student Handbook* (Rook Guide); *The Annual Cruise* (illustrated annual published by Forestry Club); *The Oregon State Student Directory* (published by student journalism and advertising societies).

Eligibility for Participation

Before a student can qualify for an elective or appointive office in any student, extracurricular, or organization activity he must obtain a certificate of eligibility from the Dean of Men or the Dean of Women. He must be registered for at least 12 term hours and have an accumulative grade-point average of at least 2.00, with a 2.00 for the preceeding term during which he must have completed at least 12 hours. A student becomes disqualified to continue in office any term in which he drops below a 12-term-hour load.

Complete rules regarding eligibility for participation in student activities are included in *Student Regulations,* a copy of which goes to each student at fall term registration.

Parent and Alumni Cooperation

Dads and Mothers Clubs

The Dads Club of Oregon State University, composed of fathers or male guardians of students attending Oregon State, has as its purposes to preserve the traditions and the future usefulness of the institution; to cooperate with the administration of higher education in Oregon; and to cooperate with similar organizations throughout the State. Scholarships are donated annually to worthy students in need of financial aid.

The Mothers Club of Oregon State University is open to all mothers and other women interested in furthering the interest and welfare of students of Oregon State. "Once an Oregon State Mother, always an Oregon State Mother." Individual units of the Mothers Club are organized in many communities of the State. Also, there are clubs of mothers of individual fraternity, residence hall, and organized independent groups. Annual meetings of the State organization is held on campus Mothers Weekend. The clubs donate tuition scholarships to deserving and needy students.

Alumni Association

Informed, organized alumni backing of college projects is provided by the Oregon State University Alumni Association. The Association publishes the *Oregon Stater,* a monthly alumni magazine, distributed to all alumni fund

contributors. *News of Oregon State* is mailed five times each year to all alumni with good addresses. Attendance at Oregon State makes one eligible for membership in the Association. All contributions to the Oregon State Fund are considered by the Alumni Board of Directors for allocation to the various categories of need. Contributions to the Fund will accumulate toward a life membership in the Association received by any Oregon Stater who contributes a total of $100 or more.

Officers and directors of the association are elected at the annual business meeting which is held in June. Directors serve for a 3-year period and officers are elected annually. Officers and directors are:

JOHN FENNER, '40, Corvallis ..... President
N. B. GIUSTINA, '41, Eugene ..... Vice President
MRS. RUTH LUNDGREN PASLEY, '35, Portland ..... Vice President
ROBERT ADAMS, '48, Corvallis ..... Treasurer
ROBERT KNOLL '48, Corvallis ..... Director of Alumni Relations
TED H. CARLSON, '50, Corvaliis ..... Assistant Director of Alumni Relations

Executive Committee:

AMBY FREDERICK, '32, Portland
HERBERT KIRKPATRICK, '34, Condon
ROBERT WHITE, '39, Salem
M. M. HUGGINS, '38, Medford
CLYDE WILLIAMSON, '08, Albany

Directors:

A. H. SMITH, '41, Corvallis
THOMAS DELZELL, '24, Portland
C. H. GRAHAM, '36, Seattle, Washington
MRS. MAE CALLAWAY COPENHAGEN, '41, Oswego
ROBERT SWAN, '50, Portland
MRS. FREIDA LINDER BLAKELY, '37, Portland
ROBERT RUSHING, '36, Oswego
JOHN GALLAGHER, SR., '00, Corvallis
H. W. LARSON, '43, Astoria
ED RIDDERBUSCH, '50, Tillamook
FLOYD MULLEN, '28, Albany
JOHN HACKENBRUCK, '46, Coos Bay
NORM KENNEDY, '52, Madras
ROBERT THOMPSON '25, Klamath Falls
JOHN MULLIGAN, '51, Pendleton
JOHN ALEXANDER, '49, Enterprise
JOE OLIVER, '40, John Day
FRANK HILL, '33, La Canada, California
RUSS STEARNS, '24, Piedmont, California
E. J. KEEMA, '33 Sacramento, California
M. JOE CARTER, '40, Spokane, Washington
ROBERT HOUSE, '41, Stockton, California

School Representatives:

Agriculture: TERRY ELDER, '47, Corvallis
Business and Technology: DONALD C. ELDREDGE, '46, Camas, Washington
Education: RALPH E. JONES, '27, Grants Pass
Engineering: HILBERT S. JOHNSON, '36, Portland
Forestry: RUDY KALLANDER, '40, Corvallis
Home Economics: MRS. BARBARA BURTIS PECK, '32 Portland
Pharmacy: WILLIAM F. RAW, '29, Corvallis
Science: DR. JAMES A. RILEY, JR., '42, Corvallis
Humanities and Social Sciences: MRS. ALICE INGALLS WALLACE, '32, Covallis

Oregon State University Federation. The Oregon State University Federation, organized in 1951, includes representatives of the Associated Students, the Mothers Club, the Dads Club, and the Alumni Association. Its purpose is to coordinate, implement, and encourage the activities of the various member groups in behalf of Oregon State and its students. Officers are URSEL H. NARVER, Portland, Chairman; and MRS. JOHN WIEMAN, Portland, Secretary.

Oregon State College Foundation

The object of the Oregon State College Foundation, as stated in its articles of incorporation, is to aid and promote educational and charitable activities and purposes, and specifically, to solicit, acquire, receive, hold, manage, construct, use, maintain, lease, exchange, and dispose of all kinds of property, whether acquired absolutely or in trust, for the benefit of OSU. Substantial gifts have been received and, since its incorporation in 1947, the Foundation has become an important adjunct to the advancement of the work of Oregon State.

Board of Trustees:

DONALD W. HOLGATE, San Francisco
GLENN L. JACKSON, Medford
ROBERT M. KERR, Portland
MRS. RAYMOND KINSER, Portland
CHARLES H. REYNOLDS, La Grande
CLAUDE F. PALMER, Portland
A. L. STRAND, Corvallis
ROBERT A. THOMPSON, Klamath Falls
MARION T. WEATHERFORD, Arlington
LINDSEY H. SPIGHT, San Francisco
GEORGE F. CHAMBERS, Salem
CHARLES W. FOX, Portland

Officers:

MARION T. WEATHERFORD, President; GLENN JACKSON, Vice President; ROBERT M. KERR, Treasurer; and A. L. STRAND, Secretary.

Councilors:

JOHN FENNER, President, Oregon State Alumni Association, Corvallis
ED LEWIS, President, Oregon State Dads Club, Salem
MRS. PHIL SCHROEDER, President, Oregon State Mothers Club, Klamath Falls
ROBERT P. KNOLL, Director of Alumni Relations, Corvallis

Summer Session

FRANKLIN ROYALTON ZERAN, Ph.D., Director of the Summer Session.

THE 8-WEEK SUMMER SESSION serves several groups of students; undergraduate and graduate students who wish to shorten time for completing degree requirements, mature students who have the summer free for study and travel, junior-college graduates and transfer students who need to make adjustment in their programs before entering advanced or professional training, recent high school graduates, and others who find the campus of Oregon State University a pleasant and profitable place for summer studies in many fields.

Instead of the 8-week program followed in other schools, and departments, the School of Home Economics operates on a 6-week basis in the Summer Session. A student may earn up to 9 term hours in this period.

Summer Courses. Ten schools and divisions participate. Courses offered include: basic courses in humanities and social sciences; undergraduate and graduate work in all departments of science; business administration, secretarial science, and business education; six-week undergraduate and graduate courses in home economics; a limited number of engineering courses; industrial engineering, industrial arts, and industrial arts education; basic and advanced course work in teaching theory stressing the training of guidance, testing, and counseling specialists; both recreational and professional physical education course work; and workshops and seminars which supplement the regular courses.

Inter Session. This session begins on the Monday following the regular 8-week session and continues for four weeks. An individual may earn up to 6 term hours in this period. This is separate and distinct from the Post Session which begins on the Monday following the regular 8-week session, continues for two weeks, and is open only to graduate students who have attended the entire 8-week Summer Session.

Credit and Fees. Students may earn a total of up to 12 term hours of credit in the 8-week session. Under certain conditions an additional three credits of graduate work may be taken in a 2-week post session in the School of education. An Inter Session of four weeks permits a student to take an additional 6 term hours of undergraduate and/or graduate work. For fees and tuition see pages 28-30.

Summer Information. For this year's Summer Session Calendar see pages 4-5. The Summer Bulletin and other special announcements may be obtained by writing the Director of the Summer Session, Oregon State University.

Liberal Arts and Sciences

At Oregon State University courses pertaining to the liberal arts and sciences are offered in the School of Humanities and Social Sciences and the School of Science.

The School of Humanities and Social Sciences offers: (1) Liberal arts courses with a divisional major in Humanities leading to the degree of Bachelor of Arts and a divisional major in General Social Science leading to a degree of Bachelor of Arts or Bachelor of Science. (2) Electives and service courses in the humanities and social sciences for students majoring in other schools. (3) Lower division work in the professional fields of Architecture and Allied Arts (including Art and Landscape Architecture), Journalism, and Music. (4) Basic courses in humanities and social sciences as preparation for later specialization in a liberal or professional field.

The School of Science offers: (1) Liberal arts courses with departmental majors leading to the degree of Bachelor of Arts or Bachelor of Science in General Science, Microbiology and Hygiene, Botany, Chemistry, Entomology, Geology, Mathematics, Natural Resources, Physics, and Zoology. (2) Professional education for students planning to enter some occupation within the realm of science. Such students may take an undergraduate science major and from one to three years or more of graduate study in science leading to master's and Ph.D. degrees. (3) Elective and service courses in science for students majoring in other schools, or for students who take science as a basis for professional or technical work in other schools.

Group Courses

Sequences in liberal arts and sciences, applicable in meeting group requirements for the Junior Certificate, are offered in the School of Humanities and Social Sciences and the School of Science. These sequences are designated by the Liberal Arts Requirements Committee composed of faculty members from both schools. The group requirements are:

1. In the School of Humanities and Social Sciences—at least one sequence in each of three "groups" representing comprehensive fields of knowledge: (a) humanities, (b) science, (c) social science, and a second sequence in any one group.
2. In the School of Science—at least one sequence or 9 term hours approved by the dean in each of groups (a) and (c).

Humanities

ENGLISH

[1]Eng 101,102,103. Survey of English Literature. 3 hours each term.
[1]Eng 104,105,106. Appreciation of Literature. 3 hours each term.
[1]Eng 107,108,109. World Literature. 3 hours each term.
Eng 201,202,203. Shakespeare. 3 hours each term.
Eng 253,254,255. Survey of American Literature. 3 hours each term.

GERMANIC LANGUAGES

GL 101,102,103. Second-Year German. 2, 3, or 5 hours each term. (Applicable as a *second* Literature sequence when taken for 3 or 5 hours each term.)
GL 201,202,203. Survey of German Literature. 3 hours each term.

[1] Only one of these sequences may apply toward fulfilling group requirements.

ROMANCE LANGUAGES

FRENCH

RL 101,102,103. Second-Year French. 2, 3, or 5 hours each term. (Applicable as a *second* Literature sequence when taken for 3 or 5 hours each term.)
RL 201,202,203. Survey of French Literature. 3 hours each term.

SPANISH

RL 107,108,109. Second-Year Spanish. 2, 3, or 5 hours each term. (Applicable as a *second* Literature sequence when taken for 3 or 5 hours each term.)
RL 207,208,209. Survey of Spanish Literature. 3 hours each term.

SLAVIC LANGUAGES

SL 101,102,103. Second-Year Russian. 2, 3, or 5 hours each term. (Applicable as a *second* Literature sequence when taken for 3 or 5 hours each term.)

PHILOSOPHY

Phl 201,202,203. Introduction to Philosophy. 3 hours each term. (Applicable as a *second* sequence in this group.)

Science

SCIENCE SURVEYS

GS 101,102,103. General Biology. 4 hours each term.
GS 104,105,106. Physical Science. 4 hours each term.

MICROBIOLOGY

Bac 200. Bacteriology Lab. 2 hours. (See Interdepartmental Combinations, below.)
Bac. 204,205,206. General Bacteriology. 4 hours each term.

BOTANY

Bot 201,202. General Botany. 3 hours each term. Bot. 203. Field Botany. 3 hours. (See Interdepartmental Combinations, below.)

CHEMISTRY

Ch 101,102,103. General Chemistry. 3 hours each term.
Ch 201,202,203. General Chemistry. 3 hours each term.
Ch 204,205. General Chemistry. 4 or 5 hours each term.
Ch 206. Qualitative Analysis. 4 or 5 hours.

ENTOMOLOGY

Ent 200. General Entomology. 3 hours. (See Interdepartmental Combinations, below.)

GEOLOGY

G 201,202,203. Geology. 3 hours each term. (May be accompanied by G 204,205,206. Geology Laboratory. 1 hour each term.)

MATHEMATICS

Mth 100, Intermediate Algebra; Mth 101, College Algebra; Mth 102, Trigonometry; 4 hours each term. St 311, Descriptive Statistics, 3 hours. Any three in this group.
Mth 200,201,202,203. Calculus with Analytic Geometry. 4 hours each term. Any three in this group.

PHYSICS

Ph 201,202,203. General Physics. 4 hours each term.
Ph 204,205,206. Astronomy. 3 hours each term.
Ph 207,208,209. Engineering Physics. 4 hours each term.

PSYCHOLOGY

Psy 201,202. General Psychology. 3 hours each term: Psy 205. Applied Psychology. 3 hours; when accompanied by Psy 208,209,210. Psych Lab. 1 hour each term.

ZOOLOGY

Z 114,115,116. Human Biology. 3 hours each term, when accompanied by Z 117 118, 119. Human Biology Laboratory. 1 hour each term.
Z 200. General Zoology. 5 hours. (See Interdepartmental Combination, below.)
Z 201,202,203. General Zoology. 3 hours each term.

INTERDEPARTMENTAL COMBINATIONS. Any two of the four following:

Bac 200. Bacteriology Laboratory; Bac 230. Prin of Bacteriology; total of 5 hours.
Bot 201,202. General Botany. 6 hours. Z 200. General Zoology. 5 hours.
Ent 200. General Entomology. 3 hours.

Social Science

GENERAL SOCIAL SCIENCE

SSc 101,102,103. Background of Social Science. 3 hours each term.

ECONOMICS

Ec 201,202,203. Principles of Economics. 3 hours each term.
Ec 213,214. Principles of Economics. 4 hours each term. Ec 215. Economic Development of the United States. 3 hours.

GEOGRAPHY

Geog 105,106,107. Introductory Geography. 3 hours each term.

HISTORY

Hst 101,102,103. History of Western Civilization. 3 hours each term.
Hst 224,225 226. History of American Civilization. 3 hours each term.

POLITICAL SCIENCE

PS 201,202,203. American Governments. 3 hours each term.
PS 206. European Political Systems. 3 hours. (With PS 201 and PS 202 *or* 203 may be counted as a sequence.)

PSYCHOLOGY

Psy 201,202. General Psychology. 3 hours each term. Psy 205. Applied Psychology. 3 hours. (May be accompanied by Psy 208,209,210. Psych Lab. 1 hour each term.)

SOCIOLOGY

Soc 204,205,206. General Sociology. 3 hours each term.
Soc 214,215,216. Anthropology. 3 hours each term.

School of Humanities and Social Sciences

Faculty

as of January 1961

RALPH COLBY, Ph.D., Dean of the School of Humanities and Social Sciences.

FRANK LOVERN PARKS, Ph.D., Head Counselor.

Architecture: Professor H. R. SINNARD (department head); Associate Professors ELLIS, WASSON; Assistant Professors GLASS, PEACOCK-LOUKES.

Art: Professor GILKEY (department head); Associate Professors FOX, GUNN, JAMESON,[1] SANDGREN, WASSON, WHITE; Assistant Professors HUCK,* S. LEVINE, ROCK, TAYSOM, TROJAN; Instructor PILADAKIS.

Economics: Professors FRIDAY (department chairman), DREESEN (emeritus), M. N. NELSON; Assistant Professors L. G. HARTER, ORZECH, PATTERSON; Instructors C. M. HARTER, R. W. NELSON; Graduate Assistants NORTON, SCHNEIDER.

Geography: Professors JENSEN (chairman), HIGHSMITH; Associate Professors HEINTZELMAN, MYATT, RUDD; Instructor LEVERENZ.

English: Professors H. B. NELSON (department head), CHILDS, COLBY, FOREMAN, GIBSON, JENKINS, S. H. PETERSON (emeritus), M. E. SMITH (emeritus); Associate Professors BROWN, GROSHONG, LIGON, MALAMUD,[2] SCHROEDER, E. D. SMITH; Assistant Professors DUBBÉ, FINNIGAN, GARRISON,[3] GILBERT, HEWITT, HUFF,[4] KING, KRANIDAS,[4] LAWRENCE, LUDWIG,[4] MCELFRESH (emeritus), MITCHELL, NORRIS, ONSTAD, STAVER, N. W. WILSON; Instructors BUTTS, CARLSON, CARTER, DIXON, HAISLIP, HENLEY, LEAHY, LUNDAHL, MCCLANAHAN, MCCORKLE, MCELROY, P. B. NELSON, POTTS, E. E. WALLACE, WHEELER, WILLEY.

History: Professors ELLISON (department head), C. K. SMITH, R. W. SMITH, VAUGHN (emeritus); Associate Professors BERKELEY, CARLIN, Assistant Professors ADOLF, SHAW, THAYER; Instructors MCCLINTOCK, PUTNAM.

Journalism: Professor SHIDELER (department head); Associate Professors BAILEY, I. C. HARRIS, LAKE; Assistant Professor ZWAHLEN.

Landscape Architecture: Professors MARTEL (department head), PECK (emeritus); Associate Professor SOLBERG (emeritus); Assistant Professors FREDEEN, RICKARD.

Modern Languages: Professors KRAFT (department chairman), BOURBOUSSON (emeritus), DAWES (emeritus); Associate Professors JURGENSON, KUNEY (emeritus), LEWIS (emeritus), RICHTER; Assistant Professors G. A. LEVINE, SJOGREN; Instructors EDELMANN, PERRY-RACZ, SOLINIS-HERRERO.

[1] On sabbatical leave 1960-61.
[2] On leave fall and winter terms 1960-61.
[3] On sabbatical leave winter term 1960-61.
[4] On leave 1960-61.
* Deceased March 13, 1961.

Music: Professors WALLS (director), BRYE, SITES;[1] Associate Professors GRAY,[2] MESANG, O'CONNOR, ROBERTS; Assistant Professors MOLTMANN, O. J. WILSON; Instructors KALDOR,[3] KNAPP, MURRAY.

Philosophy: Professor HOVLAND (department chairman); Assistant Professors ANTON, UNSOELD.

Political Science: Professors WALTER (department chairman), DUBACH (emeritus), SWYGARD; Associate Professors FUQUAY, MADDOX, MCCLENAGHAN; Assistant Professor GREEN.

Psychology: Professor CROOKS (department chairman); Associate Professors MILLS, ROHDE; Assistant Professors BRODY, CRAWFORD, DAMM, LEWIS, MADDEN, SIMMONS, SIMPSON, VAN LOAN; Instructors TAUBMAN, S. A. WILSON.

Religion: Professor HOVLAND (department chairman); Assistant Professor UNSOELD; Instructor ZEIGLER.

Sociology: Professors PLAMBECK (department chairman), BAKKUM; Associate Professor PARKS, Assistant Professors CANTRELL, FOSTER; Instructor CURRY.

Speech: Professors WELLS (department chairman), CORTRIGHT, YOUNG; Associate Professors C. N. HARRIS, LIVINGSTON, WINGER; Assistant Professors DOLER, HENRY, HILDEBRANDT, R. W. PETERSON, A. L. WALLACE; Instructors BENNETT, GONZALEZ, GROVER, PHILLIPS.

General Statement

Majors. The divisional major programs of the School of Humanities and Social Sciences provide a broad liberal education in accord with a philosophy which encourages breadth rather than specialization at the undergraduate level. The maximum number of credit hours in any one specific subject matter field which a student may count toward meeting degree requirements is 36. To ensure a well balanced as well as a broad education, the student combines a prescribed program of studies in either the subject area designated Humanities or that designated Social Sciences with a minor in the second area and in addition an approved minor in science or science and technology.

The **Humanities** are those fields of knowledge and experience having to do with the productions of man as a feeling, thinking creator and communicator of beauty and truth. They include the fields of Architecture, Art, English, Journalism, Landscape Architecture, Modern Languages, Music, Philosophy, Religion, and Speech. The **Social Sciences** are those fields of knowledge having especially to do with human institutions, customs, and behavior which define man's social relationships. They include Economics, Geography, History, Political Science, Psychology, and Sociology.

The School of Humanities and Social Sciences does not offer departmental or specialized majors. A student who wishes a departmental major should enter at the beginning of the freshman year an institution where such majors are offered. A student who, after enrolling in the School of Humanities and Social Sciences, decides that he wishes a specialized major will need to transfer to another institution.

Science and Science-Technology Minors. The student has a wide choice among approved minors in science or in science combined with technological courses. These minors range from 28 to 37 term hours, 33 hours being most frequent. See list on a following page. The aim of these minors is not to prepare the specialist but to provide the student with insight and understanding in some area of particular significance in the technological society of which he is a part.

[1] On leave 1960-61.
[2] On sabbatical leave 1960-61.
[3] Winter and spring terms 1961.

Co-majors in Defense Education. Under the principles establishing Defense Education at Oregon State College it is stipulated that the prescribed 4-year program in Air Science, or Military Science and Tactics, or Naval Science may be taken by men as a co-major in any school (see DEGREES AND CERTIFICATES). The approved co-major in Naval Science is accepted in the School of Humanities and Social Sciences as satisfying the requirements of a minor in science or science and technology. It is expected that approved co-majors in Air Science and in Military Science and Tactics, when accompanied by prescribed science courses, will be similarly accepted at a later date.

Degree Requirements. In addition to fulfilling institutional requirements (see DEGREES AND CERTIFICATES), the candidate for a baccalaureate degree must complete (1) a minimum of 72 hours of prescribed and elective courses in either Humanities or Social Sciences, 36 of which must be upper division; (2) a minor in the other area (Social Sciences or Humanities), a minimum of 18 approved hours; (3) an approved minor in science or science and technology.

Certificates. A student who has completed a total of at least 93 term hours of required and elective freshman and sophomore work and has met requirements (see DEGREES AND CERTIFICATES) may be granted a Junior Certificate. For the Junior Certificate the student must complete a sequence in each of three groups of courses; Humanities, Science, Social Science, and a second sequence in any one of the groups. See GROUP COURSES.

Individual Counseling. Each entering student is assigned to a faculty adviser in his major field who assists him in building a study program in line with his needs and interests and with school and institutional requirements. Special advisers are provided for prelaw students and those preparing to enter the Schools of Engineering and Forestry.

Lower Division and Service Departments

Under the plan adopted for the Oregon State System of Higher Education on March 7, 1932, major work in the fields of arts and letters, architecture and allied arts (including art and landscape architecture), journalism, music, and social sciences was confined to the University of Oregon. Lower division work in these fields may be taken at Oregon State University. Similarly, in certain fields in which major work is confined to Oregon State University, work is offered at the University of Oregon as follows: in home economics, lower division and service courses; in secretarial science, lower division service courses. At each institution, in addition to the lower division work, upper division service courses are offered in the nonmajor departments for students in other fields.

While it is recommended that students wishing a departmental major in any of these fields enter at the beginning of the freshman year the institution at which major work is offered, they may, if they wish, complete the first two years of work in any of these fields at the nonmajor institution, and transfer to the major institution at the beginning of the junior year with fundamental requirements for upper division work fully met. Students will be aided in the selection of lower division studies preparing them for majoring in these fields at the upper division level at the University of Oregon.

Preparatory Dental, Medical, and Nursing Education curricula are offered at Oregon State through the School of Science.

Curricula in Humanities and Social Sciences

B.A., B.S. Degrees

General Notes

a. In the School of Humanities and Social Sciences the minimum number of term hours required is 192 with a maximum of 170 in a major curriculum. As many as 36 hours in any Social Science or Humanities subject matter field may be counted toward the bachelor's degree. Students should choose elective courses suited to their interests and vocational and educational goals.

b. In the freshman year, General Hygiene (PE 150, 1 term for men; PE 160, 2 hours for men or women) is taken instead of physical education.

c. Students expecting to meet the foreign language requirement for a B.A. degree in the General Social Science curriculum should elect a language in the freshman and sophomore years. If two years of a language are elected in these years, completion of minor requirements in Humanities may be postponed until the junior and senior years.

d. For a State Teacher's Certificate, 6 hours of psychology should be elected in the sophomore year, as it is prerequisite to prescribed upper division courses in education and psychology. This requirement may be met by Psy 201,202.

e. Students wishing to qualify for a State Teacher's Certificate should elect 14 term hours in prescribed education and psychology courses in the junior year, at least 13 term hours in the senior year. Students must have a GPA of 2.50 in a recognized teaching major (see SCHOOL OF EDUCATION) and must have a teaching minor. Arrangements to do student teaching during the senior year must be made with the director of student teaching during registration for winter term of the junior year.

f. For graduation each student in the school is required to maintain a 2.00 GPA in his major field.

HUMANITIES

Freshman Year	*Hours*
English Composition (Wr 111,112 113)	9
Survey of English Lit (Eng 101,102,103) or World Lit (Eng 107,108,109)	9
Journalism, Speech, or Writing Courses	6
Approved Speech Course	3
History of Western Civilization (Hst 101,102,103)	9
Air, Military, or Naval Science (men)	3–9
Physical Education	3
Electives	6–0

Sophomore Year	
Approved Electives in Art, Landscape Architecture, or Music	9–3
Approved Philosophy Courses	9
First-Year Foreign Language	12
Approved Natural Science or Science-Technology Courses	9–12
Air, Military, or Naval Science (men)	3–9
Physical Education	3
Electives	3–0

Junior Year	
Approved Electives in Art, Landscape Architecture, or Music	0–6
[1]Upper Division Courses in Humanities	18
Second-Year Foreign Language	9
Approved Natural Science or Science-Technology Courses	9–12
Humanities Seminar (Hum 307)	3
Electives	9–0

Senior Year	
[1]Upper Division Courses in Humanities	9
Humanities Seminar (Hum 407)	6
Approved Natural Science or Science-Technology Courses	9–15
Social Science Electives	9
Electives	15–9

[1] Upper division courses in the major area must include 18 hours of work in one department and 9 hours in one or more other departments.

GENERAL SOCIAL SCIENCE

Freshman Year	*Hours*
English Composition (Wr 111,112,113)	9
History of Western Civilization (Hst 101 102,103)	9
Approved Social Science Sequence	9
Approved Sequence in Literature	9
Air, Military, or Naval Science (men)	3–9
Physical Education	3
Electives	6–0
Sophomore Year	
Approved Social Science Sequence	9
A Second Approved Social Science Sequence	9
Journalism, Speech, or Writing Courses	6
Approved Natural Science or Science-Technology Courses	9–12
Air, Military, or Naval Science (men)	3–9
Physical Education	3
Electives	9–0
Junior Year	
[1]Upper Division Social Science	18
Social Science Seminar (SSc 307)	3
Approved Speech Course	3
Approved Natural Science or Science-Technology Courses	9–12
Electives	15–12
Senior Year	
[1]Upper Division Social Science	9
Social Science Seminar (SSc 407)	6
Approved Natural Science or Science-Technology Courses	9–15
Electives	24–18

Science Minors

Specialized or Departmental

	Hours
BOTANY: Ch 101,102,103; Bot 201,202; Bot 203; Bot 331; Bot 341; Bot 351	32
CHEMISTRY: (Mth 100); Ch 101,102,103; Ph 211,212; Ch 206; Ch 226,227; Ch 340	33 (37)
Note: Students electing a chemistry minor in lieu of the physical science teaching minor may substitute Ph 201,202,203—12 hours—for Ph 211,212—6 hours—and Ch 221—4 hours—in place of Ch 226,227—10 hours.	
ENTOMOLOGY: Z 201,202,203; Ent 200; Ent 314; Ent 451,452,453; Electives (Upper division courses in entomology)	34
GEOLOGY: G 201,202,203; G 204,205,206; G 315,316,317; G 330,331,332; G 352	33
ECONOMIC GEOLOGY: G 201,202,203; G 204,205,206; G 315,316,317; G 421,422; G 423; Elective (Upper division course in geology)	33
MATHEMATICS: Mth 101; Mth 102; Mth 200; (Plus 21 hours of mathematics and/or statistics including at least 9 hours of work at the upper division level. Minor may not include Mth 10.)	33
METEOROLOGY: (Mth 100); Ph 191; Ph 201,202,203; Ph 390; NR 327 or OC 331; Ph 391,392,393	28 (32)
ZOOLOGY: Z 201,202,203; Z 331,332; Z 341; Z 345; Upper division courses in zoology	33

General or Nonspecialized

GENERAL SCIENCE	*Hours*
Minor A: GS 101,102,103; GS 104,105,106; plus any one of the following options: (1) G 315,316,317; (2) G 330,331,332; (3) G 340,341,342; (4) NR 327,328, 329; (5) NR 421,422,423; (6) NR 327 or 328 plus 329, OC 331; (7) Z 374, 375,376; (8) GS 321,322,323, (Mth 100); (9) GS 411,412,413 and Phl 471	33–36
Minor B: (Mth 100); Mth 101; Mth 102; GS 101,102,103; GS 341; GS 342; Z 341; Z 345	32 (36)
Minor C: Ch 101,102,103; Z 201,202,203; Z 331,332; Z 341 or Z 345; GS 341; GS 342	33
Minor D: Z 201,202 203; G 340,341,342; G 330,331,332; Z 345	33

[1] Upper division courses in the major area must include 18 hours of work in one department and 9 hours in one or more other departments.

BIOLOGICAL SCIENCE	*Hours*
Minor A: Z 201,202,203; Bot 201,202; Ent 200; Electives (Upper division work in any or all of the above fields or general science)	33
Minor B: Z 201,202,203; Psy 201,202; Psy 205 or Psy 314; Psy 208,209,210; Z 331, 332; Z 341 and St 311 or St 314,315	33
PHYSICAL SCIENCE: Any combination of the following courses totaling at least 33 hours provided a minimum of 9 hours' work is undertaken in each of two departments and GS 321,322,323 is a part of the program. (Mth 100); Mth 101; Mth 102; Mth 200; Ch 101,102,103; Ph 201,202,203 or Ph 211,212; Ph 204,205, 206; Ph 390; G 201,202,203 or G 200; G 204,205,206. Required of students in this minor: GS 321,322,323	33
EARTH SCIENCE: G 201,202,203; G 204,205,206; G 350; G 322; G 352; NR 421, 422,423; Oc 331	34

Science Teaching Minors

GENERAL SCIENCE: Mth 100; GS 101 102,103; Ch 101,102,103; Ph 211,212; Electives (Courses in physics or chemistry or upper division biological science)	37
BIOLOGICAL SCIENCE: GENERAL BIOLOGY: Z 201,202,203; Bot 201,202; Bot 203; Bac 230; Ent 314; Z 374,375,376	35

Agriculture

FOOD PROCESSING AND UTILIZATION: Ch 101,102,103; Ch 221; Bac 204; FDT 221, 222,223; AEc 331; FDT 350; FDT 417	35
LAND RESOURCES CONSERVATION: Bot 201,202; Bot 203 or Bot 321; Bot 341; F 260; FG 310,311; FC 341; AEc 461; AEc 462; FC 407	34–35
SOIL AND WATER CONSERVATION: Ch 101,102,103; G 200; Sls 211,212; Sls 311; Sls 314; Sls 424; AEc 461; NR 411	34

Forestry

FOREST CONSERVATION AND RECREATION: Bot 201,202; Bot 203; F 153; F 260; F 231; F 365; FG 310,311,312; F 407	33

Home Economics

FOODS AND NUTRITION: Ch 101,102,103 or Ch 204,205; Ch 221; Ch 350; Bac 204 or Z 331,332; FN 220,221; FN 225; FN 321 or FN 425 or FN 435. Minimum required in Minor	33
TEXTILES: Ch 101,102,103; Ch 221; AA 160; CT 211; CT 235; CT 250; CT 350; CT 450; DAH 481; DAH 483	36

Defense Education Co-Major

NAVAL SCIENCE: Mth 101; Mth 102; Mth 200; Ph 201,202,203; NS 111,112,113; NS 211,212; NS 311,312,313 or NS 321,322,323; NS 411,412,413 or NS 421,422, 423	57

HUMANITIES

Included under this heading for administrative convenience as well as the nature of their subject matter are the courses in humanities and the work offered in the Departments of Architecture, Art, English, Journalism, Landscape Architecture, Modern Languages, Music, Philosophy, Religion, and Speech.

Upper Division Courses

Hum 307. **Seminar.** Terms and hours to be arranged.

Hum 311,312,313. **Creative Epochs in Western Thought.** 3 hours each term. 3 ①

Seminal ideas in history, philosophy, science, art, and literature defining Western civilization. Sources in creative periods of Western culture; fifth century Greece; Imperial Rome and early Christianity; high middle ages; Renaissance; Reformation; English, American, and French Revolutions; nineteenth and twentieth centuries. Consent of committee required. Prerequisite: year sequence in literature or social science. WHITE, NORRIS, SHAW.

Hum 327,328,329. **Survey of Russian Culture.** 3 hours each term. 3 ①
Achievements of old and new Russia in art, science, music, literature, and education that have contributed significantly to Western civilization. JURGENSON.

Hum 407. **Seminar.** Terms and hours to be arranged.

Architecture

Courses in archecture and allied arts serve the cultural and informational needs of students interested in architecture and building construction and may form part of a minor for students majoring in certain other fields. Professional courses permit a student to prepare for a major in architectural design, structural design, or interior design in the upper division at the University of Oregon. The recommendation from the Department of Architecture will satisfy the architectural requirements for students transferring into the upper division School of Architecture and Allied Arts at the University of Oregon.

All student models and drawings remain the property of the department.

Lower Division Courses

AA 111,112. **Graphics I.** 3 hours each term. 3 ②
Light, color, and space in typical architectural forms, media and methods; manipulation of instruments; perspective, shades, shadows; projection and sectioning. GLASS, LOUKES.

AA 121. **Construction Materials.** 2 hours. 2 ①
Materials and techniques of constructing buildings and furnishings; materials in framing, fabrication, enveloping, surfacing, and finishing: color, scale, texture—techniques for use. Manufacture, distribution, availability, maintenance, and depreciation. Field trips, demonstrations, illustrated lectures, and laboratory investigation. ELLIS.

1 ① 2 ③

AA 178. **House Planning and Architectural Drawing.** 3 hours any term.
Appreciation and criticism of domestic architecture. Small-house planning and graphic communication with reference to the needs of students in agriculture, business and technology, education, engineering, forestry, and home economics.

AA 179,180. **House Planning and Architectural Drawing.** 3 hours each term. 1 ① 2 ③
Small-house construction; detail drawing; development of working drawings begun in AA 178; presentation plans. advanced planning, and design. Prerequisite: AA 178. SINNARD.

AA 187. **Design Studio I.** 2 hours each term, 3 terms. 2 ②
Human environment and design processes, integration of natural materials with man-made materials in studio exercises, color phenomena and use in architectural design, three-dimensional design applied to structural space, model construction. Six hours required for majors in architecture, interior architecture, and landscape architecture.

AA 211,212,213. **Graphics.** 2 hours each term. 2 ③
Principles of orthographic projection and descriptive geometry; application to construction of plans and elevations; projections of points, lines. and planes; location of shades and shadows; mechanical and freehand perspective techniques; media and techniques of architectural presentation. GLASS.

AA 218,219,220. **Construction.** 2 hours each term. 2 ①
Materials and methods of architectural construction; individual research and observation; sketching existing examples; class discussion. Prerequisite: AA 179 or 218. SINNARD, ELLIS.

AA 221. **Construction Theory.** 3 hours. 2 ① 1 ③
Structural materials and systems, historical and modern; simple ideas of force and counter force; trends in structural design in new materials and methods. ELLIS.

AA 223. **Elements of Interiors.** 2 hours. 2 ②
Introduction to scope, aim, and technique of interior design intended to give understanding of professional field. All work done in drafting room. Open to nonmajor students with consent of instructor. GLASS, WASSON.

AA 287. **Architectural Design.** 2 hours each term, three terms. 2 ③
Processes by which architectural structures are conceived and executed; site location, function, organization of space and form, scale, proportion; review of executed models and drawings. Coordinated with AA 288,289. Six hours required of majors in architecture, interior architecture, and landscape architecture. Prerequisite: AA 187. GLASS.

AA 288. **Interior Design.** 2 hours. 2 ③
Interior spaces and forms; color, materials, fabrics, fixtures, and furnishings and selection and arrangement for functional needs and environment. Coordinated with AA 287, 289. Required of majors in architecture, interior architecture, and landscape architecture. Prerequisite: AA 187. GLASS.

AA 289. **Landscape Design.** 2 hours. 2 ③
Design of exterior spaces and landscape developments; problems in site utilization, circulation, orientation, exposure, contours, grading; plant materials, growth, and composition; relation of site exterior to structures. Coordinated with AA 287,288. Required of majors in architecture, interior architecture, and landscape architecture. Prerequisite: AA 187. GLASS, RICKARD.

1 ③ to 3 ③
AA 297. **Lower Division Architectural Design.** 1 to 3 hours each term.
Principles of architectural design; methods, concepts, and ideas in architectural design and planning. Series of related problems studied and executed in plan, elevation, isometric perspective and model in 2-year sequence. ELLIS.

Art

Individual creative work in the basic principles of drawing, painting, sculpturing, and designing, in the different media, techniques, and crafts, is offered in the Department of Art, together with instruction in art history and art education. Students majoring in other fields may take art as a minor or may study specific art subjects as service courses. Students may elect the courses in preparation for majoring in architecture and allied arts at the University of Oregon or elsewhere.

Lower Division Courses

AA 160,161. **Color and Composition.** 3 hours each term. 1 ① 2 ②
Studio classes in the everyday use of principles of composing or creating with lines, colors, and textures. Required in School of Home Economics.

AA 201,202,203. **Survey of Visual Arts.** 3 hours each term. 2 ① 1 ①
Fundamentals and functions of architecture, painting, sculpture, and other arts; best of man's creations studied to develop individual taste and increased appreciation. Three terms required of students who expect to major in School of Architecture and Allied Arts at the University of Oregon. Recommended for home economics students.

2 ② 1 ②
AA 250,251. **Recreational Use of Art Crafts.** 3 hours each term.
Projects in various craft mediums with particular attention to age levels, hobby interests, cost of equipment and materials. Required for recreation majors and minors and camp education minors; suggested for physical education, elementary education, and education majors.

AA 254. **Leathercraft.** 3 hours each term, two terms. 2 ② 1 ②
Design and production of leathercraft objects.

AA 255. **Ceramics.** 3 hours any term, three terms. 2 ① 1 ②
Pottery-making materials and techniques. Laboratory hours to be arranged.

AA 257. **Jewelry.** 3 hours each term, two terms. 2 ② 1 ②
Design, tools, and techniques of jewelry introduced through individual student problems in semiprecious materials.

AA 258. **Art Metalcraft.** 3 hours each term, two terms. 2 ② 1 ②
Design and hand execution of useful and decorative objects in copper, brass, and bronze.

AA 259. **Art Craft.** 3 hours each term, two terms. 2 ② 1 ②
Application of original designs to textile and other materials by block and silk-screen printing and in weaving.

AA 281,282,283. **Industrial Arts Drawing and Design.** 3 hours each term. 2 ② 1 ②
Freehand drawing with studio experience in the design of industrial arts objects; workshop techniques in art crafts. AA 281,282 required for all industrial arts majors. AA 283 required for industrial arts education majors.

AA 290. **Painting.** 3 hours any term, six terms. 2 ③ 1 ③
Oil and mixed painting techniques; creative expression; special interests in painting. Twelve hours required of students who expect to major in drawing and painting at the University of Oregon.

AA 291. **Drawing.** 3 hours each term, three terms. 2 ② 1 ②
Primary means of art expression and communication; principles of composition and techniques of fine draughtsmanship; specialized classes in fashion illustrating, sketching, and figure sketching. Three terms required of students who expect to major in the School of Architecture and Allied Arts at the University of Oregon.

AA 292. **Water Color.** 3 hours each term, three terms. 2 ② 1 ②
Basic creative composing with colors, lines and textures in casein and water colors. Abstract composition leading into representational problems to develop creativeness.

AA 293. **Sculpture.** 3 hours each term, three terms. 2 ②
Creative clay and plaster modeling and stone and wood carving; technical methods developed in conjunction with expressive design.

AA 294. **Scientific Illustration.** 3 hours each term, two terms. 2 ②
Freehand technical drawing adapted to needs of students in science and forestry.

AA 295. **Basic Design.** 2 hours each term, three terms. 2 ②
Individual projects leading to creative mastery of basic design in major visual arts and understanding of design factors involved in professional art. Three terms required of students who expect to major in art in the School of Architecture and Allied Arts at the University of Oregon. The work is correlated with that of AA 201,202,203.

AA 296. **Display Design.** 3 hours each term, two terms. 2 ②
Practical design experience in commercial art lettering, layouts, packaging, and display advertising. Offered for pharmacy, agriculture, and business and technology students.

Upper Division Courses

AA 311,312,313. **Creative Arts and Crafts for the Classroom Teacher.** 3 hours each term. 2 ②
Studio projects, discussions, and observations to give practical approach to arts and crafts instruction at preschool and elementary school levels.

AA 363,364,365. **History of Art.** 3 hours each term. 3 ①
Visual arts from prehistoric to modern times; selected works of painting, sculpture, architecture, and other arts in relation to cultures producing them. Prerequisite: junior standing.

AA 395. **Creative Art Projects.** 2 hours each term, six terms. 2 ②
Advanced studio work on approved projects in drawing, painting, sculpture, and graphic arts. Upper division standing, one year lower division work in the selected medium, and approval of instructor required.

AA 429. **Art Problems in Elementary Schools.** (g) 3 hours. 1 ① 2 ②
Elementary art education. Motivation, materials, and ideas in creative activities. Research literature in field. Prerequisite: AA 313, or one year of teaching experience.

AA 427,428. **Art in the Secondary School.** 3 hours each term. 2 ②
Art practices in secondary school; laboratory work; individual research; current theoretical directions in relation to classroom situation. Prerequisite: 9 hours in art.

AA 480. **Printmaking.** 3 hours each term, three terms. 2 ②
Workshop instruction in making and printing engravings, etchings, lithographs, linoleum cuts, and wood cuts. Prerequisite: upper division standing.

English

The Department of English offers instruction in literature and in writing. The courses are intended to supply the training in reading and writing necessary to every educated man, to afford a cultural background or a minor for students in professional schools, and to prepare liberal arts students to major in English at the upper division level.

Literature. The study of English literature may begin with a historical presentation of the tradition of English literature or with an examination of the motives and ideas of literature. Other courses present a more detailed study of periods or centuries of literary movements; a careful analysis of the chief literary forms such as the novel, drama, poetry, and short story; or a more intensive study of the major authors. Sequences in literature, although preferably taken three terms in order as numbered, may be taken any one term separately or in any order.

Writing. The study and practice of writing aim to teach students to express their ideas clearly, simply, and accurately. An examination in English is required of all entering freshmen and all transfer students who have not completed 3 or more term hours of college English composition. Exceptional students are placed in honors sections. Students who reveal serious weaknesses are required to pass Corrective English (Wr 49), a 3-hour noncredit course in the essentials of English, before they may enroll in English Composition (Wr 111). Any student who demonstrates satisfactorily that his writing ability meets the standards required by the English Department may, with the approval of the dean of his school, be excused from all or part of his English composition. Students who do superior work in the first two terms of English composition may, upon recommendation of the English Department, substitute Report Writing (Wr 227) or Creative Writing (Wr 218) for the third term of English Composition (Wr 113).

Courses in Literature

Lower Division Courses

[1]Eng 101,102,103. **Survey of English Literature.** 3 hours each term. 3 ①
History of English literature in chronological sequence. Recommended for a major or minor in English. GIBSON, HEWITT, NELSON.

[1]Eng 104,105,106. **Appreciation of Literature.** 3 hours each term. 3 ①
Appreciation and criticism of literature with emphasis throughout on ideas and motives.

[1]Eng 107,108,109. **World Literature.** 3 hours each term. 3 ①
Masterpieces of the ancient, medieval, Renaissance, and post-Renaissance world. BROWN.

Eng 131. **Directed Recreational Reading.** 2 hours. 2 ①
Reading and discussion to stimulate enjoyment of good literature. For students who normally do not take other literature courses.

Eng 201,202,203. **Shakespeare.** 3 hours each term. 3 ①
The major plays. Recommended for a major or minor in English. FOREMAN.

Eng 253,254,255. **Survey of American Literature.** 3 hours each term. 3 ①
American literature from its beginning to present day. Recommended for a major or minor. CHILDS, JENKINS, NELSON.

Eng 263. **Great Books.** 3 hours spring. 3 ①
Great books of the world and their influence. BROWN.

[1] Only one of these sequences may apply toward fulfilling group requirements.

Eng 275. **The Bible as Literature.** 3 hours spring. 3 ①
Structure, literary types, ideas of the Bible; its influence on our literary heritage. GIBSON.

Upper Division Courses

3 ①

Eng 354,355,356. **Continental European Literature.** 3 hours each term.
Survey of those writers, chiefly modern, whose works in translation have become part of our literary heritage and which aid in understanding the world today. *Eng 354:* Romance; *Eng 355:* Germanic; *Eng 356:* Slavic. COLBY.

Eng 374. **The Stort Story.** 3 hours. 3 ①
Reading and analysis of masterpieces of the short story. JENKINS.

Eng 384,385,386. **Contemporary Literature.** 3 hours each term. 3 ①
Twentieth century American and British fiction, drama, and poetry. CHILDS.

Eng 417,418,419. **The English Novel.** (g) 3 hours each term. 3 ①
Selected English novels of 18th and 19th centuries. *Eng 417:* Richardson through Austen. *Eng 418:* Scott through Trollope. *Eng 419:* Bronte to present. Prerequisite: 9 hours of literature. GROSHONG.

Eng 454,455. **Individual Authors.** 3 hours fall and winter. 3 ①
Major English authors as listed in the Schedule of Classes. GIBSON.

Eng 488. **Literature for Teachers.** (g) 3 hours winter. 3 ①
For students who plan to teach English. Critical reading and analysis of literature selected primarily from State-adopted texts. NORRIS.

Eng 490. **Development of the English Language.** (g) 3 hours fall. 3 ①
CHILDS.

Eng 495,496,497. **The Democratic Tradition in Literature.** (g) 3 hours each term. 3 ①
Democratic ideas in literature from Plato to the present. Prerequisite: 9 hours of literature. CHILDS.

Graduate Service Courses

Courses numbered 400-499 and designated (*g*) may be taken toward a graduate minor.

Auxiliary Courses

Lower Division Courses

Eng 91,92,93. **English for Foreign Students.** 3 hours each term. 3 ①
Practice in vocabulary building, reading, writing, speaking, and comprehension of spoken discourse, adapted to needs of individual. BUTTS.

Eng 115. **Effective Reading.** 3 hours any term. 3 ①
Designed to develop better comprehension and greater speed in reading.

Eng 211. **Vocabulary Building.** 3 hours any term. 3 ①

Courses in Writing

Lower Division Courses

Wr 49. **Corrective English.** No credit. 3 ①
Refresher course in English fundamentals.

Wr 111,112,113. **English Composition.** 3 hours each term. 3 ①
Frequent written compositions with emphasis on clarity and accuracy. Courses must be taken in sequence. Prerequisite: English placement examination. Students who score low on placement test are advised to take two class hours of instruction each week in addition to Wr 111. No credit and no grades are given for the additional classes. Students who pass placement test with distinction should enroll in honors sections in Wr 111,112,113.

Wr 214. **Business English.** 3 hours any term. 3 ①
Analysis and writing of common types of business letters. Prerequisite: Wr 113. HEWITT, LIGON.

Wr 218. **Creative Writing.** 3 hours. 3 ①
For students in professional schools who desire training and practice in such writing as may be called for in their vocational or cultural pursuits. Prerequisite: Wr 113. NORRIS.

Wr 227. **Technical Report Writing.** 3 hours any term. 3 ①
Writing effective reports for business and industry. Prerequisite: Wr 113. GROSHONG, LIGON.

Wr 230. **Effective Writing.** 3 hours. 3 ①
Practice to develop exactness and facility of expression; course varied to suit individuals. Prerequisite: Wr 113. GROSHONG.

Upper Division Courses

Wr 316,317. **Advanced Expository Writing.** 3 hours each term. 3 ①
Practice in various forms of expository writing. Prerequisite: Wr 113. SMITH.

Wr 324,325,326. **Short Story Writing.** 2 hours each term. 3 ①
Designed to develop proficiency in art of writing short story. Courses may be taken separately. Prerequisite: Wr 113. MALAMUD.

Wr 411. **English Composition for Teachers.** 3 hours. 3 ①
For students expecting to teach English. DUBBÉ.

Courses in Library

Upper Division Courses

Lib 379. **Elementary School Library.** 3 hours. 3 ①
Organization, administration, and function of elementary school library; methods of ordering and processing materials; care and repair of books; library resources in the community and state. Not open to freshmen and sophomores. Prerequisite: Lib 388.

Lib 380. **Secondary School Library.** 3 hours. 3 ①
Planning, organizing and administering a public school library. Relation of library to curriculum; acquisition, processing, care, and use of library materials; routines; records. Not open to freshmen and sophomores. Prerequisite: Lib 388.

Lib 385. **Literature for High School Libraries.** 3 hours. 3 ①
Books and periodicals for public school students, including reading for information and recreation; approved lists; individual books considered critically. Prerequisite. Lib 388.

Lib 388. **Children's Literature.** 3 hours. 3 ①
Reading material suitable for elementary grades and criteria used in selecting books for children. CARTER.

Journalism

Elementary courses in journalism, besides furnishing a certain background in newspaper methods, introduce students to the fundamentals of news writing. These courses also enable students to get additional benefit from work on the *Barometer,* student newspaper, and serve to some extent as training in this work in an endeavor to keep student publications on a high plane. The Department of Journalism also gives instruction that is designed to train students in professional schools to write competently for newspapers and magazines on the subjects or in the fields in which they are specializing. These courses meet the needs of a large number of persons who, either in public service or in private life, have occasion to prepare material for the press on industrial or technical subjects. Training is also offered in the popularization of scientific material for the press.

Students intending to major in journalism at another college or university may take two years of college work at Oregon State. At the University of Oregon, only upper division and graduate students are admitted to the School of Journalism. Prejournalism students should consult the catalog of the institution to which they intend to transfer to determine the required and recommended courses. They should learn to type well and should engage in extracurricular activities in journalism.

Students desiring to prepare for positions in the field of agricultural journalism may major in general agriculture with a minor in journalism. Students in home economics may take a minor in journalism. A teaching minor in journalism is offered for students in the School of Education.

Lower Division Courses

J 111,112. **Journalism.** 3 hours each term. 3 ①
Journalistic style of writing; workings of the press, both general and technical. J 111 is required for eligibility to editorial staffs of student publications. J 111 offered each term; J 112, spring term. Must be taken in sequence. LAKE, ZWAHLEN.

J 121. **Journalism Laboratory.** 1 hour any term.
Given only in coordination with J 111 sections offering news beat experience.

J 214. **Copyediting.** 3 hours any term. 2 ① 1 ②
Copy reading, head writing, proofreading, and makeup; actual experience in editing copy. Required for advanced positions on the *Barometer*. Prerequisite: J 111. LAKE.

J 223. **Editorial Writing.** 3 hours fall. 3 ①
Materials, style, and arrangement of periodicals; training in writing editorials; policy and ethics; makeup of editorial page of farm and trade journals. Prerequisite: J 111. BAILEY.

Upper Division Courses

J 317. **Special Feature Articles.** 3 hours winter. 3 ①
Writing of special articles along line of student's own major; study of media of such articles; practice in popularization of scientific material. Prerequisite: J 111. ZWAHLEN.

J 318. **Public Information Methods.** 3 hours winter. 3 ①
Planning and executing informational campaigns; methods of informing public of public affairs and other enterprises in which in is interested. Prerequisite: J 111. BAILEY.

J 319. **Technical Writing.** 3 hours spring. 3 ①
Writing and editing popular and scientific bulletins; preparing reports and writing articles for scientific publications; preparing radio manuscripts. Prerequisite: J 111. BAILEY.

J 334. **Photo-Journalism.** 3 hours spring. 1 ① 2 ②
Planning, taking, and processing pictures for newspapers, magazines, and television. Prerequisite: J 111.

J 351,352,353. **Journalism Projects.** 2 hours each term. 1 ① 1 ②
Application of newswriting, copy-editing, feature-writing and technical-writing principles; experience on student publications; preparation of articles for trade and technical publications or specialized material for general publications. Consent of instructor required. Prerequisite: J 111,214. SHIDELER.

Landscape Architecture

Instruction includes landscape design theory and practice in solving the landscape problems of people under various social, economic, and environmental influences. Supervised field trips acquaint students with solutions to landscape design and construction problems. All student drawings and models remain the property of the department.

A 4-year curriculum in landscape construction and maintenance is offered in the Department of Horticulture leading to the degree of Bachelor of Science. A student may complete a lower division curriculum in landscape architecture at Oregon State University and transfer to the University of Oregon for the last three years of professional work.

Lower Division Courses

LA 279. **Home Ground Planning.** 3 hours any term. 1 ① 2 ②
Organization and improvement of rural and urban home grounds.

LA 280. **Landscape Design Theory.** 3 hours winter. 2 ① 1 ②
Functional and aesthetic aspects of landscape planning in the creation and preservation of human environment.

AA 289. **Landscape Design.** 2 hours. 2 ③
(See ARCHITECTURE courses.)

LA 290. **Applied Landscape Design.** 3 hours each term, three terms. 1 ① 2 ②
Design of city and suburban residence properties and other related problems. Prerequisite: LA 280.

Upper Division Courses

LA 326,327,328. **Plant Materials.** 3 hours each term. 1 ① 2 ②
Trees, shrubs, vines, and perennials and their uses in plant composition.

LA 356,357,358. **History and Literature of Landscape Architecture.** 2 hours each term. 2 ①
Story of gardens as an outgrowth of living conditions of the times from early Egyptian to the modern American. 1 ① 2 ②

LA 359,360,361. **Maintenance and Construction.** 3 hours each term.
Maintenance of private and public landscape; landscape construction problems. Prerequisite: LA 280. 1 ① 1 or 2 ②

LA 382,383,384. **Layout of Small Properties.** 2 or 3 hours each term.
City lot, small suburban properties, and other areas; sketch plans, finished renderings, and contour problems. Prerequisite: LA 280,290. 1 ① 2 ③

LA 390. **Landscape Design Problems.** 3 hours each term, three terms.
Analysis and problem solving. Prerequisite: LA 280,290.

LA 392,393,394. **Planting Plans.** 2 hours each term. 1 ① 1 ②
Planting plans; estimates of costs; construction and seasonal care of planting areas. Prerequisite: LA 290,326,327,328.

Modern Languages

The Department of Modern Languages offers instruction in Chinese, French, German, Portuguese, Russian, and Spanish. Courses are planned to meet the demand for practical use of language as well as cultural needs of all students, to provide foreign-language requirements found in scientific and technical curricula and needed in connection with various professions, and to prepare students to major in one of these languages at the upper division level. Teaching minors in French, German, Russian, and Spanish are offered for students in the School of Education.

Students who enter with one unit of high school French, German, or Spanish and wish to continue the study of the language should register for the

first-year course. Those entering with two units should register for the second-year college course; those with three or more units should register for a course in the literature of the language or in scientific or directed reading. Students having other preparation and those entering from colleges offering more or fewer hours per week in a course should confer with the instructor.

Courses in German

Lower Division Courses

GL 50,51,52. **First-Year German.** 4 hours each term. 5 ①
Elements of pronunciation, grammar, reading, and conversation. Engineering students and others may, with consent of instructor, enroll for 3 hours each term. KRAFT, RACZ.

GL 101,102,103. **Second-Year German.** 2, 3, or 5 hours each term.
(a) For 3 hours' credit: grammar, composition; reading of modern German authors. (b) For 2 hours' credit: two meetings a week devoted to conversation. (c) For 5 hours' credit: (a) and (b) combined. Prerequisite: GL 50,51,52. KRAFT, RACZ.

GL 201,202,203. **Survey of German Literature.** 3 hours each term. 3 ①
Reading of masterpieces of various periods; general survey of German literature. Prerequisite: GL 101,102,103, or equivalent. KRAFT.

1 or 2 ①

GL 211,212,213. **Directed Reading in German.** 1 or 2 hours each term.
Reading in German in field of student's major interest as aid to maintaining proficiency in the language. Students who register for 1 hour may register for an additional hour in a subsequent year. Prerequisite: two years of college German or equivalent. KRAFT.

Upper Division Courses

(Courses 300-399 are open to lower division students.)

1, 2, or 3 ①

GL 320,321,322. **Scientific German.** 1, 2, or 3 hours each term.
Recommended to students interested in science or medicine. Articles in science, surgery, history of medicine, and current clinical literature are read. A maximum of 3 term hours may be taken under each course number. Consent of instructor required. KRAFT.

GL 343,344,345. **Survey of German Literature.** 3 hours each term. 3 ①
Reading of masterpieces of various periods; general survey of German literature. Prerequisite: GL 101,102,103, or equivalent. Not open to students who have taken GL 201-203. KRAFT.

Courses in Oriental Languages: Chinese

Lower Division Courses

OL 50,51,52. **First-Year Chinese.** 4 hours each term. 5 ①
Essentials of colloquial Mandarin with emphasis on conversation and easy reading. Consent of instructor required. YANG.

Courses in Romance Languages: French

Lower Division Courses

RL 50,51,52. **First-Year French.** 4 hours each term. 5 ①
Pronunciation, grammar, reading, and conversation. Engineering students and others may, with consent of instructor, enroll for 3 hours each term. RICHTER, RACZ, SOLINIS.

RL 101,102,103. **Second-Year French.** 2, 3, or 5 hours each term.
(a) For 3 hours' credit: grammar, composition; reading of modern French authors. (b) For 2 hours' credit: two meetings a week devoted to conversation. (c) For 5 hours' credit: (a) and (b) combined. Prerequisite: RL 50,51,52. RICHTER, RACZ, SOLINIS.

RL 201,202,203. **Survey of French Literature.** 3 hours each term. 3 ①
(Third-year French.) Masterpieces of various periods; general survey of French literature. Prerequisite: two years of college French or the equivalent. RICHTER.

1 or 2 ①

RL 211,212,213. **Directed Reading in French.** 1 or 2 hours each term.
Reading in French in field of the student's major. Students who register for 1 hour any term may register for an additional hour in a subsequent year. Consent of instructor required. RICHTER, SOLINIS, staff.

Upper Division Courses

RL 311,312,313. **Survey of French Literature.** 3 hours each term. 3 ①
(Third-year French.) Masterpieces of various periods; general survey. Prerequisite: two years of college French or equivalent. Not open to students who have taken RL 201-203. RICHTER.

RL 320,321,322. **Scientific French.** 1, 2, or 3 hours each term.
For students in science, medicine, and technology. Current technical and professional literature. Maximum credit, 3 term hours under each course number. Prerequisite: second-year French or consent of instructor. RICHTER, SOLINIS.

Courses in Romance Languages: Portuguese

Lower Division Courses

RL 80,81,82. **First-Year Portuguese: Brazilian.** 4 hours each term. 5 ①
Elements of pronunciation, grammar, reading, and conversation. Engineering students and others may, with consent of instructor, enroll for 3 hours each term.

RL 217,218,219. **Directed Reading in Portuguese.** 1 to 2 hours each term. 1 or 2 ①
Reading in Portuguese to help students maintain facility in the language. Consent of instructor required.

Courses in Romance Languages: Spanish

Lower Division Courses

RL 60,61,62. **First-Year Spanish.** 4 hours each term. 5 ①
Pronunciation, grammar, reading, and conversation. Engineering students and others may, with consent of instructor, enroll for 3 hours each term. RICHTER, SOLINIS.

RL 107,108,109. **Second-Year Spanish.** 2, 3, or 5 hours each term.
(a) For 3 hours' credit: grammar, composition; reading of modern Spanish authors. (b) For 2 hours' credit: two meetings a week devoted to conversation. (c) For 5 hours' credit: (a) and (b) combined. Prerequisite: RL 60,61,62. RICHTER, SOLINIS.

RL 207,208,209. **Survey of Spanish Literature.** 3 hours each term. 3 ①
(Third-year Spanish.) Reading of masterpieces of various periods; general survey of Spanish literature. Prerequisite: two years of college Spanish.

1 or 2 ①

RL 214,215,216. **Directed Reading in Spanish.** 1 or 2 hours each term.
Reading in Spanish in student's major. Students who register for 1 hour any term may register for an additional hour in a subsequent year. Consent of instructor required. SOLINIS.

Upper Division Courses

RL 323,324,325. **Scientific Spanish.** 1, 2, or 3 hours each term. 1, 2, or 3 ①
For students in science and technology. Current technical and professional literature. Maximum credit, 3 term hours under each course number. Prerequisite: second-year Spanish. If student has not had prerequisite, consent of instructor is required.

RL 341,342,343. **Survey of Spanish Literature.** 3 hours each term. 3 ①
(Third-year Spanish.) Masterpieces of various periods; general survey. Prerequisite: two years of college Spanish or equivalent. Not open to students who have taken RL 207-209.

Courses in Slavic Languages: Russian

Lower Division Courses

SL 50,51,52. **First-Year Russian.** 4 hours each term. 5 ①
Elements of pronunciation, grammar, reading, and conversation. JURGENSON.

SL 101,102,103. **Second-Year Russian.** 2, 3, or 5 hours each term.
(a) For 3 hours' credit: review of grammar, composition; reading of newspapers, periodicals, and modern Russian authors. (b) For 2 hours' credit: two meetings a week devoted to conversation. (c) For 5 hours' credit: (a) and (b) combined. Prerequisite: SL 50,51,52. JURGENSON.

Upper Division Courses

SL 320,321,322. **Scientific Russian.** 1, 2, or 3 hours each term. 1, 2, or 3 ①
Provides opportunity to study beyond second year and to read in various fields of science. JURGENSON.

Music

Musical activities at Oregon State University are an essential part of campus life. The variety in the offerings of the Department of Music enables students interested in furthering their music education to find some activity to suit their individual needs and abilities. They may participate in music solely for its cultural and avocational benefits or, by following a planned course of study, they may prepare for majoring in music at the University of Oregon.

Musical Organizations. The Bands, Orchestra, Glee Club, Madrigal Club, and Choralaires are open to all students after consultation with the directors. Each group appears frequently in public concerts.

Applied Music. Private lessons in voice, piano, organ, and instruments of the band and orchestra carry one hour of credit for one lesson per week and two credits for two lessons per week. Class lessons in voice are also offered. (See following schedule of fees.)

Music Minors. A minor in music is available to students majoring in Secondary Education. See SCHOOL OF EDUCATION.

Scholarships. Certain scholarships in applied music are available to all interested students. See section on SCHOLARSHIPS.

Regulations and Fees. Students are expected to consult the departmental office regarding regulations governing registration, attendance, public performance of music students, etc. All fees for private music lessons must be paid in advance at the Business Office. No deduction is made for lessons missed by the student nor will such lessons be made up except in the case of serious illness. All students are expected to do their practicing in the practice rooms provided unless other arrangements are made specifically with the departmental office. The schedule of music fees is as follows:

APPLIED MUSIC (private lessons):	*Per term*
Piano, Voice, Stringed Instruments, Organ	
One lesson a week, one-half hour (1 term hour credit)	$30.00
Two lessons a week, one-half hour each (2 term hours' credit)	$50.00
Wind Instruments	
One lesson a week, one-half hour (1 term hour credit)	$20.00
Two lessons a week, one-half hour each (2 term hours' credit)	$40.00

CLASS LESSONS (one lesson a week—50 minutes):
Voice, piano, stringed instruments $15.00
Wind instruments $10.00

PRACTICE ROOM RENTAL—with piano:
One-half hour a day, a term ..... $ 2.50
One hour a day, a term ..... $ 4.00
Two hours a day, a term ..... $ 7.00
Three hours a day, a term $10.00

PRACTICE ROOM RENTAL—without piano:
One hour a day, a term ..... No Charge

ORGAN RENTAL:
One hour a day, a term (Hammond spinet) ..... $ 7.50
One hour a day, a term (Connsonata) $10.00

Lower Division Courses

Mus 111,112,113. **Music Theory I.** 4 hours each term. 5 ①
Music fundamentals, scales, key relationships, intervals. triads; harmonizations or various triad and seventh chords in all positions, nonchord tones, free harmonization and simple modulation; keyboard work, chord recognition, sight-singing, and analysis correlated with written work.

Mus 181. **Class Lessons in Voice.** 1 hour each term, three terms. 1 ①

Mus 190. **Applied Music.** 1 or 2 hours any term.
Individual instruction in piano, organ, voice, and instruments of band and orchestra. Term hours on basis of number of lessons a week (1 or 2 half-hour periods).

Mus 195. **Band.** 1 hour each term. 3 ①
Divison I band: concert organization of men and women who have obtained membership by tryout. Division II band: those who need more experience and training to meet standards of concert band. The marching band which plays at football games, parades, etc., is composed of all men in the Division I and II bands. Membership of all three groups is interchangeable at discretion of conductor.

Mus 196. **Orchestra.** 1 hour each term. 1 ② 1 ①
Symphonic group including all instruments common to such an organization. Membership is open to all string players and those wind and percussion players who, in opinion of conductor, can meet the special requirements of the orchestra.

Mus 197. **Chorus.** 1 hour each term. 3 ①
Membership is open to all students subject to tryout. Two weekly rehearsals of Glee Club (men) and Madrigal Club (women), and one rehearsal of the two groups combined. Concert of standard choral works each term.

Mus 211,212,213. **Music Theory II.** 3 hours each term. 3 ①
Continuation of Mus 113 involving use of secondary and altered chords in harmonization and analysis of master works; modulation and keyboard harmony further developed.

Mus 221. **Introduction to Music Literature.** 3 hours. 3 ①
A beginner's course in listening to music.

Mus 241. **Recreational Use of Music.** 3 hours. 3 ①
Use of musical activities in organized community recreational program. Primarily for students majoring in recreation.

Upper Division Courses

Mus 321,322. **Instrumental Conducting.** 2 hours each term. 2 ①
Basic conducting techniques and score reading for conductors of instrumental groups. Practical experience conducting campus organizations.

Mus 324,325,326. **Choral Conducting.** 2 hours each term. 2 ①
Basic conducting techniques and score reading for conductors of choral groups. Practical experience conducting campus organizations.

Mus 335,336. **Band and Orchestra Techniques.** 2 hours each term. 2 ①
Instruction on band and orchestral instruments; instrumental group organization; rehearsal procedures; survey of literature; program building.

Mus 350. **Music for the High School Teacher.** 3 hours. 3 ①
Materials and methods for developing high school choral organizations, adolescent voice, its care and development; survey of choral literature; public performance; program building; general music class; assembly singing. Prerequisite: six terms of music.

Mus 354,355. **Band Arranging.** 2 hours each term. 2 ①
Scoring and arranging for full concert and military band as well as for smaller combinations of instruments.

Mus 360,361. **History of Music.** 3 hours each term. 3 ①
Development of music in relation to social, economic, and political influences from primitive times to the present. Must be taken in sequence. Prerequisite: Mus 221.

Mus 371,372. **Music for Elementary Teachers.** 3 hours each term. 5 ①
Music activities for elementary teachers in training. Introductory course designed to build basic musicianship through experiences that apply to teaching of music in elementary classroom.

Mus 373. **Music for Elementary Teachers.** 3 hours. 3 ①
Experiences in teaching the various music activities found in the elementary school. Prerequisite: Mus 372.

Mus 390. **Applied Music.** 1 or 2 hours any term.
Advanced study of piano, organ, voice, and instruments of band and orchestra. Term hours on basis of number of lessons a week. (1 or 2 half-hour periods.) Prerequisite: 6 hours of Mus 190, or qualifying examination.

Mus 395. **Band.** 1 hour each term.
Prerequisite: 6 terms of Mus 195.

Mus 396. **Orchestra.** 1 hour each term.
Prerequisite: 6 terms of Mus 196.

Mus 397. **Chorus.** 1 hour each term.
Prerequisite: 6 terms of Mus 197.

Philosophy

Instruction in philosophy is intended both for students who anticipate more advanced study of philosophy and for those who desire a brief introductory study only.

Lower Division Courses

Phl 201,202,203. **Introduction to Philosophy.** 3 hours each term. 3 ①
Unified year sequence but work of three terms may be taken in any order. *Phl 201,* nature of philosophy and its basic problems; *Phl 202,* philosophy of ethics; *Phl 203,* social philosophy.

Phl 211,212,213. **Great Works in Philosophy.** 2 hours each term. 2 ①
Selected readings of individual philosophers designed to acquaint the student with classic philosophical documents.

Phl 214,215,216. **Modern Logic.** 3 hours each term. 3 ①
Phl 214: Critical thinking; methods and principles of deductive logic to develop facility in detection of fallacies. *Phl 215:* Symbolic logic; techniques of analysis and deduction. *Phl 216:* Metalogic; rigorous development of a propositional calculus and a lower functional calculus. Phl 215 is prerequisite for Phl 216.

Upper Division Courses

Phl 301,302,303. **History of Philosophy.** 3 hours each term. 3 ①
Western philosophy from the pre-Socratic Greeks to twentieth century. Prerequisite: Phl 201.

Phl 461. **Philosophy of Religion.** 3 hours. 3 ①
Basic convictions underlying religious thinking; values, God, problem of good and evil, immortality, human nature, religious experience.

Phl 471. **Philosophy of Science.** 3 hours. 3 ①
Systematic analysis of nature and structure of scientific concepts, theories, and laws; historical examination of revolutions in science and their causes; appraisal of influences of science and philosophy on each other.

Religion

Establishment of a chair of religion at Oregon State University was authorized in 1928, and the first courses were offered in the fall of 1928-29. The Department of Religion is nonsectarian in spirit and organization. Its purpose is threefold: (1) Courses in religion seek to develop an appreciation of the nature and processes of religion in light of conditions affecting life today, thus enabling students to make such adjustments as will vitalize religion for them. (2) Courses are determined for the most part by the needs of students who are preparing for service in the fields of science, engineering, agriculture, home economics, teaching, etc. (3) Special attention is given to the religious education of those who anticipate lay-leadership in churches of their local communities and those who plan to enter social service or religious vocations such as missionary work, the ministry, director of religious education, pastor's assistant, professional leadership of religious organizations, etc.

Lower Division Courses

R 211. **The New Testament and Its Historical Background.** 3 hours. 3 ①
Time and conditions out of which New Testament writings came and problems that gave rise to Christian movement.

R 212. **The Old Testament and Its Historical Background.** 3 hours. 3 ①
Old Testament in light of times and conditions which produced it; religion of Israel as it emerges out of critical survey of sources.

R 220. **The Sermon on the Mount.** 2 hours. 2 ①
Philosophy of Jesus' teaching as embodied in selected passage.

R 225. **The Prophets and Their Message.** 2 hours. 2 ①
Selected writings of Hebrew prophets; their significance and value for present day.

R 230. **History of Christian Thought.** 3 hours. 3 ①
Rise and spread of Christian religion; thought of its various leaders; movements within Christianity; present tendencies in religious thought.

R 231. **The American Religious Heritage.** 3 hours. 3 ①
Development of main religious groups in America: Catholicism, Judaism, Protestantism; role of the churches; current trend toward ecumenicity.

See also Eng 275. The Bible as Literature under ENGLISH.

Upper Division Courses

R 370. **Principles of Religious Leadership.** 2 hours. 2 ①
Practical study of religious leadership. Open only to students actually engaged in some form of leadership in a religious organization that serves as laboratory work for the study.

R 407. **Seminar.** Terms and hours to be arranged.

R 462. **History of Great Religions.** 3 hours. 3 ①
Comparative study of religions that command a large following today, such as Hinduism, Buddhism, Confucianism. Judaism, Christianity, and Islam.

R 463. **Psychology of Religion.** 3 hours. 3 ①
Bearing of psychology on religious thought and action, both past and present.

Speech

Instruction in speech aims to build strength of personality by aiding students to develop clear, original thinking and by giving training in effective correlation, organization, and presentation of knowledge gained through study and experience. Much drill and criticism are given on organization of material, on platform work, and on principles that underlie effective reading and speaking. The training helps to overcome self-consciousness and other emotional inhibitions and to build a strong personal address.

Courses in interpretation and community drama are conducted not only as a means of rounding out the speech training but also as an aid to prospective teachers and other community leaders in the directing of plays and in the making of stage settings, costumes, and other equipment. Seven full-length plays, several one-act plays, and a number of puppet shows are produced each year.

Courses in radio and television are offered. Well-equipped studios, in addition to those at station KOAC and station KOAC-TV, are maintained by the department for those wishing to acquire a knowledge of and practice in the use of radio and television techniques.

Intramural and intercollegiate debates, extempore speaking, and oratorical contests take place each year, and individual attention is given to students who wish to prepare for such work. Regular academic credit may be earned by the participants.

In connection with the courses in speech science and correction, a clinic is maintained by the department for those who are handicapped with various speech impediments, such as stammering, lisping, and nasality. Advice and treatment are given for overcoming both organic and functional difficulties. Foreign students are aided in acquiring acceptable standards of English speech. Any student may have a hearing test with the audiometer in the clinic.

Lower Division Courses

Sp 90. **Corrective Speech.** No credit. 2 ①
Designed specifically for students having organic or functional speech disorders; group meetings of class, supplemented by clinical periods devoted to individual diagnosis and treatment. HARRIS, HILDEBRANDT.

Sp 91. **Speech for Foreign Students.** No credit. 2 ①
Designed to help foreign students acquire accepted standards of general American speech; training in aural discrimination of component parts of speech and American speech rhythm; pronunciation and enunciation. HILDEBRANDT.

Sp 111,112,113. **Extempore Speaking.** 3 hours each term. 3 ①
Original speeches; analysis and synthesis of material, adaptation to audience, outline construction; development of confidence and release on platform; voice, enunciation, gesture, and bearing in delivery; speeches for special occasions; the extended address. Must be taken in sequence. WELLS, staff.

Sp 120. **Voice and Diction.** 3 hours. 3 ①
Vocal tone and correct speech sounds, pronunciation standards, vocabulary building, and word usage in relation to social integration of student; principles underlying good business and technical speaking on platform, radio, and television. HARRIS, WINGER.

Sp 121,122,123. **Interpretation.** 3 hours each term. 3 ①
Analysis and presentation of printed materials; study of emotional reactions that give color and interest; expressive vocal and bodily responses; pantomime; correction of faulty speech habits; intensive work in characterization; choral reading; interpretation of dramatic literature. Must be taken in sequence. CORTRIGHT, YOUNG, WINGER, HENRY, BENNETT.

Sp 231. **Parliamentary Procedure.** 3 hours winter or spring. 3 ①
Rules of parliamentary procedure; practice in application; forming temporary and permanent organizations; preparation of constitutions and bylaws. Students serve as chairman and secretary and learn how to participate effectively in meetings. WINGER, DOLER.

Sp 232. **Group Discussion.** 3 hours winter or spring. 3 ①
Preparing for, leading, and participating in types of discussions used in various groups led by extension workers, technical and professional people, and teachers, in conferences, panels, lecture-forums, and symposiums; strong emphasis on problem-solving and interpersonal relations. Prerequisite: Sp 111. HARRIS, WINGER, DOLER, PETERSON.

Sp 237. **Argumentation.** 3 hours fall or winter. 3 ①
Analysis; brief-drawing; collection and use of evidence; deductive and inductive reasoning; types of argument; fallacies; construction of speeches. Prerequisite: Sp 111. PETERSON.

Sp 238. **Persuasion.** 3 hours fall or winter. 3 ①
Study of models; composition exercises; writing a term speech; mastery of audience psychology and effective style. Prerequisite: Sp 111. WELLS.

Sp 240. **Creative Drama for Elementary Teachers.** 3 hours. 3 ①
Creative dramatics in elementary classroom; principles and methods of developing original dramatization with children; methods in acting, staging, and costuming for assembly programs; correlation with classroom studies. HENRY.

Sp 242. **Recreational Use of Drama.** 3 hours fall or spring. 3 ①
Leadership and participation in recreational-creative dramatics; story-telling; creating original story; pantomime; improvisation in acting, staging, and costuming; correlation of music, art crafts, and drama for camp and playground. HENRY.

Sp 243. **Puppetry.** 3 hours winter. 3 ①
History of puppetry; practice in adapting plays, stories, and historical events for puppet dramatization; practice in manipulating puppets and marionettes; application to television. HARRIS.

Sp 244. **Stagecraft and Lighting.** 3 hours. 2 ① 2 ③
Constructing scenery and stage properties; lighting equipment and basic principles of lighting; practical experience in lighting, backstage procedures, and designing and construction of settings both realistic and suggestive. CORTRIGHT, YOUNG, BENNETT.

Sp 247,248,249. **Community Drama.** 3 hours each term. 3 ①
Participation and leadership in community dramatics; community-drama idea; play selection; stage technique and acting; costume and makeup; short cuts in craftsmanship; directing and play production. Prerequisite for *Sp 247:* Sp 122; for *Sp 248:* none; for *Sp 249:* Sp 247. CORTRIGHT, YOUNG, HENRY, BENNETT.

Sp 253. **Workshop Theater.** 1 to 3 hours each term, maximum 6 hours.
Application of principles of acting and dramatic production. Consent of instructor required. CORTRIGHT, YOUNG, HARRIS, HENRY, BENNETT.

Sp 264. **Radio-Television Projects.** 2 hours.
Educational projects in radio-television under supervision, chosen for variety of experience in microphone interpretation, production planning, script preparation, studio acoustic practices; practical laboratory experimentation under broadcast conditions. Consent of instructor required. LIVINGSTON, GONZALEZ, GROVER, PHILLIPS.

Sp 271. **Oratory.** 1 hour each term, four terms. 2 ①
Application of principles of persuasion; organization and presentation of one or more formal addresses. Prerequisite: Sp 111. Sp 238 or consent of instructor required. WELLS.

Sp 274. **General Forensic Speaking.** 1 hour each term, four terms.
Preparing oral reports, demonstrations, discussions, radio talks, or after-dinner speeches for presentation in seminars or before community organizations. Prerequisite: Sp 111. Either Sp 112 or consent of instructor required. DOLER, PETERSON.

Sp 277. **Debate.** 1 hour each term, four terms. 2 ①
Application of principles of argumentation; organization and presentation of debate speeches. Prerequisite: Sp 111. Either Sp 237 or consent of instructor required. PETERSON.

Upper Division Courses

Sp 346. **Scene and Stage Design.** 3 hours. 2 ① 2 ③
Physical theater; forms of auditoriums and stages; history of scene design; design of stage settings; application to high school and community dramatics. Prerequisite: Sp 244 or consent of instructor. YOUNG, BENNETT.

Sp 355. **Workshop Theater.** 1 to 3 hours each term, maximum 6 hours.
Advanced work in acting and dramatic production. Prerequisite: 3 term hours of Sp 253. CORTRIGHT, YOUNG, HARRIS, HENRY, BENNETT.

Sp 361,362,363. **Radio Speaking.** 3 hours each term. 2 ① 1 ②
Sp 361: Radio delivery techniques; adapting informational materials to broadcasting; radio station policies. *Sp 362:* Basic production techniques for talks and dramatic programs; program planning and promotion. *Sp 363:* Writing for radio, including theory and principles adaptable to both educational and commercial broadcasting. Prerequisite: Sp 111. Need not be taken in sequence. LIVINGSTON, GROVER, PHILLIPS.

Sp 365. **Radio-Television Projects.** 2 hours.
Educational projects in radio-television similar to work in Sp 264. Prerequisite: Sp 264 or Sp 361. LIVINGSTON, GONZALEZ, GROVER, PHILLIPS.

Sp 367. **Basic Television.** 3 hours fall or winter. 2 ① 1 ②
Television performance techniques; fundamental understanding of tools of television including cameras, microphones, lighting, staging, television station operational policies; adaptation of informational materials to television. Prerequisite: Sp 361. LIVINGSTON, GROVER.

Sp 368. **Television Programing.** 3 hours winter. 2 ① 1 ②
Structure of broadcast programs, both educational and commercial; programing objectives, audience analysis, and promotion methods; laboratory preparation of representative programs in areas of student interest. Prerequisite: Sp 367. LIVINGSTON, GROVER.

Sp 372. **Oratory.** 1 hour each term, six terms.
Advanced work in oratory. Prerequisite: Sp 271. WELLS.

Sp 375. **General Forensic Speaking.** 1 hour each term, six terms.
Advanced work in general forensic speaking. Prerequisite: Sp 274. DOLER, PETERSON.

Sp 378. **Debate.** 1 hour each term, six terms.
Advanced work in debate. Prerequisite: Sp 277. PETERSON.

Sp 451. **Audio-Visual Aids in Radio-Television.** (g) 3 hours. 3 ①
Adaptation of audio-visual effects in broadcasting; use of sound, music, graphics, film, and special studio and electronic effects in communicating information through broadcast media. Prerequisite: Sp 367. LIVINGSTON.

Sp 480. **Speech Science.** 3 hours fall or winter. 3 ①
Scientific bases of speech; nature and purpose of speech; origin and development in race and individual; anatomy and physiology of speech mechanisms, both peripheral and nervous; physics of speech sounds; phonetic elements; psychological aspects. WELLS.

3 ①
Sp 493. **Principles and Techniques of Speech Correction.** (G) 3 hours.
Nature, causes, diagnosis and treatment of speech defects both organic and functional; for students requiring knowledge of speech problems of children and adolescents especially. Recommended prerequisite: Sp 480. WELLS, HARRIS, HILDEBRANDT.

Sp 494. **Clinic Procedures.** (G) 3 hours spring. 3 ①
Extensive practical experience in handling clinical cases, including taking of case history, making diagnosis, and giving remedial treatment Prerequisite: Sp 493. WELLS, HILDEBRANDT.

Graduate Service Courses

Courses numbered 400-499 and designated *(g)* or *(G)* may be taken for graduate credit.

SOCIAL SCIENCES

Included under this heading for administrative convenience as well as the nature of their subject matter are the courses in general social science and the work offered in the Departments of Economics (including Geography), History, Political Science, Psychology, and Sociology.

General Social Science

Lower Division Courses

SSc 101,102,103. **Background of Social Science.** 3 hours each term. 3 ①
Orientation in social sciences emphasizing the integration of all the social sciences into a discipline of learning; general influences on human behavior; scientific method in social sciences. Open to freshmen and sophomores only. CANTRELL.

Upper Division Courses

SSc 307. **Seminar.** Terms and hours to be arranged.

SSc 407. **Seminar.** Terms and hours to be arranged.

SSc 441,442,443. **International Politics and National Power.** (g) 3 hours each term. 3 ①
First term: foreign relations and basic policy affecting power position of United States. *Second term:* relative power position of states with reference to military, economic, social, geographic, and psychological factors and the stability and effectiveness of governments. *Third term:* national power and international organization; United Nations and national power. Prerequisite: PS 201 and 417. Students who have not had prerequisite must have consent of instructor. SWYGARD.

Economics

Instruction in the Department of Economics is intended to serve the cultural and informational needs of all students interested in economic problems in relation to citizenship; to provide courses for students majoring in the humanities and social sciences; to supply a foundation for law, business, or public service; and to meet the prescriptions found in professional curricula.

Under the Department of Economics, courses in geography are designed to meet needs within the major curricula on the campus. Courses provide for study of world environmental patterns; interrelationships of physical and cultural complexes; patterns of economies and human occupance fundamental to the education of every citizen in the twentieth century. Courses in physical and resource geography are offered in the Department of Natural Resources in the School of Science.

Courses in Economics

Lower Division Courses

Ec 111. **The American Economy.** 3 hours fall. 3 ①
Introduction to economic institutions in United States; living standards, employment, income distribution, economic resources, forms of business enterprise, and role of government. Emphasis on position and problems of consumer in market economy.

Ec 201,202,203. **Principles of Economics.** 3 hours each term. 3 ①
The principles that underlie production, exchange, and distribution; practical problems, such as monetary and banking reform, trade regulations, taxation, labor movements, unemployment, business cycles. A 3-term sequence. FRIDAY, staff.

Ec 212. **Outlines of Economics.** 3 hours. 3 ①
A rapid survey of the principles of economics and economic institutions. Restricted to science and upper division professional school students. FRIDAY, staff.

Ec 213,214. **Principles of Economics.** 4 hours winter and spring. 4 ①
Similar to Ec 201,202,203. A 2-term sequence.

Ec 215. **Economic Development of the United States.** 3 hours. 3 ①
Origin and development of economic institutions including industry, agriculture, commerce, transporation, labor, and finance. Analyzes the economic progress of the United States. FRIDAY.

Upper Division Courses

Ec 310. **Economics of National Security.** 3 hours fall. 3 ①
Economic basis of national security; industrial mobilization; stabilization of civilian economy; national budget and fiscal and monetary policy under a security program; foreign aid policies. FRIDAY.

*Ec 407. **Seminar.** (g) Terms and hours to be arranged.

Ec 420. **Business Combinations.** (g) 3 hours spring. 3 ①
Historical development and present status of American business combinations; cooperatives, trade associations, trusts, holding companies and consolidations; monopolies; fair and unfair practices, monopoly price problems; control. Prerequisite: elementary economics.

Ec 421. **Business Fluctuations.** (g) 3 hours spring. 3 ①
Variations in economic activity viewed in historical perspective; fluctuations and cycles; prosperity and depression; measurement and control. Prerequisite: elementary economics. ORZECH.

Ec 422. **Economics of Consumption.** 3 hours spring. 3 ①
Economic principles applied to consumer problems; wealth consumption; living standards; living costs; budgeting; consumer markets; choice in buying; conservation policies; consumption theories. Prerequisite: elementary economics. PATTERSON.

Ec 423. **Economics of Public Utilities.** 3 hours winter. 3 ①
Development of public utilities in the United States; their economic and legal characteristics; problems of regulation, rates, services, and finance. Prerequisite: elementary economics. PATTERSON.

*Ec 424. **Money and Banking.** (g) 4 hours fall or spring. 4 ①
Nature and functions of money; factors affecting price; forms of money; functions of banks; history of banking; Federal Reserve Bank Act; American and foreign banking systems. Prerequisite: elementary economics. NELSON.

Ec 425. **Labor Problems.** (g) 4 hours fall or winter. 4 ①
Sources and nature of labor problems; labor market; wages; unions; law related to employer and union tactics; effect of levels of employment. Prerequisite: elementary economics. HARTER.

4 ①
Ec 426. **Collective Bargaining and Labor Legislation.** 4 hours spring.
Wages and hours; unemployment; labor relations and social insurance; collective bargaining; legal, social, and economic implications of the labor movement. Prerequisite: elementary economics. HARTER.

Ec 427. **Public Finance.** (g) 3 hours winter. 3 ①
Survey of government taxing, spending, borrowing with emphasis on current issues of theory and practice at Federal, State, local levels; shifting and incidence; effects of taxes on income distribution and welfare. Prerequisite: elementary economics.

*Ec 435. **Transportation.** (g) 3 hours winter. 3 ①
Development of systems of transportation; organization and financing; effect of competition; freight classification; rates and fares; government control; State and Federal regulation. Prerequisite: elementary economics. PATTERSON.

* Applicable toward a graduate major in agricultural economics, School of Agriculture.

*Ec 443. **International Trade.** (g) 4 hours winter. 4 ①
Theory of international trade; nature and effects of government bounties, subsidies, import and export duties; commercial policies of nations; consular service; ocean routes and carriers. Prerequisite: elementary economics.

Ec 450. **Comparative Economic Systems.** 3 hours fall. 3 ①
Analysis and critical appraisal of contemporary economic systems; capitalism, socialism, communism. Prerequisite: elementary economics.

*Ec 475,476,477. **Current Economic Theory and Problems.** (g) 3 hours each term. 3 ①
Ec 475: Nature and scope of economics; role of economic theory; microeconomics: supply and demand; indifference curves; pricing under conditions of competition, oligopoly, monopoly; functional distribution of income. *Ec 476:* Macroeconomics; determination of national income and employment; consumption; investment; multiplier; accelerator; monetary and fiscal policy. *Ec 477:* Economics of growth: long run changes in national income and structure of economic institutions; growth theories; underdeveloped economies. Courses may be taken separately. Prerequisite: Elementary economics. FRIDAY, ORZECH.

*Ec 481. **Economic Programing.** (g) 3 hours spring. 3 ①
Basic principles of programing problems and methods of solution in decision-making problems in agriculture, transportation, and manufacturing; meaning and application of input-output analysis. Prerequisite: Ec 475,476,477. ORZECH.

Graduate Service Courses
Courses numbered 400-499 and designated (*g*) may be taken toward a graduate minor.

Courses in Geography

Lower Division Courses

Geog 105,106,107. **Introductory Geography.** 3 hours each term. 3 ①
Elements and implications of geography. *Geog 105,* World Regions: analysis of the patterns of world environment; man and his activities. *Geog 106,* Economic Geography: world commodity production. *Geog 107,* Political Geography: implications of geography on world political entities. To be taken in sequence.

Upper Division Courses

Geog 313. **Geography of Pacific Northwest.** 3 hours. 3 ①
Analysis of human and economic geography of Pacific Northwest with special attention to Oregon. Prerequisite: Geog 107. MYATT.

Geog 326. **Geography of Europe.** 3 hours. 3 ①
Physical and cultural environment and economic activities of each political unit (excluding U.S.S.R.). Prerequisite: Geog 107. HEINTZELMAN.

Geog 328. **Geography of Latin America.** 3 hours. 3 ①
Geographic foundations of the Latin American nations; industrial and commercial development and potentialities. Prerequisite: Geog 107. JENSEN.

Geog 329. **Geography of North America.** 3 hours any term. 3 ①
Regional analysis of North America, including Canada and Alaska but not Mexico. Prerequisite: Geog 107. MYATT.

Geog 331. **Geography of Asia.** 3 hours. 3 ①
Geographic appraisals of Asiatic countries including the island fringe; human, cultural, and economic conditions; national economies and world relationships; implications for present and future. Prerequisite: Geog 107. HIGHSMITH.

Geog 332. **Geography of Africa.** 3 hours. 3 ①
African nations and colonies; human, cultural, and economic conditions; national economies and world relationships; implications for present and future. Prerequisite: Geog 107. MYATT.

* Applicable toward a graduate major in agricultural economics, School of Agriculture.

History

A knowledge of the history of the civilizations of the world is fundamental as background for the social sciences and humantities. It is of special value to the students of law, journalism, and business. It is necessary for a liberal education and is preparation for intelligent, informed citizenship. Courses are designed both for those who wish to major in the field and for general students.

Lower Division Courses

3 ①

Hst 101,102,103. **History of Western Civilization.** 3 hours each term.
Survey of history of man, his governmental, economic, social, religious, intellectual, and esthetic activities, from earliest times to present, in Europe, Asia, and Americas. Special effort is made to relate past to contemporary events and institutions.

Hst 208,209. **English History.** 3 hours each term. 3 ①
Political, economic, social, intellectual, and religious developments since 1485; evolution from Empire to Commonwealth and part played by Britain in transition. Prerequisite: Hst 101,102,103. Students not having prerequisite must have consent of instructor. C. K. SMITH.

3 ①

Hst 224,225,226. **History of American Civilization.** 3 hours each term.
Rise and development of American civilization from beginning to present; special attention to economic, social, and cultural life, political changes and international relations.

Hst 230,231,232. **Great Americans in Thought and Action.** 2 hours each term. 2 ①
Personality and leadership of men and women who have been outstanding in various fields of endeavor, great movements, and critical periods. BERKELEY.

Upper Division Courses

Hst 341,342,343. **Europe Since 1789.** 3 hours each term. 3 ①
Political, social, economic, and cultural trends since fall of Napoleon; growth of political institutions; development of national states, imperial rivalries, problems of race, origin of World War I, peace settlement; totalitarianism, Munich, World War II, contemporary scene. *Fall:* 1815-1890; *winter:* 1890-1933; *spring:* 1933-present. prerequisite: Hst 101,102,103 or consent of instructor. C. K. SMITH.

Hst 360,361. **Latin-American Civilization.** 3 hours each term. 3 ①
Native civilizations of Mexico, Central America, and South America; impact and blending of these cultures with those of Spain and Portugal in colonial age; struggle for independence; development of Latin-American republics to present. R. W. SMITH.

Hst 391,392,393. **The Far East.** 3 hours each term. 3 ①
Introduction to history, civilization, and political, economic, cultural, and social problems of modern China, Japan, India, Korea, South Asia, and the Pacific Islands. ADOLF.

Hst 447. **Tsarist Russia.** (g) 3 hours fall. 3 ①
Growth of Russian Empire and its institutions; rise of revolutionary thought and movement. Prerequisite: Hst 101,102,103. C. K. SMITH.

Hst 448. **Soviet Union.** (g) 3 hours. 3 ①
Political, diplomatic, economic, and social development of Russia from 1917 to present. Prerequisite: Hst 101,102,103. C. K. SMITH.

3 ①

Hst 460,461,462. **American Thought and Culture.** (g) 3 hours each term.
Growth of American thought, ideals, and institutions; analysis of contribution to American culture by schools, newspapers, magazines, motion pictures, radio, art, literature, television, and philosophy. Prerequisite: Hst 224,225,226. CARLIN.

Hst 478. **History of Pacific Northwest.** (g) 3 hours. 3 ①
Survey of growth and development of Oregon, Washington, and Idaho from Indian times to present, with emphasis on political, economic, social, cultural changes. Prerequisite: Hst 224,225, or equivalent. ELLISON.

Hst 480,481,482. **The United States in the Twentieth Century.** (g) 3 hours each term. 3 ①
Development of political and economic institutions since 1897; relevant social and cultural changes. Prerequisite: Hst 224,225,226. SHAW.

Graduate Service Courses
Courses numbered 400-499 and designated (*g*) may be taken toward a graduate minor.

Political Science

The courses in political science are designed primarily to prepare for intelligent citizenship and effective participation in public affairs; to give the student an active interest in the principles and structure of political life and the operation of governments, and an understanding of current political questions. The course offerings in public administration and foreign relations are designed to help prepare students majoring in technical fields who contemplate careers in public service both at home and abroad.

Lower Division Courses

PS 201,202,203. **American Governments.** 3 hours each term. 3 ①
First term: principles of American constitutional system, political process, and the organization of national government. *Second term:* powers and functions of national government. PS 201 may be taken separately but is prerequisite for PS 202. *Third term:* Practical operation and contemporary reforms in government at state and local levels.

PS 206. **European Political Systems.** 3 hours. 3 ①
Comparative study of ideological foundations, forms, and practices of political systems of major European countries; comparison to and contrast with American political system. WALTER.

Upper Division Courses

PS 312. **Basic American Constitutional Law.** 3 hours. 3 ①
Interpretation of Constitution; judical review; nation-state relationship; civil rights; powers of President and Congress. Prerequisite: PS 201. FUQUAY.

PS 313. **Political Parties.** 3 hours. 3 ①
Practical politics in action; political parties and pressure groups; propaganda; nominations and elections; citizen's relationship to agencies that influence public policy and government at all levels. Prerequisite: PS 201. MCCLENAGHAN.

PS 334,335,336. **Current Problems in American Democracy.** 2 hours each term. 2 ①
Domestic and foreign policy, organization and operation of American political system; individual and state in democratic society.

PS 411,412,413. **Public Administration.** (g) 3 hours each term. 3 ①
PS 411: principles of public administration; administrative organization and procedures; public relations. *PS 412:* administrative functions; public personnel and fiscal problems and practices. *PS 413:* basic administrative law; control of administrative agencies; powers, limitations, and remedies. Prerequisite: PS 201. Students who have not had prerequisite must have consent of instructor. MADDOX, FUQUAY.

PS 417. **International Relations.** (g) 3 hours. 3 ①
International relations from emergence of modern state system to present. Designed to provide student with essential backgrounds and to show significance and interrelationships of international law, war, power politics, peaceful settlement of disputes, and international organization. WALTER.

PS 419. **Pacific Area Relations.** (g) 3 hours. 3 ①
Survey of problems in government and foreign relations of Pacific powers; revolutionary ferment and postwar adjustments, with particular attention to American security and commercial interests. SWYGARD.

PS 423. **Municipal Government.** (g) 3 hours spring. 3 ①
Organization, functions, and present-day problems of city governments. Prerequisite: PS 201,203. Students who have not had prerequisites must have consent of instructor. MADDOX.

PS 431,432,433. **Western Political Ideas.** (g) 3 hours each term. 3 ①
PS 431: bases of Western political ideas; *PS 432:* modern political thought; *PS 433:* American political thought from Revolution to present. Prerequisite: PS 201 and 6 hours from PS 202,203,206,312,313. WALTER.

SSc 441,442,443. **International Politics and National Power.** (g) 3 hours each term.
(See GENERAL SOCIAL SCIENCE courses.)

Graduate Service Courses
Courses numbered 400-499 and designated (*g*) may be taken for credit toward a graduate minor.

Psychology

Psychology courses are intended to meet the needs of students desiring a knowledge of psychology as a part of their general education or as a foundation for work in education, child development, and other professions; to prepare students to major in psychology at the upper division level; and to meet the service needs of various schools and departments that require psychology as a part of their program of training. The School of Education offers courses in the psychology of childhood, adolescence, education, guidance, and vocations.

Lower Division Courses

Psy 111. **Personality and Development.** 3 hours. 3 ①
Self-understanding and development; emphasis upon habits, attitudes, emotional problems, and efficient learning techniques. Open only to freshmen and sophomores.

Psy 201,202. **General Psychology.** 3 hours each term. 3 ①
Study of behavior and experience; facts and principles of motivation, learning, perceiving, and individual difference. Two-term sequence; with Psy 205 forms year sequence. Prerequisite: sophomore standing.

Psy 205. **Applied Psychology.** 3 hours. 3 ①
Applications of psychological facts and principles to such fields as education, industry, business, and other professions. Prerequisite: Psy 202.

Psy 208,209,210. **Psychology Laboratory.** 1 hour each term. 1 ③
Introduction to laboratory experimental methods. Operated in coordination with Psy 201,202,205. Must be taken in sequence. Combination counts as science sequence in meeting group requirements.

Psy 212. **Practical Psychology.** 3 hours. 3 ①
A survey of basic facts and principles of human behavior particularly useful to students of engineering, forestry, and agriculture. Not open to students who have taken Psy 202. Prerequisite: Sophomore standing.

Upper Division Courses

Psy 311. **Human Development.** 3 hours. 3 ①
Psychological problems in child's development from 5 to 14; development of muscular activities; perception; language; motivational and emotional patterns; intelligence; social behavior; measurement of child behavior. Prerequisite: Psy 202.

Psy 314. **Human Adjustment.** 3 hours. 3 ①
Principles of motivation, perception, communication, learning, and adjustment with emphasis on their discovery and application in life patterns of student; self-understanding and self-acceptance fundamental to increasing human efficiency and effectiveness requisite for happy living. Prerequisite: Psy 202.

Psy 361. **Group Dynamics.** 3 hours. 2 ① 1 ②
Principles and techniques of group work; interaction of individuals within groups. For students preparing to work with groups in industry, extension work, youth organizations, etc. Prerequisite: Psy 202.

Psy 371. **Quantitative Methods.** 3 hours. 3 ①
Fundamentals of experimentation; design and conduct of experiments; analysis and interpretation of data; reporting of research in human behavior. Prepares for critical reading of literature of research in psychology, social sciences, business, education, and home economics. Not primarily computational. Prerequisite: Psy 202.

Psy 411. **Mental Hygiene.** (g) 3 hours. 3 ①
Principles and application of mental hygiene to problems of individual in home, school, and occupational situations. Prerequisite: Psy 314 or equivalent.

Psy 431. **Industrial Psychology.** (g) 3 hours. 3 ①
Study of human relationships in industry, human engineering, personnel placement and selection. Prerequisite: Psy 205 or equivalent.

Psy 433. **Human Factors in Engineering.** 3 hours. 3 ①
Principles of human behavior as related to fundamentals of equipment design, layout, and operation. Special attention given to abilities and limitations of human operators and effect of such on accuracy, speed, safety, training, comfort, and fatigue in equipment operation. Prerequisite: Psy 202 or 212.

Psy 462. **Behavior Deviations.** (g) 3 hours. 3 ①
Normal and abnormal behavior contrasted; understanding of bases for deviant behavior; role of society in promoting deviant behavior. Prerequisite: Psy 311 or 314 or equivalent.

Psy 472,473,474. **Individual Differences.** (g) 3 hours each term. 3 ①
Theories of personality; experimental evidence on individual differences; evaluation of differences; guiding and directing normal development. Prerequisite: Psy 371 or equivalent. Prerequisite for 473 or 474: Psy 472.

Psy 478,479,480. **Psychological Tests and Testing.** (g) 3 hours each term. 3 ①
Theory and practice of psychological testing; supervised practice in administration, scoring, and interpretation of individual mental tests; analysis of group tests of intelligence, personality, interests, etc. Prerequisite: Psy 371 or equivalent. Prerequisite for Psy 479 or Psy 480: Psy 478.

Psy 482. **Practice in Psychological Services.** (g) 3 hours each term, two terms. 3 ①
Designed to give properly qualified students experience in use of psychological and related methods in dealing with individuals at adolescent and adult levels. Consent of instructor required. Prerequisite: Psy 473,479.

Graduate Service Courses

Courses numbered 400-499 and designated (*g*) may be taken toward a graduate minor.

Sociology

All instruction in sociology, like that in the related social sciences, is intended to contribute to training for good citizenship through a better understanding of principles that govern human associations and relationships. Particular attention is given to gaining an insight into the structures and functioning of society and into contemporary social problems. Basic courses are provided for students planning to major in sociology elsewhere. All courses are designed to meet the special needs of students in other fields.

Lower Division Courses

Soc 204,205,206. **General Sociology.** 3 hours each term. 3 ①
Principles underlying structure and functioning of human groups. Soc 206 stresses application of sociological principles to social problems. Soc 212 may be substituted for Soc 204.

Soc 212. **Introduction to Sociology.** 3 hours. 3 ①
Selected sociological principles. Not open to students who have taken Soc 204.

Soc 214,215,216. **Anthropology.** 3 hours. 3 ①
Interplay of man with his environment through the ages; factors influencing physical and cultural development of man. *Soc 214:* physical anthropology; *Soc 215:* cultural anthropology—general; *Soc 216:* cultural anthropology—American. Prerequisite: Soc 215 must be taken before 216. PARKS.

Upper Division Courses

Soc 312. **Sociology of the Family.** 3 hours. 3 ①
Historical development of the family as an institution; trends and problems in courtship, marriage, and family life related to society. Prerequisite: Soc 204 or 212. CANTRELL.

Soc 327. **Introduction to Social Research.** 3 hours. 3 ①
Nature of scientific inquiry; sources of data for the social sciences; basic methods and techniques in social research. Prerequisite: 9 hours of social science.

Soc 364. **Sociology of Rural Life.** 3 hours. 3 ①
Basic social factors in rural life; rural communities in a changing society. FOSTER.

Soc 411,412,413. **Social Problems.** (g) 3 hours each term. 3 ①
May be taken separately. *Soc 411:* disorganization—personal and social; *Soc 412:* criminology and penology; *Soc 413:* race relations and minority groups. Prerequisite: 6 hours of sociology or sociology and psychology. BAKKUM, CANTRELL, PLAMBECK.

Soc 468. **Sociology of Urban Life.** (g) 3 hours. 3 ①
Sociological analysis of the modern city; its history, structures, functions, and problems. Prerequisite: 6 hours of sociology or sociology and psychology.

Soc 469. **Rural Social Organizations.** (g) 3 hours. 3 ①
More detailed analysis of special aspects of rural life than in Soc 364. Prerequisite: 9 hours of sociology or of sociology and economics or psychology. FOSTER.

Soc 474. **Social Psychology.** (g) 3 hours. 3 ①
Biological and social functions of human behavior; individual and social adjustments; behavior in presence of others; social psychology of institutions; social conflict. Prerequisite: 6 hours of sociology and psychology. BAKKUM.

Soc 475. **Community Organization.** (g) 3 hours. 3 ①
Nature and problems of community organization; adjustments in community organization to meet changing needs. Prerequisite: 6 hours of sociology or sociology and psychology. PLAMBECK.

Soc 490. **Educational Sociology.** (g) 3 hours. 3 ①
Contributions of sociology to educational problems and practices. Prerequisite: 6 hours of sociology or sociology and psychology. BAKKUM.

Graduate Service Courses

Courses numbered 400-499 and designated (*g*) may be taken toward a graduate minor.

School of Science

Faculty

As of January 1961

FRANCOIS ARCHIBALD GILFILLAN, Ph.D., Dean of the School of Science.

GRAYDON TALMADGE CREWS, Ed.D., Science Student Personnel Adviser.

General Science: Professors HANSEN (department chairman), GILFILLAN, WILLIAMSON; Associate Professors BEER, CREWS, HUMPHREY; Assistant Professors FOX, STAHL; Instructor CRAVEN; Graduate Assistants BELTZ, GRIFFIN, HODGES, MCDOWELL, MOORE, NEELEY, OWENS, PEMBROOK.

Bacteriology: Professors ELLIKER (department chairman), C. L. ANDERSON,[1] BOLLEN, GILMOUR, LANGTON, PILCHER; Associate Professor A. W. ANDERSON; Assistant Professors PARKS, SANDINE; Instructor BUCKLEY; Teaching Fellow BOWEN; Graduate Assistants EZELL, KNITTEL, SAUNDERS, PAYNE; Research Assistants EVENSON, KRACKOV.

Botany: Professors YOUNG (department chairman), ATWOOD (emeritus), DIETZ (emeritus), EVANS, GILFILLAN (executive committee, Institute of Marine Biology), GILKEY (emeritus), MILBRATH, ROTH,[2] SMITH, VAUGHAN; Associate Professors BELKENGREN, CHAMBERS (Curator, Herbarium), CHILCOTE, JENSEN, JONES, PHINNEY; Assistant Professors BRANDT, CAMERON, CORDEN, DEEP, RAYMER; Senior Instructor LUND; Instructors DENNIS, DUBE, PEEK; Assistant in Plant Pathology KUHLMAN; Research Assistants MURPHY, JOHNSON; Graduate Assistants BAKER, BROWN, DEAN, KUMLER, WEST.

Chemistry: Professors CHRISTENSEN (department chairman), BUTTS,[3] CALDWELL, CHELDELIN, CLARK, DECIUS, GILBERT (emeritus), KING, KURTH, LOGAN, MEHLIG (emeritus), NORRIS, PEASE (emeritus), REMMERT, RICHARDSON, SCOTT,[4] SLABAUGH, WANG, WESWIG, WILLIAMS; Associate Professors FREUND, HEDBERG, KICE, MARVELL, NEWBURGH,[5] PARSONS, REESE; Assistant Professors HEISLER, KALMAN; Instructors BAICH, BRAY, BUBL, IWASAKI, STEVENS; Research Fellows COKER, HEALY, HOLMES, KHIDER, MARTINEZ, NISSEN, RAMSEY, ROCKHOLT, SCHNEIDER, SEEFELD, WIMAN; Research Assistants D. R. ANDERSON, KENNEDY, LEITIS, A. A. PERSYN, POTTER; Fellows J. A. ANDERSON, BAIN, CATON, CURTICE, DENNISON, ENGEBRETCH, HANSEN, KUHN, NITIDANDHAPRABHAS, PATTON, RICHARDSON, ROWELL, STUMP, VAN ORDERN, WARREN, WILSON; Graduate Assistants BLANK, BROWER, CHAN, CLAEYS, DAVIS, GREENDORFER, JOHNSON, KAUFMAN, LILIENTHAL, LINDBECK, MASUMOTO, NAZEERI, NELSON, PATTERSON, A. R. PERSYN, PROVANT, RAUCH, SELF, SMITH, STRAUCH, STREBIN, TANAKA, TASHIRO, VANDERZANDEN.

Entomology: Professors RITCHER (department chairman), MARTIN,[6] CHAMBERLIN (emeritus), MOTE (emeritus), SCULLEN (emeritus), SWENSON;[7] Associate Professors RUDINSKY, STEPHEN; Assistant Professors BROOKES, GOULDING, LATTIN; Instructors HASBROUCK, KRAFT.

Geology: Professors WILKINSON (department chairman), ALLISON, PACKARD (emeritus); Associate Professor TAUBENECK;[8] Assistant Professors BOSTWICK, CUMMINGS, KOCH; Instructors BOND, SNOOK; Graduate Assistants ARNDT, CLARK, GLENN, HOLLISTER, LEMBACH, LUKANUSKI, MCKNIGHT.

Mathematics: Professors LONSETH (department chairman), ARNOLD, BEATY (emeritus), FULKS, GASKELL, GOHEEN, HOSTETTER (retired), MILNE (emeritus), OBERHETTINGER, POOLE; Associate Professors KIRKHAM, SAUNDERS, STONE;[9] Assistant Professors BAKKUM, BUSCHMAN, GODARD, GROEMER, MCLEOD,[10] R. R. REYNOLDS, STALLEY; Instructors BALLANTINE, DEFENBACH, FLOOD, GOEBEL, HERRMAN, G. MALOOF, OVERHOLSER, N. REYNOLDS, ROETMAN, TUCKER, WITCRAFT, WYSE; Research Associate HICKS; Teaching Fellows ANDERSON, BRADY, GUENTHER, ENGSTROM-HEG, M. MALOOF, ROSENTHAL, K. SONI, R. SONI, VINSON; Research Assistants BACHELOR, BRENNE, HANSON, KOHFELD; National Science Foundation Cooperative Fellow B. KVARDA; National Defense Education Act Fellows KROGH, PHILLIPS; Graduate Assistants BUTLER, CHISUM, DIGBY, DIXON, DOBSON, GAMON, GOING, GOLDEN, HENDERSON, JACOBS, LAWRENCE, LIM, PRENTER, SHOLA, TOMS, UNGER.

Natural Resources: Professors JENSEN (department chairman), HIGHSMITH; Associate Professors HEINTZELMAN, RUDD; Instructor JACK; Graduate Assistants BROWN, CHRISTENSEN, NEWLAND, YOUNG.

[1] On sabbatical leave fall term.
[2] On sabbatical leave 1960-61.
[3] On leave.
[4] On sabbatical leave 1960-61.
[5] On sabbatical leave 1960-61.
[6] On sabbatical leave fall and spring 1960-61.
[7] On sabbatical leave 1960-61.
[8] On leave.
[9] On leave 1960-61.
[10] On leave winter and spring 1960-1961.

Nursing Education: Professor BOYLE (director), Associate Professor OLSON.

Oceanography: Professor BURT (department chairman); Associate Professors BYRNE, FROLANDER, PATTULLO; Assistant Professors MACNEILL, PEARCY; Instructors KUJALA, MCALISTER, STRONG, WYATT; Research Assistants DAY, KULM, MALONEY, MANSKE, OSTERBERG, ROSENBERG, SMITH.

Physics: Professors YUNKER (department chairman), BRADY, DEMPSTER, VARNER (emeritus); Associate Professors DECKER, GARMAN, MORGAN (emeritus), NICODEMUS, SCHECTER, TRIGG, VINYARD; Assistant Professors BURCH, CHURCH, EASTERDAY, FORREST, LOWRY (acting); Instructors ANDERSON, COLEMAN, NEWSTEAD, SKINNER, TYNES; Graduate Assistants J. ANDERSON, APPLEBEE, BARR, BENTON, CALDERON, COOPER, CUDERMAN, DARRAH, DICKERSON, FESSENDEN, KHANNA, LONG, MANSFIELD, MARR, PRADHAN, TUCKER, WEBB; Research Assistants EVENSON, GLASGOW, LALL, SOMMERFELDT.

Science Education: Professor WILLIAMSON (department chairman); Assistant Professor FOX.

Statistics: Professors LI (department chairman), CALVIN; Associate Professors LINK, PETERSON; Graduate Assistant THOMAS.

Zoology: Professors DORNFELD (department chairman), ALLMAN, GILFILLAN, (executive committee, Oregon Institute of Marine Biology), GORDON, HILLEMANN, KRUEGER,[1] PRATT, WULZEN (emeritus); Associate Professors MAYSHARK, MOHLER, OSBORN (emeritus), PRITCHARD, STORM; Assistant Professors HISAW, OWCZARZAK; Instructor NEWSTEAD; Research Associate KAUFMAN; National Institutes of Health Fellow STANLEY; National Science Foundation Fellows DANFORTH, FORD; Research Fellows J. BELTZ, CANARIS, JOHNSON, PUYEAR; Teaching Fellows ANDERSON, MONROE, STEWART; Graduate Assistants BAWDON, BELTON, BORGARD, CONNELL, CRANDELL, DORSCH, HEATH, KERLEY, TURNER, WHITE.

General Statement

THE SCHOOL OF SCIENCE at Oregon State University offers: (1) Liberal arts courses with majors in science leading to the degree of Bachelor of Arts or Bachelor of Science. (2) Professional education for students planning to enter some occupation within the realm of science. Such students may take an undergraduate science major and from one to three years or more of graduate study in science. (3) Elective and service courses in science for students majoring in other schools, or for students who take science as a basis for professional or technical work in other schools.

Degree Honors Program

THE HONORS PROGRAM in the School of Science seeks to enrich educational opportunities for the more able student and to recognize scholarly achievement.

Application. Entering freshmen may apply to participate in the program. Interested high school graduates may obtain application forms from the dean of the School of Science as soon as they have been accepted for admission to Oregon State. Thereafter, a student registered in the School of Science may make such application at the time of registration for any term through the first term in the junior year. Transfer students may also apply.

Eligibility. To be eligible for the HONORS PROGRAM, an entering freshman must have been in the upper one-third of his high school graduating class and must have an average above B in science and mathematics. Consideration also will be given to the student's performance on college placement examinations. The applicant must be recommended for the HONORS PROGRAM by one of his high school science teachers or the principal of his high school. This written recommendation must accompany the application for admission to the honors program. Other students who have been in the School of Science for at least one term,

[1] On leave 1960-62.

but not more than six terms, and have a grade-point average of 3.00 or higher also may apply for admission to the HONORS PROGRAM.

The School of Science Honors Council passes on the qualifications of applicants and makes its recommendations to the dean of the School of Science who has the authority to approve candidates for the HONORS PROGRAM.

Basic Science Honors Program. All freshmen and sophomores in the HONORS PROGRAM follow the same basic honors requirements. They enroll in honors sections in chemistry, English, mathematics, and physics and must develop a reading knowledge in a foreign language. They enroll in a special 1-credit course each term.

Departmental Honors Program. Department honors requirements include honors readings, seminars, special projects, special course work, research, thesis, and comprehensive written examinations. All upper division honors students enroll in a 2-hour colloquium. All departments have a requirement of an oral examination of at least one hour's duration. A student may receive from 9 to 18 hours of credit for work in the HONORS PROGRAM during the junior and senior years. Honors are awarded in the field of the department recommending the student for honors.

Withdrawal. A candidate for honors may withdraw or be dropped from the program without prejudice when the Honors Council and the dean deem such action to be in the best interests of the student, the program, the department, and the school.

Other Special Programs

General Science. A student in general science takes at least 51 term hours of science. He may choose electives in the humanities and social sciences, or professional fields. For students interested in fields that involve two or more of the traditional sciences—e.g., biophysics, geophysics, life sciences, paleobiology, seismology—special curricula will be outlined. Interdepartmental majors are administered through the Department of General Science, and student programs are supervised jointly by the departments concerned.

Special Curricula. In addition to the special curricula described below, programs of study and guidance are provided students preparing to enter optometry schools and physical therapy and occupational therapy schools.

Dentistry and Dental Hygiene. The minimum educational requirement for admission to a dental school is successful completion of two years of college-level study including a year's work each in English, biology, physics, and inorganic chemistry, and a half-year's study in organic chemistry. Science courses must include laboratory practice.

The School of Science offers 2-year and 3-year predental curricula. Both curricula satisfy the requirements set by the Council on Dental Education of the American Dental Association for admission to University of Oregon Dental School in Portland or other standard dental school. Students completing the 3-year curriculum may qualify for a bachelor's degree from Oregon State after one year at dental school. See detailed curricula on a later page.

Students who complete the 2-year program in dental hygiene at the Dental School may qualify for a bachelor's degree from Oregon State by two additional years on the campus at Corvallis. One year at Corvallis may be taken before entering Dental School.

Counselors for predental students are Dr. D. I. Allman, professor of physical education, chairman; Dr. A. W. Pritchard, associate professor of zoology; and Dr. Frank C. Morris, D.M.D.

Medicine. The School of Science offers a premedical curriculum preparing for entrance into standard medical schools.

The medical college admission test of the Association of American Medical Colleges is given each spring to all students who expect to apply during the next academic year for admission to a medical school. Further knowledge of the student's ability is obtained through frequent conferences between the student and his instructors and counselors.

The counselors for premedical students are: Dr. C. S. Pease, professor emeritus of chemistry, chairman; Dr. R. M. Storm, associate professor of zoology; Dr. J. D. Mohler, associate professor of zoology; and Dr. Charles E. Reed, M.D.

The entrance requirements of the University of Oregon Medical School in Portland are as follows:

(1) **High School Preparation.** The following high school course, which meets all the formal requirements, is strongly recommended:

	Units		*Units*
English	4	Latin	2
Algebra	1½	History	1
Physics	1	German or French	2
Chemistry	1	Electives	1½
Geometry	1		
Total			15

(2) **Collegiate Preparation.** The Medical School requires for admission at least three academic years of preparatory work (138 term hours exclusive of credit in military or naval science). The following work is prescribed:

	Term hours
Chemistry	23
General inorganic, which may include qualitative analysis	12
Quantitative analysis, emphasis on volumetric analysis	3
Organic	8
Biology	15
General biology or zoology	9
Selections from general embryology. vertebrate anatomy, or general physiology	6
Physics	12
Mathematics	6
English	9
Total prescribed credit	65

Foreign language is not specifically required for admission to the Medical School, but some knowledge of a major modern foreign language (German, French, Russian, Spanish) is highly recommended as a part of the cultural training of a physician. Students anticipating research in the medical sciences should obtain a basic knowledge of German and French. The premedical student should keep in mind that some medical schools require credit in foreign language for admission.

The work in organic chemistry must include the chemistry of both aliphatic and aromatic compounds. Biochemistry will not be accepted toward meeting the requirements. Students electing additional work are advised to take a course in elementary physical chemistry. At least 25% of all chemistry credit must be received for laboratory work.

Human anatomy is not accepted toward meeting the minimum requirements in biology. Students electing additional work are advised to take courses in embryology, vertebrate anatomy, histological technique, or general physiology.

The work in physics must include the divisions of mechanics, heat and sound, light and electricity. Students electing additional work are advised to take further courses in electricity or atomic physics.

The work in mathematics should be of standard college grade, and include subjects such as algebra, elementary analysis, or trigonometry. Students electing additional work in mathematics are advised to take calculus.

The premedical student is advised very strongly against taking any medical courses in his preparation for the study of medicine. Rather, he should devote his efforts to obtaining the best possible general cultural education and, in addition, a thorough training in the basic sciences of chemistry, physics, and biology.

Recommended Elective Subjects. The student preparing to study medicine is advised to plan a balance in elective courses between courses in liberal arts and courses beyond the minimum requirements in subjects prescribed for admission to the Medical School. Subjects suggested are: history, economics, sociology, psychology, English, public speaking, and foreign language.

The Medical School also requires that the student who enters without a Bachelor of Arts or Bachelor of Science degree must complete the work at the institution at which he received his premedical preparation, before entering upon the work of the third year at the Medical School. At Oregon State, a maximum of 48 term hours of work in medicine may be counted as credit earned toward the bachelor's degree.

Before entering the Medical School, the student should satisfy all requirements for senior standing and all requirements for a degree (including institutional and School of Science requirements) that cannot be satisfied at the Medical School. The courses taken during the first year of medical training, together with science courses prescribed in the premedical curriculum, will satisfy all major requirements in general science. Students selecting other liberal arts majors in the School of Science must satisfy all major requirements before entering the Medical School, except that Biochemistry (BCh 411,412), offered at the Medical School, may be counted toward the satisfaction of the major requirements in chemistry, and physiology (Phy 412) toward the major requirements in zoology. The premedical curriculum is printed on a later page.

Medical Technology. The first two years of the curriculum in medical technology as given in regular courses at Oregon State satisfy the minimum requirements of the American Society of Clinical Pathologists. The third and fourth years include additional courses needed to qualify for the B.S. degree in medical technology. It is recommended that three years or more be devoted to this curriculum. Some hospitals require three years of college work and a few demand a college degree for admission to the technician's course. The counselors for students pursuing this curriculum are Professor K. S. Pilcher and Professor C. M. Gilmour of the Department of Microbiology and Hygiene.

Nursing. Oregon State offers the one year of prenursing required for entrance into the School of Nursing of the University of Oregon in Portland.

Adviser of students in the prenursing program is Miss Guhli Olson.

Veterinary Medicine. The School of Science offers a 2-year preparatory curriculum for students planning to enter a professional school of veterinary medicine. Beginning students who plan to complete the preveterinary curriculum within the 2-year period must have adequate high school training in English, mathematics, and other basic sciences. The curriculum is designed to meet the general requirements for admission into the schools of veterinary medicine at Colorado State University, Fort Collins; Washington State University, Pullman; or the University of California, Davis. Admission requirements vary with each professional school; therefore, early in his preveterinary training, each student should select the school of veterinary medicine he plans to attend.

A limited number of Oregon residents may attend the above-listed schools of veterinary medicine without paying out-of-state fees. For further information concerning interstate agreements write to: Commissioner, State of Oregon, Western Interstate Commission for Higher Education, P.O. Box 5175, Eugene, Oregon.

The adviser for preveterinary students on this campus is Dr. Ira W. Deep, Department of Botany.

Curricula in Science

B.A., B.S., M.A., M.S., Ph.D. Degrees

General Notes

a. Maximum term hours required within the School of Science do not exceed 125 in any major curriculum. Maximum number of hours required for a major in any department is 72. The student thus has liberal opportunity to elect courses in other fields as well as in science.

b. In the freshmen year General Hygiene (PE 150, 1 term hour for men; PE 160, 2 hours for women) is taken one term in place of physical education. For all baccalaureate degrees, one year of social science and one year of humanities are required.

c. At least one year each of biological and physical science is required in each curriculum.

d. All science students before graduation must show by placement examination or completed college courses accomplishment in mathematics equal to completion of Mth 10.

e. Students expecting to meet the language requirements for a B.A. or to obtain a reading knowledge of Russian German, or French in preparation for graduate work may elect a language in freshman and sophomore years. If two years of a language are elected in freshman and sophomore years, completion of group requirements in either literature or social science may be postponed until junior year. Students expecting to major in certain of the science curricula may have to postpone two groups.

f. For State Teacher's Certificate 6 hours of psychology should be elected in sophomore year as it is prerequisite to upper division courses in education. This requirement may be met by Psy 201, 202.

g. Students wishing to qualify for a State Teacher's Certificate should elect 12 term hours in prescribed education courses in junior year, at least 11 term hours in senior year, and 9 term hours in first term of graduate year. Students must have a GPA of 2.50 in a recognized teaching major (*see* SCIENCE EDUCATION) and must have a teaching minor. Arrangements to do student teaching during senior year must be made with director of student teaching during registration for winter term of junior year.

h. Except in general science, each student in the School is required for graduation to maintain a 2.00 GPA in his major field.

Department of General Science

Undergraduate and graduate general science majors: general science, biology, physical science.
Interdepartmental graduate majors: biophysics, geophysics, life sciences, paleobiology, seismology, and other fields involving joint majors.

Freshman Year

	Hours
Approved Biological Science Sequence	9–12
English Composition (Wr 111,112,113)	9
Mathematics (Mth 101,102,200), or approved physical science sequence	9–15
Air, Military, or Naval Science (men)	3–9
Physical Education	3
Electives	0–15

Sophomore Year

	Hours
Group Requirements in Humanities	9
Sophomore Science Sequence	9–15
Air Military, or Naval Science (men)	3–9
Physical Education	3
[1]Approved Electives	24–12

Junior Year

Group Requirement in Social Science	9
[2]Approved Upper Division Science	12
[1]Approved Electives	27

Senior Year

[2]Approved Upper Division Science	12
[1]Approved Electives	36

Department of Microbiology and Hygiene

Undergraduate majors: bacteriology, sanitary bacteriology.
Graduate majors: bacteriology. dairy bacteriology, food bacteriology, hygiene, and sanitation, industrial bacteriology, physiology of bacteria, soil bacteriology.

Common Freshman Year

	Hours
General Zoology (Z 200)	5
English Composition (Wr 111,112,113)	9
General Chemistry (Ch 204,205)	10
Qualitative Analysis (Ch 206)	5
Air. Military, or Naval Science (men)	3–9
Physical Education	3
Electives	14–8

Common Sophomore Year

	Hours
Group Requirements in Humanities	9
Organic Chemistry (Ch 226,227)	10
Quantitative Analysis (Ch 234)	5
General Bacteriology (Bac 204,205)	8
Air, Military, or Naval Science (men)	3–9
Physical Education	3
Electives	9–3

[1] The electives may include courses in health education leading to special preparation in that field. See SCIENCE EDUCATION.

[2] These courses should be in fields related to work taken in lower division and must include one year sequence

Bacteriology

Junior Year	Hours
Group Requirements in Social Science	9
General Physics (Ph 201,202,203)	12
Elementary Physical Chemistry (Ch 340)	3
Approved Upper Division Bacteriology	15
[1]Approved Electives	9

Senior Year	Hours
Approved Upper Division Bacteriology Courses	15
[1]Approved Electives	30
Seminar (Bac 407)	3

Sanitary Bacteriology

Junior Year	Hours
Group Requirement in Social Science	9
Clinical Laboratory Methods (Bac 341)	5
Food Sanitation Bacteriology (Bac 411)	4
Approved Upper Division Bacteriology	3
Community Health Problems (Bac 424 425,426)	9
Abridged General Physics (Ph 211,212)	6
Market Milk (FDT 310)	3
Approved Electives	9

Senior Year	Hours
Approved Upper Division Bacteriology	13
Pathogenic Bacteriology (Bac 332)	3
Pathogenic Bacteriology Lab (Bac 333)	2
Epidemiology (Bac 453)	3
Food Bacteriology (Bac 460)	4
Bact of Water & Sewage (Bac 470)	4
Federal & State Food Reg (FDT 421)	2
Seminar (Bac 407)	3
Approved Electives	15
Suggested Electives: Bac 321,401,412, 421,431,441,442,451,452,480,481,490; Ch 234,450,451,452; Ent 412; SEd 431,432,433; Mth 101,102,200; DAH 351; FDT 412,423,424; CE 414; Wr 227; Z 331,332,456.	

Department of Botany

Undergraduate majors: general botany with emphasis, if desired, on one of the fields of the graduate majors.
Graduate majors: cytology, ecology, morphology, mycology, phycology, plant pathology, physiology, systematic botany.

Freshman Year	Hours
General & Field Bot (Bot 201,202,203)	9
English Composition (Wr 111,112,113)	9
[2]General Chemistry (Ch 101,102,103)	9
[3]Foreign Language	9–12
Air, Military, or Naval Science (men)	3–9
Physical Education	3
Electives	0–3

Sophomore Year	Hours
[4]Upper Division Botany	12
General Zoology (Z 200)	5
Mathematics	4
Humanities or Social Science	9
Air, Military, or Naval Science (men)	3–9
Physical Education	3
Electives	6–12

Junior Year	Hours
Upper Division Botany	12
Statistical Techniques (St 314)	3
[5]Supporting Science	9–15
[6]Electives	18–24

Senior Year	Hours
Seminar	3
Social Science or Humanities	9
[5]Supporting Science	9–15
Electives	21–27

[1] Mathematics, modern language, biochemistry and physical chemistry recommended for those who plan to obtain the Ph.D.
[2] Students interested in physiological and chemical aspects of plant life should take Ch 204,205,206, and Ch 226,227, and 340, or equivalent, as early as convenient.
[3] Students having taken one year of high school French or German should continue the language. Those planning professional training in botany should elect to follow first year language with an appropriate language reading course.
[4] The student is required to take the following courses, each of which introduces a field of botanical specialization: Bot 321,331,341,351,371,470.
[5] Courses may be taken in bacteriology, entomology, genetics, geology, or physics, or additional work may be taken in the fields of chemistry, mathematics, or zoology.
[6] Should be devoted largely to upper division courses in botany.

Department of Chemistry

Undergraduate and graduate majors: agricultural chemistry, analytical chemistry, biochemistry, inorganic chemistry, organic chemistry, physical (including colloidal) chemistry, forest products chemistry, radiochemistry.

Common Freshman Year

	Hours
General Chemistry (Ch 204,205)	10
Qualitative Analysis (Ch 206)	5
Mathematics (Mth 101,102)	8
Anal Geometry and Calculus (Mth 200)	4
English Composition (Wr 111,112,113)	9
Chemistry Survey (Ch 111,112)	2
Air, Military, or Naval Science (men)	3–9
Physical Education	3

Common Sophomore Year

	Hours
Chemical Theory (Ch 241)	4
Quantitative Analysis (Ch 232,233)	10
General Physics (Ph 201,202 203)	12
Calculus (Mth 201,202,203)	12
Air, Military, or Naval Science (men)	3–9
Physical Education	3
Electives	1

Major in Chemistry

Analytical chemistry, inorganic chemistry, organic chemistry, physical (including colloidal) chemistry, forest products chemistry.

Junior Year[1]

	Hours
Organic Chemistry (Ch 430,431,432)	15
Physical Chemistry (Ch 440,441,442)	9
Physical Chemistry Laboratory (Ch 443, 444,445)	3
German	12
[2]Group Requirements in Humanities or Social Science	9

Senior Year

	Hours
[3]Approved Upper Division Chemistry Courses	9
Group Requirement in Social Science and Humanities	9
[4]Biological Science Sequence	9
Principles of Research (Ch 415)	1
Electives	21

Major in Agricultural Chemistry

(See Common Freshman and Sophomore Year.)

Junior Year

	Hours
Organic Chemistry (Ch 430,431,432)	12–15
Physical Chemistry (Ch 440,441,442)	9
Physical Chemistry Laboratory (Ch 443 444,445)	3
[2]Group Requirement in Humanities	9
[5]Electives Including Biological Science Sequence	15–12

Senior Year

	Hours
Approved Electives in Biochemistry or Plant Biochemistry	15
Group Requirement in Social Science	9
German	12
Statistical Techniques (St 314)	3
Principles of Research (Ch 415)	1
[5]Electives	9

Major in Biochemistry

(See Common Freshman and Sophomore Year.)

Junior Year

	Hours
Organic Chemistry (Ch 430,431,432)	15
Physical Chemistry (Ch 440,441,442)	9
Physical Chemistry Laboratory (Ch 443, 444,445)	3
Biological Science Sequence (approved life science electives)	15
[2]Group Requirements in Humanities	9

Senior Year

	Hours
Approved Electives in Biochemistry	15
Group Requirement in Social Science	9
German	12
Statistical Techniques (St 314)	3
Principles of Research (Ch 415)	1
[6]Electives	6

[1] The student is encouraged to take, if possible, a year of modern physics (Ph 311,312, 313) in his junior year.

[2] Students in Air. Military, or Naval Science will adjust electives and other courses to make this advanced work possible.

[3] The 9 hours of advanced chemistry must be courses having prerequisites of 3 years of chemistry and must include 3 hours of actual laboratory work. Students interested in forest products chemistry should include Ch 470,471,472,473,474, and some bacteriology.

[4] Students having one year of biological science in high school may reduce this requirement to 5 term hours.

[5] Junior or senior electives must include at least 9 hours of life sciences, which may include approved courses in agriculture or home economics.

[6] Students majoring in agricultural chemistry or biochemistry may take a life science elective instead of Mth 203.

Department of Entomology

Undergraduate and graduate major: entomology.

Freshman Year[1]

	Hours
General Zoology (Z 201,202,203)	9
[2]General Chemistry (Ch 204,205), Qualitative Analysis (Ch 206)	15
English Composition (Wr 111,112,113)	9
Air, Military, or Naval Science (men)	3–9
Physical Education	3
Electives	9–3

Sophomore Year

	Hours
General Entomology (Ent 200)	3
Economic Entomology (Ent 314)	4
Mathematics (Mth 100 or 101)	4
Gen & Field Bot (Bot 201,202,203)	9
Group Requirement in Humanities	9
General Bacteriology (Bac 204)	3
Air, Military, or Naval Science (men)	3–9
Physical Education	3
Electives	10–4

Junior Year

	Hours
Group Requirement in Social Science	9
Approved Upper Division Courses in Entomology	15
Plant Pathology (Bot 351)	5
[3]Electives	19

Senior Year

	Hours
Statistical Techniques (St 314)	3
Approved Upper Division Course in Entomology	14
Electives	31

Department of Geology

Undergraduate and graduate majors: geology, paleontology.

Major in Geology

Freshman Year

	Hours
English Composition (Wr 111,112 113)	9
Geology (G 201,202,203)	9
Geology Laboratory (G 204,205,206)	3
Group Requirement in Humanities	9
Mathematics (Mth 101,102,200)	12
Air, Military, or Naval Science (men)	3–9
Physical Education	3

Sophomore Year

	Hours
Mineralogy & Rock Study (G 312,313, 314)	12
General Chemistry (Ch 204,205)	10
Qualitative Analysis (Ch 206)	5
Group Requirement in Social Science	9
Air, Military, or Naval Science (men)	3–9
Physical Education	3
Electives	0–6

Junior Year

	Hours
Sedimentology (G 323)	4
Geomorphology (G 322)	4
Structural Geology (G 321)	4
General Physics (Ph 201,202,203)	12
Field Methods (G 380)	3
Technical Report Writing (Wr 227)	3
[4]Electives	21

Senior Year

	Hours
Upper Division Geology Sequence	12
Seminar (G 407)	3
Paleontology or Other Biological Science	9–12
[5]Electives	21

Major in Paleontology

Students majoring in paleontology follow the geology curriculum but substitute zoology for physics.

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[1] Students planning to specialize in forest entomology should confer with Dr. Julius Rudinsky.

[2] Prospective economic entomologists should elect Ch 226,227, and 252, or their equivalent as early as convenient.

[3] Junior or senior electives must include at least 9 hours of life sciences, which may include approved courses in agriculture or home economics.

[4] Recommended courses are Ch 234,241,321,322,323, or 340; Mth 201,202,203; NR 421, 422,423; Ph 311,312,313; Oc 331,432; St 314,315.

[5] Students contemplating graduate work are advised to elect German, French, or Russian.

Department of Mathematics

Undergraduate majors: mathematics with emphasis on any of the fields of the graduate majors; actuarial mathematics; computer mathematics; secondary teaching.
Graduate majors: analysis, algebra, geometry, applied mathematics.

Freshman Year

	Hours
Group Requirement in Humanities	9
[1]Mathematics (Mth 101,102 200)	12
English Composition (Wr 111,112,113)	9
Air, Military, or Naval Science (men)	3–9
Physical Education	3
[2] Electives	12–6

Sophomore Year

	Hours
Mathematics (Mth 201,202,203)	12
Group Requirement in Social Science	9
Physical Science	9
Air, Military, or Naval Science (men)	3–9
Physical Education	3
[2]Electives	12–6

Junior Year

	Hours
[3]Upper Division Mathematics	18
[4]Biological Science	9
Electives	21

Senior Year

	Hours
[3]Upper Division Mathematics	9
Electives (including courses leading to graduate minors)	39

Department of Natural Resources

Undergraduhate major: natural resources.
Graduate major and minor: natural resources.

Freshman Year

	Hours
English Composition (Wr 111,112,113)	9
General Chemistry (Ch 101,102,103)	9
Intro Geography (Geog 105,106,107)	9
Air, Military, or Naval Science (men)	3–9
Physical Education	3
[6]Electives	15–9

Sophomore Year

	Hours
Group Requirement in Humanities	9
Cartography (NR 261,262,263)	9
General Botany (Bot 201 202,203)	9
Soils (Sls 211,212)	6
Air, Military, or Naval Science (men)	3–9
Physical Education	3
[6]Electives	9–3

Junior Year

	Hours
Physical Geography (NR 327,328,329)	9
Phys Geog Lab (NR 321,322,323)	3
Techniques in Field Research (NR 361)	5
Geog of Pacific Northwest (Geog 323)	3
[5]Electives in Resource Fields	18
[6]Electives	10

Senior Year

	Hours
Aerial Photointerpretation (NR 413)	3
Nat Res of World (NR 421,422,423)	9
Conserv Prin & Practices (NR 411)	3
Seminar (NR 407)	3
Thesis (NR 403)	6
[6]Electives	24

Department of Physics

Undergraduate majors: classical and modern physics with emphasis, if desired, on one of the fields of the graduate majors.
Graduate majors: atomic physics, theoretical physics, applied physics, nuclear physics, physics of the solid state, photography, electronics and meteorology.

Freshman Year

	Hours
General Physics (Ph 201,202,203)	12
Mathematics (Mth 101,102)	8
Calc with Anal Geom (Mth 200)	4
English Composition (Wr 111,112,113)	9
Air, Military, or Naval Science (men)	3–9
Physical Education	3
Electives	9–3

Sophomore Year

	Hours
Intro to Mod Physics (Ph 311,312,313)	9
Calc with Anal Geom (Mth 201,202,203)	12
General Chemistry (Ch 204,205)	10
Qualitative Analysis (Ch 206)	5
Air, Military, or Naval Science (men)	3–9
Physical Education	3
Electives	6–0

[1] Well prepared freshman may enroll directly in Mth 200 by passing appropriate placement tests.
[2] A foreign language (French, German, Russian) is strongly recommended for those who plan to do graduate work in mathematics.
[3] Include at least one of the sequences Mth 411 412,413; Mth 421,422,423; Mth 337, 432,433; Mth 434, 435,436; Mth 441,442,443; Mth 451,452,453.
[4] On petition, this requirement may be reduced to 5 hours for those with a year of high school biology who wish to earn degrees in both mathematics and engineering.
[5] Must include approved courses in both forestry and agriculture.
[6] See departmental recommendations on use of electives.

Junior Year

	Hours
Electricity and Magnetism (Ph 331,332)	8
Thermodynamics and Heat Measurements (Ph 353)	4
Differential Equations (Mth 321,322)	6
Group Requirement in Humanities	9
Approved Courses in Biological Science	9
[1]Electives	12

Senior Year

	Hours
Mechanics (Ph 424,425,426)	9
Geometrical and Physical Optics (Ph 465,466)	6
Atomic & Nuc Phys (Ph 474,475,476)	9
Electronics (Ph 430) if Ph 437,438,439 is not elected	3
Group Requirement in Social Science	9
[1]Electives	12

Curriculum in Engineering Physics

Students electing the program in engineering physics should register in the School of Engineering.

Department of Science Education

For requirements of this department see "Science Education" under SCHOOL OF EDUCATION. Students who complete the health education teaching major meet the requirements for a major in the School of Science.

Department of Zoology

Undergraduate majors: zoology with emphasis, if desired, on one of the fields of the graduate majors.

Graduate majors: anatomy and embryology, physiology. invertebrate zoology and parasitology, cellular biology, genetics, and natural history and ecology.

Freshman Year

	Hours
English Composition (Wr 111,112,113)	9
General Zoology (Z 201,202,203)	9
General Chemistry and Qualitative Analysis (Ch 204,205,206)	15
Physical Education	3
Air, Military, or Naval Science (men)	3–9
Electives	3–9

Sophomore Year

	Hours
Group Requirement in Humanities	9
Comp Vert Anat (Z 324,325)	8
Comp Vert Embry (Z 326)	4
General Botany (Bot 201,202)	6
Mathematics or Physics Sequence	12
Physical Education	3
Air, Military, or Naval Science (men)	3–9
Electives	0–3

Junior Year

	Hours
Approved electives in invert zoology	8–10
Genetics (Z 341)	3
Organic Chemistry (Ch 226,227)	10
Group Requirement in Social Science	9
Electives	16–18

Senior Year

	Hours
Approved Electives in Physiology	9–15
Zoology Option (see requirements under ZOOLOGY)	10–12
Electives	21–29

Premedical Curriculum

(School of Science and Medical School)

A minimum of 138 term hours exclusive of air, military, or naval science is required before entering the University of Oregon Medical School.

Freshman Year

	Hours
English Composition (Wr 111,112,113)	9
General Chemistry (Ch 204,205)	10
Qualitative Analysis (Ch 206)	5
General Zoology (Z 201,202,203)	9
Mathematics (Mth 101,102)	8
Group Requirement in Humanities	3
Air or Military Science (men)	3
[2]Physical Education	3
[3]Electives	1

Sophomore Year

	Hours
Organic Chemistry (Ch 226,227)	10
Quantitative Analysis (Ch 234)	5
General Physics (Ph 201,202,203)	12
Comparative Vert Embryology (Z 326)	4
Comparative Vert Anatomy (Z 324,325)	8
Air or Military Science (men)	3
Physical Education	3
Electives	3

[1] Mathematics; German, Russian, French; Ph 477,478,479 and Ph 511,512,513 recommended for those who plan to do graduate work.

[2]Freshman women must take General Hygiene (PE 160), 2 term hours in any term.

[3]Students should confer with their premedical adviser in the selection of electives.

Junior Year

The junior year should include at least two terms of a group requirement in humanities (6 hours), a group in social science (9 hours), German French, Russian, or Spanish (12 hours), and electives (12 hours).

Major in Science at Oregon State

B.A.. B.S. Degrees

A student preparing to enter medical school should complete by the end of his junior year an approved major in science and requirements for a degree except fourth year of undergraduate residence. First year at the medical school may be counted in lieu of fourth year undergraduate residence. Courses taken during first year of medical training, together with science courses prescribed in premedical curriculum will satisfy all major requirements in general science. Biochemistry taken at medical school may be applied toward a major in chemistry, and physiology toward a major in zoology.

Three-Year Predental Curriculum

Freshman Year	*Hours*
English Composition (Wr 111,112,113)..	9
[1]General Chemistry (Ch 101,102,103) or General Chemistry (Ch 204,205) and Qualitative Analysis (Ch 206)	9–15
General Zoology (Z 201,202,203)	9
[2]Approved Art Course	2–3
Intermediate Algebra (Mth 100)	4
College Algebra (Mth 101)	4
Air or Military Science (men)	3
Physical Education	2
Hygiene	2
Electives	3–0

Sophomore Year	*Hours*
Group Requirement in Social Science	9
General Physics (Ph 201,202,203).....	12
Comp Vert Embryology (Z 326)	4
Comp Vert Anatomy (Z 324,325)	8
Air or Military Science (men)	3
Physical Education	3
Electives	4–9

Junior Year[3]

The junior year should include Organic Chemistry (Ch 226,227), 10 hours; Quantitative Analysis (Ch 234), 5 hours; a group requirement in humanities, 9 hours; and electives, 24 hours.

Two-Year Predental Curriculum[4]

This curriculum should be attempted only by students with excellent high school records. The student must have completed a year of high school chemistry, or must take Ch 206 in summer session following his freshman year.

Freshman Year	*Hours*
English Composition (Wr 111,112,113)..	9
[1]Gen Chem (Ch 204,205 or Ch 101,102, 103) and Qual Anal (Ch 206)	14–15
General Zoology (Z 201,202,203)	9
[2]Approved Art Course	2–3
Mathematics (Mth 100,101)	8
Air or Military Science (men)	3
Physical Education	2
Hygiene	2

Sophomore Year	*Hours*
Organic Chemistry (Ch 226,227)	10
Quantitative Analysis (Ch 234)	5
Gen Physics (Ph 201,202,203) or Engr Physics (Ph 207,208,209)	12
Humanities or Social Science	9
Comp Vert Embry (Z 326)	4
Comp Vert Anat (Z 324,325)	8
Air or Military Science (men).....	3
Physical Education	3

[1] Those taking General Chemistry (Ch 101,102,103) must complete Qualitative Analysis (Ch 206) before enrolling for Organic Chemistry (Ch 226).

[2] Recommended courses: Basic Design (AA 295), Jewelry (AA 257), Art Metalcraft (AA 258), Graphic Arts (AA 275), Elementary Sculpture (AA 293), or Scientific Illustration (AA 294).

[3] On successful completion of the 3-year program and 48 term hours (32 semester hours) of dental-school work, the student may be awarded a bachelor's degree in general science. If two years of a language are completed during the 3-year program, the student may satisfy requirements for the Bachelor of Arts degree.

[4] Students who complete the 2-year program for dental hygienists at the University of Oregon Dental School may qualify by two additional years for a baccalaureate degree in general science at Oregon State University.

Preveterinary Curriculum[1]

See page 92

Freshman Year

	Hours
Intermediate Algebra (Mth 100)	4
English Composition (Wr 111,112,113)	9
[2]General Chemistry (Ch 204.205), Qualitative Analysis (Ch 206) or General Chemistry (Ch 101,102,103)	15–9
Approved Sequence in Social Science	9
Air or Military Science (men)	3
Physical Education	3
[1]Approved Electives	8–14

Sophomore Year[4]

	Hours
General Physics (Ph 201,202,203) or Abridged General Physics (Ph 211, 212)	12–6
Organic Chemistry (Ch 226,227)	10
General Zoology (Z 201,202,203)	9
Air or Military Science (men)	3
Physical Education	3
Approved Electives	14–20

Curriculum in Medical Technology[3]

B.S. Degree

The following curriculum is suggested as meeting the requirements of the American Society of Clinical Pathologists for admission to approved training schools. Some hospital authorities require three years of college work and some a bachelor's degree. It is recommended that, where possible, students devote at least three years to preparing for their clinical-laboratory training. Students completing three years of work as outlined may receive a B.A. or B.S. degree from Oregon State University after completing a year of prescribed work in medical technology at the University of Oregon Medical School. See page 166.

Freshman Year[4]

	Hours
[5]General Chemistry (Ch 204,205,206)	15
English Composition (Wr 111,112,113)	9
[6]Humanities	9
General Zoology (Z 201,202)	6
[7]Intermediate Algebra (Mth 100)	4
Physical Education	2
General Hygiene (PE 160)	2
Approved Electives	7

Sophomore Year[4]

	Hours
General Bacteriology (Bac 204)	3
Quantitative Analysis (Ch 234)	5
Organic Chemistry (Ch 226,227)	10
Physiology (Z 331,332)	6
Social Science	9
Physical Education	3
Approved Electives	12

Junior Year

	Hours
Pathogenic Bacteriology (Bac 332,333)	5
Abridged General Physics (Ph 211,212)	6
Upper Division Science	12
Approved Electives	25

Senior Year
(Medical School)

	Hours
Medical Technology	49

General Science

The Department of General Science offers the opportunity of studying science in its broad aspects. It is an ally of all the science departments, integrating and correlating the specialized branches. Courses aim to give the student a comprehensive view of science as a division of knowledge.

Through a general science major students pursue a broad program of study in science, either for a liberal arts degree or as preparation for professional service involving general science. Through the interdepartmental undergraduate and graduate majors students pursue one of the sciences such as biophysics, geophysics, life sciences, seismology, oceanography, and other fields involving

[1] Curriculum and electives must be adapted to meet the specific requirements for admission into the professional school of veterinary medicine the student plans to attend.
[2] Those taking Ch 101,102,103 must complete Qualitative Analysis (Ch 206) before enrolling for Organic Chemistry (Ch 226).
[3] Students who wish to take a longer period of time to fulfill medical technology requirements may do so with approval of the adviser.
[4] Men in Medical Technology must adjust program in freshman and sophomore years to provide for Air, Military, or Naval Science.
[5] Students who have not had high school chemistry should take Ch 101,102,103, and 206.
[6] Students not candidates for a degree may substitute for Humanities.
[7] Requirements for Mth 100 may be waived if mathematics placement test so indicates.

joint majors. The courses also are open to students majoring in a particular science and to students in the professional schools.

Elementary courses in biological and physical sciences are designed for the student interested in science more as a cultural subject than for any other specific purpose. Courses may satisfy a science group requirement or serve as part of a teaching major or minor, but they are not usually considered prerequisites to further work in science or in the professional schools.

Lower Division Courses

[1]GS 101,102,103. **General Biology.** 4 hours each term. 3 ① 1 ②
Principles of biology as they apply to both plants and animals. For general students and majors in fields other than biology.

[1]GS 104,105,106. **Physical Science.** 4 hours each term. 3 ① 1 ②
Principles of physics, chemistry, astronomy, and geology; development and application of the scientific method. For majors in fields other than the physical sciences.

GS 111,112,113. **Readings in Science.** 1 hour each term.
Independent reading in science, self-directed study through a modified tutorial approach emphasizing individual conferences. Reserved for School of Science Honors Freshmen.

GS 214,215,216. **Explorations in Science.** 1 hour each term.
Independent, self-directed reading with conferences on the nature of scientific thought and discovery. Reserved for School of Science Honors Sophomores.

Upper Division Courses

GS 321,322,323. **Advanced Physical Science.** 3 hours each term. 3 ①
Readings and discussions to provide a synthesis of modern ideas concerning man's physical environment. Prerequisite: One year of college physical science and Mth 100. CREWS.

GS 341. **Bioecology.** 3 hours. 2 ① 1 ③
Interrelations of plants and animals in their life processes and their reaction upon the environment; human relations and bioeconomics. Prerequisite: one year of biological science and junior standing. BEER.

GS 342. **Biogeography.** 3 hours. 3 ①
Plant and animal distribution; development of faunas and floras; biogeographic areas. Prerequisite: one year of biological science, GS 341, and junior standing. BEER.

GS 401. **Research.** Terms and hours to be arranged.

GS 403. **Thesis.** Terms and hours to be arranged

GS 405. **Reading and Conference.** Terms and hours to be arranged.

GS 407. **Seminar.** Terms and hours to be arranged.

GS 411,412,413. **History of Science.** (G) 2 hours each term. 2 ①
Development of science from beginnings, with emphasis on scientific method and spirit. Prerequisite: 18 hours of upper division science, or equivalent. Offered alternate years. Offered 1961-62. HUMPHREY.

GS 421,422,423. **Classics of Science.** (G) 2 hours each term. 2 ①
Works notable in development of science studied for (1) significance to science and (2) form; biographies of men of science studied as background. Prerequisite: 18 hours of upper division science or equivalent. Offered alternate years. Not offered 1961-62.

GS 431. **Physical Limnology.** (G) 3 hours spring. 3 ①
Physical and chemical processes in lakes and rivers; methods of making physical measurements; some field work. Prerequisite: senior or graduate standing, two years of biological science.

[1] Students who have earned 6 term hours in one or more of the biological sciences prior to taking GS 101,102,103 are not allowed to count credit earned in the latter toward graduation except with the approval of the dean of the School of Science. A similar limitation exists regarding GS 104,105,106.

GS 451. **Radiation Biology.** (G) 3 hours fall or winter. 3 ①
Effects of radiation on living organisms, genetic effects of radiation, atomic bombs and fall-out injury, research application of radiation. Senior standing in School of Science, or equivalent required. STAHL.

Backgrounds For Nursing

Nur 111. **Backgrounds for Nursing.** 3 hours. 3 ①
Backgrounds of modern social and health movements; relation to evolution of nursing as a profession; present aims and problems in nursing at home and abroad. OLSON.

Graduate Courses
Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit

GS 501. **Research.** Terms and hours to be arranged.

GS 503. **Thesis.** Terms and hours to be arranged.

GS 505. **Reading and Conference.** Terms and hours to be arranged.

GS 507. **Seminar.** Terms and hours to be arranged.

*The courses below marked * are for high school teachers of science. They do not prepare for science research. Graduate standing is prerequisite to all these courses which are applicable toward the M.S. in general science for high school science teachers. These courses are not applicable toward a graduate major in one of the special sciences. For full descriptions see Summer Session Catalog.*

*Bot 521 **Taxonomy and Field Botany.** 3 hours summer.

*Bot 571. **Morphology of Lower Plants.** 3 hours summer.

*Bot 572. **Morphology and Anatomy of Seed Plants.** 3 hours summer.

*Bot 573. **Preparation of Botanical Materials.** 3 hours summer.

*Ch 561. **Advanced Inorganic Chemistry.** 3 hours summer.

*Ch 562. **Advanced Inorganic Chemistry.** 3 hours summer.

*Ch 564. **Organic Chemistry.** 3 hours summer.

*Ch 565. **Organic Chemistry.** 3 hours summer.

*GS 511 **History of Biological Science.** 3 hours summer.

*GS 541. **Bioecology.** 3 hours summer.

*G 511. **Geology for Teachers.** 3 hours summer.

*G 530. **Geologic History of Life.** 3 hours summer.

*G 550. **Rocks and Minerals.** 3 hours summer.

*G 552. **Geology of Northwest.** 3 hours summer.

*Mth 591. **Mathematics for High School Teachers: Arithmetic.** 3 hours summer.

*Mth 592. **Mathematics for High School Teachers: Algebra.** 3 hours summer.

*Mth 593. **Mathematics for High School Teachers: Geometry.** 3 hours summer.

*Ph 520 **Astronomy.** 3 hours summer.

*Ph 581. **Modern Physics.** 3 hours summer.

*Ph 582. **Modern Physics.** 3 hours summer.

*Ph 591. **Meteorology.** 3 hours summer.

*Z 541. **Heredity.** 3 hours summer.

*Z 554. **Invertebrate Zoology.** 3 hours summer.

*Z 556. **Collection and Preparation of Zoological Materials.** 3 hours summer.

*Z 560. **Cells and Tissues.** 3 hours summer.

*Z 577. **Ornithology.** 3 hours summer.

*Z 578. **Field Natural History.** 3 hours summer.

Microbiology and Hygiene

Microbiology, especially through its application in agriculture, industrial fermentations, sanitation, and medicine, has great importance in modern civilization. Because of its close relation to many fundamental aspects of human life, Microbiology affords an excellent field of concentration for a liberal arts degree; it also affords opportunity to prepare for professional service, especially in fields involving applications of bacteriology and hygiene.

The graduate majors include general bacteriology, industrial bacteriology, dairy bacteriology, food bacteriology, hygiene and sanitation, pathogenic bacteriology, virology, and soil bacteriology. As agriculture and allied fields are vital in Oregon industrial life, a valuable and practical field of research is open to the student taking advanced work in agricultural bacteriology. Similarly, the recent trend toward industrialization in certain parts of the State, with attendant increases in population densities, demands more bacteriologists with specialized training in sanitation and industrial bacteriology.

Lower Division Courses

[1]Bac 200. **Bacteriology Laboratory.** 2 hours spring. 2 ②
May be taken only with Bac 230, which combination may be used in meeting science group requirement.

[1]Bac 204,205,206. **General Bacteriology.** 4 hours each term. 2 ① 2 ②
Bac 204: Characteristics of bacteria, yeasts, molds, viruses, and related organisms; elementary technique in cytology, taxonomy, and physiology. *Bac 205:* Application of microbiology to dairy, soils, industry, sanitation, and the home. *Bac 206:* Fundamental factors in growth and death of micro-organisms; systematic identification of micro-organisms and a study of their metabolisms. Prerequisite: one year of chemistry. Bac 204 is offered fall and winter; Bac 205 offered spring term.

Bac 230. **Principles of Bacteriology.** 3 hours spring. 3 ①
Applications to agriculture, industry, sanitation, disease. Prerequisite: one year of chemistry.

Bac 261. **Sanitary Bacteriology.** 3 hours fall. 2 ① 2 ②
Principles of water and sewage bacteriology applied to problems in sanitary engineering.

[1] Students may receive credit only for Bac 230 with Bac 200; or for Bac 204.

Upper Division Courses

Bac 321. **Sanitation.** 3 hours winter. 3 ①
Sanitation in home, school, city; control of communicable diseases and their relation to foods, rodents, swimming pools, eating establishments, insects, ventilation, industrial hygiene, etc. Prerequisite: one term of general bacteriology or equivalent.

Bac 332. **Pathogenic Bacteriology.** 3 hours winter. 3 ①
Important bacteria pathogenic for man, emphasizing morphological, physiological, and disease-producing properties; methods of isolation and identification. Prerequisite: Bac 204; Ch 227.

Bac 333. **Pathogenic Bacteriology Laboratory.** 2 hours winter. 2 ③
Laboratory studies to accompany Bac 332.

Bac 341. **Clinical Laboratory Methods.** 5 hours fall. 3 ① 2 ③
Methods used in clinical laboratory to aid the physician in diagnosis and treatment of disease; theory and interpretation. Prerequisite: Bac 204; Ch 226,234, or 221.

Bac 401. **Research.** Terms and hours to be arranged.

Bac 403. **Thesis.** Terms and hours to be arranged.

Bac 405. **Reading and Conference.** Terms and hours to be arranged.

Bac 407. **Seminar.** 1 hour each term. Staff.

Bac 411. **Food Sanitation Bacteriology.** (g) 4 hours fall. 2 ① 2 ②
Physiological activities of dairy and food spoilage micro-organisms; bacteriological problems in production and processing of milk, cream, and other foods with emphasis on sanitation and public health. Prerequisite: Bac 204 and organic chemistry. ELLIKER.

Bac 412. **Dairy Bacteriology.** (G) 4 hours winter. 2 ① 2 ②
Continuation of Bac 411. Microbiology of milk products; a more thorough study of specific problems in dairy microbiology and training in advanced techniques. Prerequisite: Bac 411. ELLIKER.

Bac 421. **Soil Bacteriology.** (G) 4 hours fall. 2 ① 2 ③
Relation of micro-organisms to soil fertility; ammonification; nitrification; nitrogen fixation; organic decomposition and humification. Prerequisite: Bac 204. BOLLEN.

Bac 422. **Soil Bacteriology.** (G) 3 hours winter. 1 ① 2 ③
Continuation of Bac 421. Review of literature and special problems. Prerequisite: Bac 421. Offered alternate years. Offered 1961-62.

3 ①
Bac 424,425,426. **Community Health Problems.** (g) 3 hours teach term.
Application of principles of hygiene to sanitary, statistical, governmental, epidemiological, and sociological problems. Prerequisite: junior or senior standing, one year of upper division biological science. C. L. ANDERSON.

Bac 431. **Bacteriological Technique.** (G) 5 hours fall. 3 ① 2 ②
Intensive study of the fundamental principles involved in the study of bacteria. Prerequisite: Bac 206 or equivalent and two years of chemistry. BOLLEN.

Bac 441. **Systematic Bacteriology.** (G) 3 hours winter. 3 ①
Taxonomy and nomenclature; history of bacterial classification; International Rules of Nomenclature and Bacteriological Code; Bergey's Manual. Prerequisite: Bac 206 or equivalent and two years of chemistry. GILMOUR.

2 ②
Bac 442. **Systematic Bacteriology Laboratory.** (G) 2 hours winter.
Laboratory studies to accompany Bac 441. Prerequisite: Bac 431. GILMOUR.

Bac 451. **Physiology of Bacteria.** (G) 3 hours spring. 3 ①
Bacterial growth, reproduction, and death; influence of environmental factors; metabolic pathways; microbial nutrition. Prerequisite: Bac 205 and organic chemistry. PARKS.

Bac 452. **Physiology of Bacteria Laboratory.** (G) 2 hours spring. 2 ②
Laboratory studies to accompany Bac 451. Prerequisite: Bac 442. PARKS.

Bac 453. **Epidemiology.** 3 hours spring. 3 ①
Causes and behavior of communicable diseases in general population; factors influencing occurrence of epidemics; basic principles underlying control. Prerequisite: Bac 205 or equivalent. C. L. ANDERSON.

Bac 460. **Food Bacteriology.** (g) 4 hours spring. 2 ① 2 ②
Control of micro-organisms in production and handling of foods; microbiological methods of examining foods. Prerequisite: Bac 205 or equivalent. A. W. ANDERSON.

2 ① 2 ②
Bac 470. **Bacteriology of Water and Sewage.** (g) 4 hours spring.
Numbers and kinds of micro-organisms in water and sewage; indicators of water pollution, tests for pollution, acceptable standards; purification of water and bacteriology of sewage disposal. Prerequisite: Bac 204,205, one year of chemistry or equivalent. Offered alternate years. Offered 1961-62. GILMOUR.

Bac 480. **Immunology and Serology.** (G) 3 hours spring. 3 ①
Theory and applications of immunity in infectious diseases and of serological reactions in diagnosis of disease and in medicolegal problems. Prerequisite: Bac 332 or 205 and two years of chemistry. Offered alternate years. Offered 1961-62. PILCHER.

2 ③
Bac 481. **Immunology and Serology Laboratory.** (G) 2 hours, spring.
Laboratory exercises to accompany Bac 480.

Bac 490. **Industrial Microbiology.** (G) 4 hours spring. 2 ① 2 ②
Micro-organisms in industrial processes; production of organic acids, solvents, antibiotics, and enzymes of microbiological origin. For advanced students in bacteriology, chemistry, pharmacy, and chemical engineering. Consent of instructor required. Prerequisite: one year of bacteriology, two years of chemistry. Offered alternate years. Not offered 1961-62. GILMOUR.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit

Bac 501. **Research.** Terms and hours to be arranged.

Bac 503. **Thesis.** Terms and hours to be arranged.

Bac 505. **Reading and Conference.** Terms and hours to be arranged.

Bac 507. **Seminar.** Terms and hours to be arranged. Staff.

Bac 530. **Marine Bacteriology.** 3 hours summer. 2 ① 2 ②
Micro-organisms of ocean water, their ecology and economic importance. Prerequisite: one year upper division bacteriology.

Bac 551,552. **Advanced Bacterial Physiology.** 3 hours each term, fall and winter. 1 ① 2 ②
Growth, fermentation, and death of micro-organisms; morphology, cytology, and cell microchemistry. Prerequisite: Bac 451 or equivalent; organic and physical chemistry. SANDINE, PARKS.

Bac 553. **Biochemistry of Bacteria.** 3 hours fall. 1 ① 2 ②
Role of carbohydrates, proteins, fats, minerals accessory growth factors in nutrition of micro-organisms; microbiological assay techniques. Prerequisite: Bac 451 and one year of biochemistry. Offered alternate years. Not offered 1961-62. A. W. ANDERSON.

Botany

Courses offered provide comprehensive and advanced training for majors in all fields of botany or for those who wish a liberal arts major in botany. Selected courses will also provide a foundation for work in such professional fields as farm crops, horticulture, range management, forestry, and fish and game management.

Training in the professional fields prepares students: (1) to be plant pathologists, plant physiologists, or to fill other specialized positions at experiment stations, or to teach or do research in colleges or universities; (2) for technical positions in which a knowledge of botany is essential, such as in agricultural extension, plant disease control, plant quarantine inspection, fish and game management, and seed testing; and (3) for advanced study and research in such fields as farm crops, horticulture, forestry, and paleontology.

Excellent greenhouse facilities are available for botanical instruction and research. The herbarium collections total more than 150,000 specimens including over 95,000 classified specimen sheets of higher plants and 40,000 collections of parasitic fungi. There are also collections of seeds, bryophytes, myxomycetes, algae, and photographs of type specimens that are located in other herbaria.

An extensive and diversified research program relating to plant diseases is conducted by State and Federal investigators. A number of graduate students are granted research assistantships that enable them to gain valuable training in research under guidance of these investigators. Undergraduate students also have opportunity to obtain part-time employment and experience in research.

Lower Division Courses

Bot 201,202. **General Botany.** 3 hours each term. 3 ②
How plants get their food, grow, differentiate, and reproduce. *Bot 201:* seed plants; *Bot 202:* lower plants.

Bot 203. **Field Botany.** 3 hours spring. 2 ① 2 ②
Identification of native plants; use of keys; floral morphology.

Upper Division Courses

Bot 314. **Agrostology.** 3 hours fall. 2 ① 2 ②
Taxonomy of grasses. Identification in vegetative condition and in flower. Prerequisite: Bot 203. CHAMBERS.

Bot 316. **Aquatic Plants.** 3 hours fall 1 ① 2 ③
Ecology, taxonomy, and economic significance of aquatic plants. Prerequisite: Bot 203 or equivalent. PHINNEY.

2 ① 1 ③

Bot 320. **Fungus Deterioration of Wood Products.** 3 hours winter.
Relation of decay in standing timber to decay of wood products; fungus deterioration of logs, lumber, and remanufactured products. Prerequisite: Bot 201,202. Offered alternate years. Not offered 1961-62. ROTH.

Bot 321. **Systematic Botany.** 4 hours spring. 2 ① 2 ③
Taxonomy of vascular plants. Principles of plant classification; collection and identification. Prerequisite: Bot 201,203, or equivalent. CHAMBERS.

Bot 331. **Plant Physiology.** 5 hours fall or spring. 2 ① 3 ②
Survey of physiology with emphasis on agriculture and forestry. Prerequisite: Bot 201,202, and one year of chemistry. BELKENGREN.

Bot 341. **Plant Ecology.** 4 hours fall or spring. 2 ① 2 ②
Structure, methods of analysis, environmental relations, and dynamics of vegetation, with application to fields of agriculture, Prerequisite: Bot 201,202,203. CHILCOTE.

Bot 351. **Plant Pathology.** 5 hours fall or spring. 2 ① 3 ②
Cause, symptoms, effects, spread, and control of plant diseases. Prerequisite: Bot 201, 202. DIETZ, DEEP.

Bot 371. **Structure of Seed Plants.** 4 hours winter. 2 ① 2 ③
Morphology, anatomy, and reproduction. Prerequisite: Bot 201,202. SMITH.

Bot 401. **Research.** Terms and hours to be arranged.

Bot 403. **Thesis.** Terms and hours to be arranged.

Bot 405. **Reading and Conference.** Terms and hours to be arranged.

Bot 407. **Seminar.** 1 hour each term.

Bot 411,412,413. **Morphology.** (G) 4 hours each term. 2 ① 2 ②
Fall: algae, fungi, lichens. *Winter:* bryophytes, pteridophytes. *Spring:* spermatophytes. Prerequisite: Bot 201,202,203, and three terms upper division biology. PHINNEY.

Bot 415. **Forest Pathology.** (g) 4 hours winter. 3 ②
Disease in relation to forest development, protection, and harvest. Prerequisite: Bot 201,202; F 231 or Bot 351. ROTH.

1 ① 2 ③

Bot 421,422,423. **Advanced Systematic Botany.** (G) 3 hours each term.
Nomenclature of vascular plants; history and systems of classification; preparation of taxonomic keys. Prerequisite: Bot 321 or equivalent. CHAMBERS.

3 ①

Bot 431,432,433. **Advanced Plant Physiology.** (G) 3 hours each term.
Plant-water relationships; synthesis and metabolism of organic compounds; mineral nutrition; hormones; bioelectric phenomena. Prerequisite: Bot 331 and one term organic chemistry. BELKENGREN.

2 ① 1 ③

Bot 441,442,443. **Advanced Plant Ecology.** (G) 3 hours each term.
Fall: environmental factors affecting plant growth. *Winter:* the plant community, its structure, development, classification, and interpretation. *Spring:* methods in vegetation sampling and analysis. Prerequisite: Bot 341 or equivalent. CHILCOTE.

1 ① 2 ③

Bot 451. **Research Methods in Plant Pathology.** (G) 3 hours fall.
Problems involved in study and research on fungus, bacterial, and virus diseases of plants. Prerequisite: Bot 331 and 351, or equivalent. DEEP.

Bot 452. **Field Crop Diseases.** (g) 3 hours spring. 1 ① 2 ②
Identification, development, and control of principal diseases of field crops. Prerequisite: Bot 351. Offered alternate years. Offered 1961-62. RAYMER.

Bot 453. **Diseases of Ornamental and Nursery Plants.** (G) 3 hours spring. 1 ① 2 ②
Identification, development, and control of principal diseases. Prerequisite: Bot 351. Offered alternate years. Not offered 1961-62. DEEP.

Bot 461. **Mycology.** (G) 4 hours fall. 2 ① 2 ③
Occurrence, significance, structure, function, and relationships of molds and other saprophytic fungi and plant pathogenic forms. Prerequisite: Bot 201,202, and 3 terms upper division biological science. ROTH.

Bot 462,463. **Mycology.** (G) 3 hours winter, spring. 1 ① 2 ③
Winter: identification of fungi with emphasis on plant pathogenic forms. *Spring:* special problems. Prerequisite: Bot 461. ROTH.

Bot 470. **Microtechnique.** (G) 4 hours winter. 3 ③
Preparation of permanent microscope slides of plant materials. Prerequisite: Bot 201, 202, and two terms of upper division biology. SMITH.

Bot 471. **Plant Anatomy.** (G) 4 hours fall. 2 ① 2 ③
Origin, structure, and development of plant tissues. Prerequisite: Bot 201,202,371, and two terms of upper division botany or equivalent. SMITH.

Bot 472. **Plant Cytology.** (G) 5 hours spring. 3 ① 2 ②
Cell components; nuclear and cell division meiosis, heteroploidy, gametophyte development, and fertilization. Prerequisite: Bot 201,202, and two terms of upper division botany or equivalent. SMITH.

Bot 490. **Paleobotany.** (G) 4 hours spring. 2 ① 2 ③
Paleobotanically important plants; plant history revealed in fossil records; tertiary flora of Oregon. Prerequisite: general geology or general botany. Offered alternate years. Not offered 1961-62. PHINNEY.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit

Bot 501. **Research.** Terms and hours to be arranged.

Bot 503. **Thesis.** Terms and hours to be arranged.

Bot 505. **Reading and Conference.** Terms and hours to be arranged.

Bot 507. **Seminar.** Terms and hours to be arranged.
GENERAL SEMINAR. 1 hour each term.
PLANT PATHOLOGY SEMINAR. 1 hour each term.

Bot 511. **Fresh-Water Algae.** 4 hours spring. 2 ① 2 ③
Taxonomy and ecology of fresh-water algae. Prerequisite: Bot 411 or Z 451. PHINNEY.

Bot 515. **Forest Pathology.** 3 hours winter. 2 ① 1 ③
Forest disease problems; organized to meet needs of individual students in forest management or forest pathology. Prerequisite: Bot 315 or 351, or equivalent. Offered alternate years. Offered 1961-62. ROTH.

Bot 531,532,533. **Research Methods in Plant Physiology.** 2 hours each term. 2 ③
Laboratory experiments employing modern methods used in research in plant physiology supplemented by assigned reading and conference. Prerequisite or parallel: Bot 431. BELKENGREN.

Bot 541. **Plant Geography.** 3 hours fall. 2 ① 1 ③
Origin, development, and distribution of major units of vegetation, with emphasis on western United States. Prerequisite: Bot 321,341,441. Offered alternate years. Offered 1961-62. CHILCOTE.

Bot 551. **Virus Diseases of Plants.** 3 hours fall. 2 ① 1 ③
Nature and properties of plant viruses; plant reactions; classification and nomenclature; transmission; control. Prerequisite: Bot 351; 6 hours upper division biological science. MILBRATH.

Bot 552. **Bacterial Diseases of Plants.** 3 hours winter. 2 ① 1 ③
Symptoms, etiology, and control; determination and classification of causal agents. Prerequisite: Bot 351, Bac 204; 6 hours upper division biology. Offered alternate years. Offered 1961-62. DEEP.

Bot 553. **Fungus Diseases of Plants.** 3 hours spring. 2 ① 1 ③
Symptoms, etiology, and control; infection phenomena; host-parasite relationships. Prerequisite: Bot 351 or equivalent; 6 hours upper division botany. VAUGHAN.

Bot 554. **Nematode Diseases of Plants.** 4 hours winter. 2 ① 2 ②
Principles of nematology; identification and biology of nematodes; symptoms and control of nematode diseases. Consent of instructor required. Prerequisite: Bot 351 or equivalent and 6 hours of upper division biology. JENSEN.

Bot 560. **Plant Disease Control.** 3 hours winter. 2 ① 1 ③
Principles of control; mode of action of fungicides and antibiotics. Prerequisite: Bot 351, Ch 226,227, or equivalent. Not offered 1961-62. YOUNG.

Bot 570. **Cytological Microtechnique.** 4 hours spring. 3 ③
Preparation of slides for study of chromosomes during mitosis, meiosis, and pollen tube formation; smear techniques. Prerequisite: Bot 470 or equivalent. SMITH.

Bot 573. **Plant Cytogenetics.** 4 hours winter. 2 ① 2 ②
Cytological and genetical effects of variations in chromosome structure and number. Prerequisite: Z 341 and Bot 472. METZGER.

Bot 580. **Biological Micrography.** 2 hours winter. 2 ③
Problems involved in applying optical research tools to various types of biological materials and problems. Prerequisite: graduate standing in biological science. PHINNEY.

Chemistry

The first three years of the chemistry curricula make provision for thorough grounding in fundamental chemistry and related sciences and other liberal studies. Undergraduate students major in chemistry as a field of concentration for a liberal arts degree or as preparation for professional work in the field of chemistry. Beginning with the second or third year numerous elective choices permit the student to begin more intensive study in one of the classical fields—analytical, inorganic, organic, and physical, or in some field of special interest such as agricultural chemistry, biochemistry, colloids, electrochemistry, or forest products chemistry. The student is urged to broaden his training by utilizing some of the large numbers of elective hours to take courses in the humanities.

The Department of Chemistry aims to prepare its major students for (1) graduate work in pure or applied chemistry; (2) governmental work under the Civil Service; (3) teaching positions in colleges, universities, junior colleges, and secondary schools; (4) positions as research chemists and technical experts in commercial testing laboratories of all types and in chemical industries; (5) positions as chemists in laboratories of agricultural experiment stations or in industries specializing in manufacture of food or agricultural products. A student with an interest in chemistry who does not expect to make it a profession may, by careful choice and full use of the many electives, use the undergraduate curriculum as a core for an attractive liberal arts program.

Additional training beyond the baccalaureate degree is highly advantageous in obtaining better positions in any field of chemical activity whether it be teaching, governmental, or industrial work. Undergraduate curricula serve as a foundation for this specialization, and qualified students are encouraged to continue toward the master's or doctor's degree involving research.

Prerequisite to graduate work leading to an advanced degree with a major in chemistry is the completion of undergraduate work in chemistry, mathematics, physics, and biology substantially equivalent to that required of undergraduate students in the several chemistry curricula.

The curriculum, staff, library, and laboratory facilities of the Department of Chemistry have been examined by the Committee on Professional Training of Chemists of the American Chemical Society. Graduating chemistry majors are approved as having met all requirements of the American Chemical Society. The department is well equipped for graduate study and research, with a well-trained and diversified staff.

Lower Division Courses

[1]Ch 101,102,103. **General Chemistry.** 3 hours each term. 2 ① 1 ③
A basic sequence covering fundamentals of chemistry. Students whose college aptitude test scores indicate the need will be permitted to attend one extra recitation per week without additional credit.

Ch 111,112. **Chemistry Survey.** 1 hour winter and spring. 1 ① 1 ②
To acquaint students with chemistry as a profession and with chemical methodology.

[1]Ch 201,202,203. **General Chemistry.** 3 hours each term. 2 ① 1 ③
Course content particularly adapted for students in engineering.

[1] Certain courses cover somewhat similar subject matter, and credit cannot be granted for duplication. For any sequence or combination of general chemistry courses the terminal course being Ch 103, a maximum of 9 term hours is allowed; the terminal course being Ch 206, a maximum of 15 term hours is allowed. Credit for Ch 221 will not be allowed if Ch 226 is taken. Ch 251 and Ch 226 will not both be credited. Ch 226,227, and Ch 432 can be used as a sequence, but this does not give upper division credit for Ch 226,227. Credit cannot be had for both Ch 232 and Ch 234.

[1]Ch 204,205. **General Chemistry.** 5 hours each term. 3 ① 2 ③
Basic principles of general chemistry for students majoring in chemistry, pharmacy, and certain other curricula. High school chemistry recommended as prerequisite.

[1]Ch 206. **Qualitative Analysis.** 5 hours spring or fall. 3 ① 2 ③
Chemistry of selected metallic elements and semimicro qualitative analysis. A sequence with Ch 204 and 205, or with Ch 101, 102, 103.

[1]Ch 221,222. **Organic Chemistry.** 4 hours each term. 3 ① 1 ③
General service course covering aromatic and aliphatic chemistry (for home economics students). Prerequisite: Ch 103.

Ch 226,227. **Organic Chemistry.** 5 hours each term. 3 ① 2 ③
General service course covering aromatic and aliphatic chemistry. Prerequisite: Ch 103.

[1]Ch 232,233. **Quantitative Analysis.** 4 or 5 hours each term, winter and spring. 2 ①; 2 or 3 ③
Fundamental principles and laboratory practice. For chemistry majors 5 hours; for chemical engineering majors 4 hours. Prerequisite: Ch 206.

2 ① 3 ③

[1,2]Ch 234. **Quantitative Analysis.** 5 hours fall, winter, or spring.
Principles of gravimetric analysis and volumetric analysis. Service course for pharmacy, premedical, and medical-technology students. Prerequisite: Ch 103.

Ch 241. **Chemical Theory.** 4 hours fall. 3 ① 1 ②
Theory and calculations in general chemistry as a foundation for physical and engineering chemistry. Prerequisite: Ch 206.

Ch 243. **Instrumental Methods.** 4 hours spring. 2 ① 2 ③
Analysis of industrial products such as water, petroleum, gaseous and solid fuels. Prerequisite: Ch 232.

3 ① 2 ③; 3 ①

[1]Ch 251,252. **Organic Chemistry.** 5 hours fall, 3 hours winter.
General service course covering aromatic and aliphatic chemistry designed for agricultural students. Prerequisite: Ch 103.

Upper Division Courses

Ch 321,322,323. **Metallurgical Chemistry.** 3 hours each term. 1 ① 1 ⑤
Chemistry and techniques in winning various metals from ores, including principles of fire assaying; special attention to chemical treatment and analysis of Northwest minerals. Prerequisite: Ch 203. CALDWELL.

Ch 340. **Elementary Physical Chemistry.** 3 hours. 3 ①
Aspects of physical chemistry having application in engineering, biological sciences, and medicine. Use of mathematics minimized. Some knowledge of physics required. Prerequisite: Ch 203 or equivalent.

Ch 350,351,352. **Biochemistry.** 3 hours each term. 3 ①
Service course for students majoring in agriculture and home economics. Prerequisite: Ch 227, or 252 or 222.

Ch 353,354,355. **Biochemistry Laboratory.** 1 hour each term. 1 ③
Laboratory work to accompany Ch 350-2 sequence.

Ch 370,371,372. **Glass Blowing.** 1 hour each term. 2 ②
Practice in manipulation of glass and assembling setups. Prerequisite: Ch 226, Ph 311, or graduate standing. May be started any term.

Ch 401. **Research.** Terms and hours to be arranged.

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[1] Certain courses cover somewhat similar subject matter, and credit cannot be granted for duplication. For any sequence or combination of general chemistry courses the terminal course being Ch 103, a maximum of 9 term hours is allowed; the terminal course being Ch 206, a maximum of 15 term hours is allowed. Credit for Ch 221 will not be allowed if Ch 226 is taken. Ch 251 and Ch 226 will not both be credited. Ch 226,227, and Ch 432 can be used as a sequence, but this does not give upper division credit for Ch 226,227. Credit cannot be had for both Ch 232 and Ch 234.

[2] Ch 234 will be offered with 4 hours credit in special section for students majoring in curricula of the School of Agriculture.

Ch 403. **Thesis.** Terms and hours to be arranged.

Ch 405. **Reading and Conference.** Terms and hours to be arranged.

Ch 407. **Seminar.** Terms and hours to be arranged.

Ch 411,412,413. **Descriptive Inorganic Chemistry.** (G) 2 hours each term. 2 ①
Chemistry of inorganic elements and compounds from standpoint of periodic table and atomic structure; chemical conversion of inorganic materials for industrial use. Prerequisite: three years of college chemistry. PARSONS.

1 ③

Ch 414. **Inorganic Laboratory.** (G) 1 hour each term, maximum 3 hours.

Ch 415. **Principles of Research.** (g) 1 hour. 1 ①
Principles underlying experimentation and research and the application of the principles to actual experimental situations. Prerequisite: three years of college chemistry.

Ch 418. **History of Chemistry.** (G) 3 hours. 3 ①
Rise and development of chemical theories and laws. Prerequisite: three years of chemistry.

Ch 419. **Radioactive Tracer Methods.** (g) 4 hours. 2 ① 2 ③
Elements of radiochemistry; safe handling of radioactive isotopes; measurement of radioactivity; principles and techniques in applying tracer methods in various fields. Prerequisite: two years of chemistry. WANG.

1 ① 2 ③

Ch 420,421,422. **Advanced Quantitative Analysis.** (g) 3 hours each term.
Analytical procedures of electroanalysis, fuel analysis, analysis of nonferrous alloys, water, iron, and steel. Prerequisite: three years of college chemistry. FREUND.

Ch 424. **Chemical Microscopy.** (G) 3 hours fall. 1 ① 2 ③
Theory and use of microscope in microscopic measurements, quantitative analyisis of mixtures, identification of organic compounds, optical crystallography, crystallization phenomena, etc. Prerequisite: three years of college chemistry, college physics. WILLIAMS.

1 ① 1 ③

Ch 427,428,429. **Advanced Laboratory Methods.** (G) 2 hours each term.
Principles and practice in advanced organic laboratory techniques; distillation, fractionation, crystallization, filtration, chromatography, extraction, high and low pressure hydrogenation, chlorination, oxidation, and important methods of synthesis. Prerequisite: Ch 432,442. CHRISTENSEN.

3 ① 1 ③; 3 ① 2 ③

Ch 430,431,432. **Organic Chemistry.** (g) 4 or 5 hours each term.
Professional course designed to meet the requirement of majors in chemistry and chemical engineering. Prerequisite: two years of college chemistry. CHRISTENSEN.

Ch 434. **Organic Preparation.** (G) 1 or 2 hours each term, maximum 5 hours. 1 ③ 2 ③
Important methods of synthesis, such as Grignard's Friedel-Craft's, Perkin's reaction, and others. Prerequisite: Ch 432 or equivalent. PEASE.

1 ① 1 ③; 1 ① 2 ③

Ch 435,436. **Organic Analysis.** (G) 2 hours winter, 3 hours spring.
Qualitative tests and analysis of organic compounds and mixtures. Prerequisite: Ch 232, Ch 432 or 227. MARVELL.

Ch 437,438. **Survey of Organic Chemistry.** (G) 3 hours each term. 3 ①
Designed for advanced chemistry students who are not major students in organic chemistry, and for students who plan to take advanced work in organic chemistry but have not passed the organic qualifying examinations. Prerequisite: Ch 432 or equivalent.

Ch 440,441,442. **Physical Chemistry.** (g) 3 hours each term. 3 ①
Molecular weights, properties of liquids, solids, and solutions, chemical equilibrium, reaction kinetics, electrochemistry, atomic and molecular structure. Prerequisite: quantitative analysis, and calculus. DECIUS, SCOTT.

1 ③

Ch 443,444,445. **Physical Chemistry Laboratory.** (g) 1 hour each term.

Ch 448,449. **Colloidal Chemistry.** (G) 3 hours each term. 3 ①
Classical and modern surface theory, absorption, membrane and bulk diffusion, nucleation and Donnan potential, lyophilic and lyophobic colloids, including proteins and clays. Prerequisite: three years of college chemistry. SLABAUGH.

Ch 450,451,452. **Biochemistry.** (g) 2, 3, or 5 hours each term. 3 ① 2 ③
Lectures (3 hours) and laboratory (2 hours) may be taken either together or separately. *Fall:* Carbohydrates, proteins, and fats of importance in biological systems. *Winter:* Enzymes and vitamins. *Spring:* Metabolism. Prerequisite: Ch 222 or 227 or 252, or equivalents. Students who have taken the lecture for 3 hours each term may take the laboratory for 2 hours in later terms. Students qualifying for Ch 490 will not ordinarily be admitted to this course for credit. BUTTS.

Ch 453. **Plant Biochemistry.** (G) 3 or 5 hours spring. 3 ① 2 ③
Chemical processes and metabolism in plant systems. Prerequisite: Ch 451. REMMERT.

Ch 454,455,456. **Agricultural Biochemical Methods.** (G) Hours to be arranged. 2 ①, 2 or 3 ③
Advanced theory and practice on the chemistry of colloids, carbohydrates, lipids, amino acids and proteins, vitamins, enzymes, pigments, etc., of both plant and animal significance. Emphasis on newer analytical methods and techniques, both instrumental and chemical. Prerequisite: Ch 452. REESE.

Ch 457. **Dairy Chemistry.** (g) 3 hours. 3 ①
Physical, physiochemical, and chemical properties of milk and milk products; chemistry of the individual constituents of milk, including the enzyme systems; principles involved in processing dairy products. Prerequisite: Ch 251. Ch 340 recommended. RICHARDSON.

Ch 458. **Dairy Chemistry Laboratory.** (g) 2 hours. 2 ③
Laboratory course to accompany Ch 457. RICHARDSON.

Ch 467. **Molecular Spectroscopy.** (G) 2 hours. 1 ① 1 ③
Use of infrared and other types of spectroscopy for the identification and analysis of gases, liquids, crystailine and polymeric solids. Determination of molecular structure. Prerequisite: Ch 442. DECIUS.

Ch 468. **Chemical Kinetics.** (G) 3 hours. 3 ①
Measurement of reaction rates, experimental methods mechanisms of elementary processes, complex inorganic reactions, complex organic reactions, catalysis, general theories, and potential energy surfaces. Prerequisite: Ch 442. SCOTT.

Ch 470. **Forest Products Chemistry.** (G) 3 hours fall. 3 ①
Chemistry of natural plant materials with special attention to woods and other sources of cellulose, hemicellulose, lignin, and extractives. Prerequisite: Ch 432. KURTH.

Ch 471. **Chemical Analysis of Wood and Related Products.** (G) 3 hours winter. 1 ① 2 ③
Laboratory methods of analysis of woods and related fibrous materials. Prerequisite: Ch 234,432. KURTH.

3 ①
Ch 472,473. **Pulp and Paper Chemistry.** (G) 3 hours winter and spring.
Fundamental chemical processes of pulp and paper industry. Prerequisite: Ch 470. KURTH.

Ch 474. **Pulp and Paper Chemistry.** (G) 3 hours spring 2 ① 1 ③
Nature of cellulose pulp and papers; cellulose-water relationships; properties of surfaces; influence of raw materials, cooking, bleaching, beating, formation, pressing, and drying on papers; empirical and fundamental evaluation of the properties of pulps and papers. Prerequisite: Ch 203; Mth 203. CLARK.

Ch 480,481. **Survey of Physical Chemistry.** (G) 3 hours each term. 3 ①
For advanced chemistry students majoring in physical chemistry and for students who plan to take advanced work in physical chemistry but have not passed the physical chemistry qualifying examination. Prerequisite: Ch 442.

Ch 482,483. **Thermodynamics.** (G) 3 hours each term. 3 ①
Chemical principles from standpoint of thermodynamics. Prerequisite: Ch 442. SCOTT, HEDBERG.

Ch 484. **Electrochemistry.** (G) 3 hours. 3 ①
Theoretical and applied electrochemistry, including electrochemistry of solutions. With Ch 482,483 constitutes a year sequence. Prerequisite: Ch 442. SCOTT.

Ch 490,491. **Biochemistry.** (G) 3 hours winter and spring. 3 ①
Professional course for majors in biochemistry and others with prerequisites. *Winter:* Major chemical constituents of biological materials and enzymes. *Spring:* Biological oxidation and intermediary metabolism. Students who have taken the lecture for 3 hours each term may take the laboratory for 2 hours in later terms. Prerequisite: Three years of college chemistry including Ch 234,340,432 or equivalent; consent of instructor. CHELDELIN.

Ch 493,494. **Biochemistry Laboratory.** (G) 2 hours. 2 ③
Laboratory work to accompany Ch 490,491.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit

Ch 501. **Research.** Terms and hours to be arranged.

Ch 503. **Thesis.** Terms and hours to be arranged.

Ch 505. **Reading and Conference.** Terms and hours to be arranged.

Ch 507. **Seminar.** Terms and hours to be arranged.
A reading knowledge of German and French is expected.

2 ①

Ch 511,512,513. **Advanced Inorganic Chemistry.** 2 hours each term.
Chemistry of several groups of nonmetals and metals, complex compounds, and acid-base reactions and reactions in nonaqueous solvents. Prerequisite: Ch 442. NORRIS.

Ch 516,517,518. **Radiochemistry.** 2 hours each term. 2 ①
Radioactivity, nuclear properties, nuclear reaction, and associated nuclear-chemical phenomena; application to theoretical and applied chemistry; instrumentation and laboratory techniques. Prerequisite: Ch 442. NORRIS.

Ch 519. **Radioactive Tracer Technology.** 3 hours spring. 1 ① 2 ③
Fundamental principles and experiments on radioactivity measurements; characteristics of radioactive substances; design of simple tracer experiments; synthesis and degradation of labeled compounds. Prerequisite: Ch 432, Ch 442, and Ch 518 may be taken concurrently, or Ph 474,475,476. WANG.

3 ①

Ch 520,521,522. **Advanced Analytical Chemistry.** 3 hours each term.
Two terms on principles underlying modern methods of analysis and their application to the analytical chemistry of the elements. Third term devoted to special fields of current interest. Prerequisite: Ch 442. FREUND.

Ch 523. **Organic Quantitative Microanalysis.** 3 hours. 1 ① 2 ③
Laboratory practice in methods of quanitative organic microanalysis. Prerequisite: Ch 233,432. WANG.

Ch 525,526. **Instrumental Analysis.** 3 hours winter and spring. 1 ① 2 ③
Principles and practice in use of special optical and electrical instrumental methods of analysis; spectroscopy, colorimetry, spectrophotometry, etc. Prerequisite: Ch 442. WILLIAMS, FREUND.

Ch 527. **Organic Radioactive Tracer Techniques.** 3 hours 1 ① 2 ③
Design of tracer experiments; synthesis of labeled compounds; application of tracer technique in reaction mechanism and biochemical studies; isolation and isotopic dilution technique; radioautograph; degradation studies. Prerequisite: Ch 519 or equivalent. WANG.

Ch 530,531,532. **Advanced Organic Chemistry.** 2 hours each term. 2 ①
Course in organic chemistry designed to give advanced students intimate acquaintance with facts and theories essential to organic research. Prerequisite: passing grade in graduate qualifying examinations. MARVELL.

Ch 533,534,535. **Theoretical Organic Chemistry.** 2 hours each term. 2 ①
A three-term sequence on the theories of organic chemistry. Physical basis for structural organic chemistry, reaction mechanisms. Prerequisite: Ch 438,481, or equivalent and consent of instructor. KICE.

Ch 536,537,538. **Selected Topics in Organic Chemistry.** 2 hours each term. 2 ①
Topics: (1) Organic nitrogen compounds; (2) Carbohydrates; (3) Terpenes; (4) Organic-metallic compounds; (5) Steroids; (6) Heterocyclic compounds. Prerequisite: Ch 432 or equivalent. LOGAN.

Ch 540,541,542. **Advanced Physical Chemistry.** 3 hours each term. 3 ①
Therories of atomic and molecular structure; nature of chemical bond; statistical calculation of thermodynamic functions. Prerequisite: Ch 442. DECIUS.

Ch 543,544,545. **Selected Topics in Physical Chemistry.** 2 hours each term. 2 ①
Reaction kinetics including photochemistry; phase rule; magnetochemistry; physical chemistry of solids; experimental determination of molecular structure; solution chemistry. Not all topics are covered each year. SLABAUGH, SCOTT, DECIUS, and HEDBERG.

Ch 546. **Chemical Literature.** (G) 1 hour. 1 ①
Use of the chemical literature; character of various chemical journals, dictionaries, reference books, and other sources of information. GILBERT.

3 ①
Ch 550,551,552. **Selected Topics in Biochemistry.** 3 hours each term.
Nonsequence courses designed to acquaint student with recent advances in biochemistry and their application to special fields of study. *1961-62—Ch 550:* proteins, nucleic acids; *Ch 551:* enzymes; *Ch 552:* biological oxidations. Prerequisite: Ch 491. Students who have not had Ch 491 must have consent of instructor. KING.

Ch 554. **Biochemical Preparations.** 1 or 2 hours each term.
Preparation, purification, and analysis of compounds of biological importance; chemical and biological resolutions. Maximum credit 6 hours. Prerequisite: Ch 432. KING.

Ch 555. **Biochemical Techniques.** 3 hours winter. 1 ① 2 ③
Concentration of biochemical compounds (enzymes, coenzymes, and various physiologically important intermediates and metabolites) by recently developed methods; study of their properties by enzymic, manometric, and other special techniques. Prerequisite: quantitative analysis, Ch 452 or 453 or equivalent. KING.

Entomology

Entomology courses are planned to acquaint the student with the relationship of entomology to other sciences, to train for commercial positions in entomology, to prepare for State and Federal service in entomology, and to meet needs of students from other departments. A student may major in entomology for a liberal arts degree as well as prepare for professional service in entomology or allied fields. Advanced work is offered in general entomology, economic entomology, forest entomology, insect toxicology, acquatic entomology, and systematic entomology. Advanced courses are planned to equip students specializing in entomology with fundamental groundwork sufficient to prepare for effective service in applied entomology or for further study.

Certain types of commercial and inspection work may not require more training than is represented by the bachelor's degree. The student who intends to engage in research work or college teaching should clearly appreciate the fact that the 4-year curriculum does not give him adequate preparation for a career in these fields; additional study at the graduate level of from one to three years is essential.

Because of the department's close ties with Agricultural Experiment Station work in entomology, many research facilities are available for use by students

and staff. These include the entomology farm, compartmented greenhouses, and the new forest insect research laboratory. Graduate assistantships, available to qualified graduate students, provide valuable work experience.

Lower Division Course

Ent 200. **General Entomology.** 3 hours spring. 2 ① 1 ②
For entomology majors and other interested in biology. Study of insects with emphasis on biology, ecology, classification, morphology, and physiology.

Upper Division Courses

Ent 314. **Economic Entomology.** 4 hours fall or winter. 2 ① 2 ②
Primarily for agriculture and forestry students. Typical economic insect forms; insect-pest control. Prerequisite: one term of zoology or chemistry.

Ent 321. **Forest Entomology.** 3 hours fall. 2 ① 1 ②
Forest losses due to insects; the groups responsible; prevention and control. Prerequisite: one year of forestry, or Ent 200.

Ent 341. **Aquatic Entomology.** 3 hours spring. 1 ① 2 ②
Identification, collection, and ecology of aquatic insects. Prerequisite: upper division standing.

Ent 401. **Research.** Terms and hours to be arranged.
Approved problems carried on in library, laboratory, or field.

Ent 403. **Thesis.** Terms and hours to be arranged.

Ent 405. **Reading and Conference.** Terms and hours to be arranged.

Ent 407. **Seminar.** Terms and hours to be arranged.

Ent 411. **Fruit Insects.** (G) 3 hours fall. 2 ① 1 ②
Major pests and their control. Especially for students in horticulture. Prerequisite: Ent 314 or equivalent. RITCHER.

2 ① 1 ②
Ent 412. **Insects Affecting Man and Animals.** (G) 3 hours fall.
Life histories, disease vectors and carriers, control measures. Prerequisite: fundamental courses in entomology or zoology. Offered alternate years. Not offered 1961-62. GOULDING.

Ent 413. **Field and Truck-Crop Insects.** (G) 3 hours spring. 2 ① 1 ②
Major pests and their control; especially for farm crops, vegetable crops, and entomology students. Prerequisite: Ent 314 or equivalent. Offered alternate years. Offered 1961-62. CROWELL.

Ent 423. **Advanced Forest Entomology.** (G) 3 hours winter. 2 ① 1 ③
Bark beetles, sawflies, lepidoptera, and homoptera injurious to forest trees. Prerequisite: Ent 321 or equivalent. Offered alternate years. Not offered 1961-62. RUDINSKY.

Ent 431. **Biological Control.** (G) 3 hours spring. 3 ①
Relation of insect enemies to insect populations. Prerequisite: Ent 314 or equivalent. Offered alternate years. Offered 1961-62. MARTIN.

Ent 451,452,453. **Systematic Entomology.** (G) 3 hours each term. 2 ③
Taxonomy, nomenclature, literature, phylogeny, and distribution of insects. Prerequisite: Ent 200,314. LATTIN.

Ent 461. **General Acarology.** (G) 3 hours fall. 1 ① 2 ②
Taxonomy of mites and ticks; methods of collection and preservation. Consent of instructor required. Prerequisite: Ent 314. Offered alternate years. Offered 1961-62. KRANTZ.

Ent 463. **Historical Entomology.** (G) 3 hours winter. 3 ①
History of basic and applied entomology and its relationship to the development of natural science. Prerequisite: Ent 200 or equivalent. LATTIN.

1 ② 1 ①

Ent 472. **Forest Insect Survey and Control.** (G) 3 hours winter.
Aerial and ground survey techniques; population sampling methods; control by forest management, insecticides, and natural enemies. Prerequisite: Ent 321 or equivalent. Offered alternate years. Offered 1961-62. RUDINSKY.

Ent 473. **Insect Ecology.** (G) 3 hours fall. 3 ①
Influence of environment on insect development, distribution, and behavior. Prerequisite: Ent 200 or 314. Offered alternate years. Offered 1961-62. MARTIN.

Ent 474. **Insect Toxicology.** (G) 3 hours spring. 2 ① 1 ③
Mode of action of insecticides; physical and chemical properties; mammalian toxicity; insect resistance to insecticides; testing, formulation and application. Prerequisite: two terms organic chemistry or biochemistry. Offered alternate years. Not offered 1961-62. TERRIERE.

Ent 481. **Insect Morphology.** (G) 3 hours fall. 2 ① 1 ③
Morphology of the external skeleton and its appendages. Prerequisite: Ent 200 or 314. Offered 1961-62. MARTIN.

Ent 482. **Insect Morphology.** (G) 3 hours winter. 3 ②
Morphology of internal organs. Prerequisite: Ent 200 or 314. Offered alternate years. Not offered 1961-62. MARTIN.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit

Ent 501. **Research.** Terms and hours to be arranged.

Ent 503. **Thesis.** Terms and hours to be arranged.

Ent 505. **Reading and Conference.** Terms and hours to be arranged.

Ent 507. **Seminar.** Terms and hours to be arranged.

Ent 515. **Principles of Research.** 3 hours winter. 2 ① 1 ①
Investigative procedures; applied biometry; insect populations. Prerequisite: Ent 314 or equivalent Ent 473, St 421. Offered alternate years. Offered 1961-62. MARTIN.

Ent 525. **Insect Transmission of Plant Viruses.** 3 hours fall. 2 ① 1 ③
Principles of plant virus transmission by arthropods applied to field and laboratory. Prerequisite: Ent 452, Bot 551. Offered alternate years. Offered 1961-62. SWENSON.

Ent 533. **Aquatic Entomology.** 4 hours fall. 2 ① 2 ②
Aquatic insects with emphasis on biologies, habitats; classification of major groups. Prerequisite: Ent 341 or equivalent. LATTIN.

Ent 554. **Immature Insects.** 3 hours winter. 3 ②
Methods of collection, preservation, and identification; emphasis on taxonomy and morphology of families of immature insects. Prerequisite: Ent 453,481. RITCHER.

Ent 572. **Insect Physiology.** 3 hours spring. 2 ① 1 ③
Emphasis on peculiar hexapod systems and functions such as metamorphosis, excretion, the integument and haemolymph. Prerequisite: Ent 482 and organic chemistry. Offered alternate years. Not offered 1961-62. BROOKES.

Ent 582. **Principles of Systematics.** 3 hours winter. 3 ①
History, principles, trends in International Code as applied to zoological sciences; species; infraspecific and superspecific categories; type method. Prerequisite: systematic entomology, zoology, or botany; genetics. Students who have not had genetics must have consent of instructor. Offered alternate years. Offered 1961-62. STEPHEN.

Ent 583. **Speciation and Distribution.** 3 hours winter. 3 ①
Distributional patterns exhibited by insects, other animals, and plants from early geological time to present and significance in evolution; genetic and systematic views on formation of specific and infraspecific categories. Prerequisite: Systematic entomology, zoology, or botany; genetics. Students who have not had genetics must have consent of instructor. Offered alternate years. Not offered 1961-62. STEPHEN.

Geology

The Department of Geology offers undergraduate majors for students who are interested in geology for a liberal arts degree, for a professional major in geology, and for a major in paleontology. The general major affords opportunity for wide electives in other fields. The department is equipped to offer graduate work in geology including advanced petrology, economic geology, advanced studies in structure, stratigraphy, sedimentation, or paleontology. A field course of at least 9 hours is prerequisite to candidacy for an advanced degree.

Lower Division Courses

[1]G 200. **Physical Geology.** 3 hours. 3 ①
Elective short course on earth materials, processes, and history.

[1]G 201,202,203. **Geology.** 3 hours each term. 3 ①
Earth materials, processes, and structures; history of earth and life.

G 204,205,206. **Geology Laboratory.** 1 hour each term. 1 ②
Laboratory and field work to accompany G 201,202,203.

Upper Division Courses

2 ① 2 ③
[1]G 312,313,314. **Mineralogy and Rock Study.** 4 hours each term.
Crystal forms, physical and chemical properties; identification of economic and rock-forming minerals; common rock types of special industrial importance. Prerequisite: chemistry. Students who have not had chemistry may take it concurrently.

1 ① 2 ②
[1]G 315,316,317. **Mineralogy and Rock Study.** 3 hours each term.
Prerequisite: one year of physical science.

G 321. **Structural Geology.** 4 hours spring. 3 ① 1 ③
Origin, interpretation, and mapping of joints, faults, cleavage, plutons, and folds. Prerequisite: G 201,202.

G 322. **Geomorphology.** 4 hours winter. 3 ① 1 ③
Development of the surface features of the earth by erosion, deposition, earth movements, and volcanism. Prerequisite: general geology.

G 323. **Sedimentology.** 4 hours fall. 3 ① 1 ③
Genesis and subsequent history of stratified rocks; geologic processes concerned with sedimentation. Prerequisite: G 201,202,203.

G 324, 325. **Engineering Geology.** 3 hours each term. 2 ①
Physical geology and its application in engineering and industry. Prerequisite: upper division standing. Some field trips required.

G 330,331,332. **Life of the Past.** 3 hours each term. 3 ①
Fall: fossil plants and invertebrates. *Winter:* rise of vertebrates; emphasis on reptiles and mammals. *Spring:* geologic history of primates, especially man. Prerequisite: one year of biology or geology. G 330 not open to geology majors. May be taken in any sequence.

G 340,341,342. **Invertebrate Paleontology.** 4 hours each term. 2 ① 2 ③
Major phyla of fossil invertebrates, with emphasis on comparative morphology of fossil and living representatives; important Paleozoic and Mesozoic guide fossils. Prerequisite: general geology or one year of biological science.

G 350. **Rocks and Minerals.** 3 hours fall. 2 ① 1 ②
Prerequisite: upper division standing.

[1] G 312,313,314 and 315,316,317 are parallel sequences and credit may not be obtained for both. Similarly, credit may not be obtained for both G 200 and G 201.

G 352. **Geology of Oregon.** 3 hours spring. 3 ①
Origin and geologic history of landscape features of Oregon; for students without prior geologic background.

G 380. **Field Methods.** 3 hours. 1 ① 1 ⑥
Geologic mapping and surveying methods; pace-and-compass traverses, plane table plotting. Prerequisite: one year of general geology.

G 401. **Research.** Terms and hours to be arranged.

G 403. **Thesis.** Terms and hours to be arranged.

G 405. **Reading and Conference.** Terms and hours to be arranged.

G 407. **Seminar.** 1 hour any term. 1 ①

G 412,413,414. **Petrography.** (G) 4 hours each term. 2 ① 2 ③
Use of microscope in identification of minerals and in rock classification. Prerequisite: G 312,313,314. TAUBENECK.

G 420. **Geophysical Exploration.** (g) 3 hours. 3 ①
Physical methods used in mining and oil prospecting, emphasizing geologic interpretation. Prerequisite: Ph 203; G 321,323. WILKINSON.

2 ① 1 ②

G 421,422. **Mining Geology and Industrial Minerals.** 3 hours each term.
Origin, occurrence, exploration, mining, technology, and uses of metals, nonmetallic minerals, and other geologic resources. Prerequisite: G 315,316,317 or G 312,313,314. Some field trips required. KOCH.

G 423. **Oil Geology.** 3 hours spring. 3 ①
Origin, occurrence, exploration, and technology of gas and oil. Prerequisite: G 201,202, 203. Some field trips required. KOCH.

G 424. **Biostratigraphy.** (G) 4 hours fall. 2 ① 2 ③
Principles of stratigraphic paleontology governing use of fossils in chronology and correlations; paleo-ecology; stratigraphic succession of invertebrates; experience in collection, preparation, and identification of megafossils. Prerequisite: G 340,341,342.

G 430. **Principles of Stratigraphy.** (G) 4 hours fall. 3 ① 1 ③
Interpretation of stratigraphic column; environmental, biologic, techonic factors; correlation; field, laboratory procedures. Prerequisite: two years of geology including G 323.

G 431. **Stratigraphy of North America.** (G) 4 hours. 4 ①
The geologic development of the North American continent. Prerequisite: G 323,430.

G 432. **Geologic History of the Pacific Coast.** (G) 4 hours. 4 ①
Prerequisite: G 323,340,341.

G 440. **Micropaleontology.** (g) 4 hours. 2 ① 2 ③
Collecting, preparation, classification, and identification of microfossils; elements of biostratigraphy and ecologic evaluation of fossil foraminiferal assemblages. Prerequisite: 3 years of geology or zoology. G 340. BOSTWICK.

G 441. **Advanced Micropaleontology.** (G) Terms and hours to be arranged.
Morphologic and stratigraphic studies of Paleozoic microfossils; fusulinids, conodonts, and ostracodes; techniques for study and photography of microfossils. Prerequisite: G 440. BOSTWICK.

G 471,472. **Map Interpretation.** 2 hours each term. 1 ① 1 ③
Structural, stratigraphic, and historical interpretation of geologic and topographic maps. Prerequisite: G 321,322.

G 473. **Photogeology.** 2 hours. 1 ① 1 ③
Stereoscopic analysis of aerial photographs as a tool for geologic mapping. Prerequisite: G 471,472.

G 480. **Field Geology.** 12 hours.
Intensive study of small area, conducted in 8-week summer camp. Prerequisite: G 380. WILKINSON.

Graduate Courses
Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit

G 501. **Research.** Terms and hours to be arranged.

G 503. **Thesis.** Terms and hours to be arranged.

G 505. **Reading and Conference.** Terms and hours to be arranged.

G 507. **Seminar.** Terms and hours to be arranged.

G 512,513,514. **Petrology.** Hours to be arranged.
Petrogenesis of igneous and metamorphic rocks. Prerequisite: G 414. TAUBENECK.

G 520. **Petroleum Geology.** 3 hours spring. 2 ① 1 ③
Origin, occurrence, and exploration of natural gas, petroleum, and oil shales. Prerequisite: G 321. KOCH.

G 521,522. **Economic Geology.** 3 hours each term. 2 ① 1 ③
Origin and occurrence of metallic and nonmetallic ore deposits. Prerequisite: G 312, 313,314,414. KOCH.

G 523,524,525. **Sedimentary Petrology.** 3 hours each term. 1 ① 2 ③
Laboratory analysis of sedimentary rocks. Prerequisite: G 323,414. CUMMINGS.

G 541. **Spore and Pollen Analysis.** 4 hours spring. 2 ① 2 ③
Preparation of sediments for identification of spores, pollen grains, plant microfossils, classification, nomenclature of plant microfossils; stratigraphic, ecologic, and chronologic interpretation of pollen profiles and diagrams. Prerequisite: G 440 or graduate standing in botany. HANSEN.

G 580. **Graduate Field Geology.** Terms and hours to be arranged.
Advanced field problems assigned to meet the requirements of the graduate student.

Mathematics

Mathematics is "the science which draws necessary conclusions" (Benjamin Peirce, 1870). The typical mathematician, whether "pure" or "applied," makes definitions and hypotheses, and then traces out their logical consequences. This "mathematical method" can be applied to any object of thought, including thought itself. Courses offered in the department develop this method in directions which will help students in the various branches of science and technology, as well as along paths which will produce mathematical specialists.

Placement examinations for incoming students are described under PROCEDURES AND REQUIREMENTS elsewhere in this catalog. Attention is especially directed to the procedure for advanced standing.

Undergraduate majors. Informal options include: pure, applied, or actuarial mathematics; secondary teaching; and digital computing. Suggested course programs for these options, details about honors degree programs, and other information are included in a special departmental publication, obtainable on request.

Graduate Study. Master's and doctor's degrees may be earned in pure or applied mathematics. A program in computer science and technology is carried on jointly with the Department of Electrical Engineering. Further information will be sent on request.

Staff and Facilities. The faculty includes outstanding research workers and teachers in both pure and applied mathematics. There is an exceptionally good library. The department's Computing Laboratory is equipped with an Alwac III-E electronic digital computer, a magnetic drum machine with 8,192-word memory. Several research projects in analysis and applied mathematics, largely financed by government agencies and industry, help provide a stimulating environment.

Lower Division Courses

Mth 10. **Elementary Algebra.** 4 hours. 4 ①
Fundamental operations with polynomials and rational fractions, linear equations and stated problems. For students with little or no algebra. Credit not counted toward graduation.

Mth 100. **Intermediate Algebra.** 4 hours. 4 ①
Functions and graphs, linear equations in two unknowns, quadratic equations, negative and fractional exponents, radicals, progressions, binomial theorem, logarithmic computation. Prerequisite: Mth 10 or equivalent.

Mth 101. **College Algebra.** 4 hours. 4 ①
Review of high school algebra emphasizing number system, logarithms, progressions, binomial series, theory of equations, determinants. Prerequisite: Mth 100 or equivalent.

Mth 102. **Trigonometry.** 4 hours. 4 ①
Trigonometric functions for general angles, solution of triangles, addition formulas, trigonometric equations, graphs, complex numbers, and De Moivre's theorem. Prerequisite: Mth 101 or equivalent.

Mth 110. **Mathematics of Finance.** 4 hours. 4 ①
Simple and compound interest, annuities certain, present value, insurance and elements of actuarial mathematics. Prerequisite: Mth 101.

3 ①

Mth 111,112. **Mathematics for Elementary Teachers.** 3 hours each term.
To aid prospective elementary teachers in understanding the nature of Arithmetic. Concepts stressed rather than techniques.

Mth 200,201,202,203. **Calculus With Analytic Geometry.** 4 hours each term. 4 ①
Mth 200: Differentiation and integration: applications to rates, areas, volumes. *Mth 201:* Applications in mechanics; plane analytic geometry, elementary transcendental functions. *Mth 202:* Techniques of integration, vectors, solid analytic geometry. *Mth 203:* Partial differentiation, multiple integration, infinite series. Prerequisite: Mth 102.

Upper Division Courses

Mth 321,322. **Differential Equations.** 3 hours each term. 3 ①
Ordinary differential equations arising in geometry, physics, and engineering. Exact and approximate solutions, Laplace transform. Prerequisite: Mth 203.

Mth 323. **Applied Analysis.** 3 hours. 3 ①
Continuation of Mth 321,322 with emphasis on partial differential equations. Prerequisite: Mth 322.

Mth 334. **Computer Coding.** 3 hours. 3 ①
Coding instruction and practical laboratory work on electronic digital computer. Prerequisite: Mth 200 or BA 213 and Mth 100.

Mth 335. **Computer Laboratory.** 1 hour. 1 ①
To accompany Mth 334. Prerequisite: Mth 200 or BA 213 and Mth 100.

Mth 337. **Probability.** 3 hours. 3 ①
Combinatorial problems, continuous distributions, expectation, laws of large numbers. Prerequisite: Mth 200.

Mth 338. **Finite Differences.** 3 hours. 3 ①
Use of difference techniques in finite integration and series summations; solution of difference equations. Prerequisite: Mth 200.

Mth 339. **Linear Programing and Games.** 3 hours. 3 ①
Optimization subject to linear constraints, zero-sum two-person games. Applications to industrial and economic problems. Prerequisite: Mth 341 which may be taken concurrently.

Mth 341. **Linear Algebra.** 3 hours. 3 ①
Linear systems of equations, determinants. Prerequisite: Mth 202.

Mth 342. **Theory of Equations.** 3 hours. 3 ①
Properties of algebraic polynomials and methods for finding their zeros. Prerequisite: Mth 201.

Mth 343. **Theory of Numbers.** 3 hours. 3 ①
Properties of integers, Euclid's algorithm, diophantine equations, prime numbers, congruences, residues of powers. and quadratic residues. Prerequisite: Mth 200.

Mth 351. **Projective Geometry.** 3 hours. 3 ①
Introduction to analytic and synthetic projective geometry. Prerequisite: Mth 202.

Mth 353. **Topology.** 3 hours. 3 ①
Elements of combinatorial and point set topology. Intuitive discussions of traversing networks and coloring maps are followed by more rigorous general developments. Prerequisite: Mth 200.

Mth 401. **Research.** Terms and hours to be arranged.

Mth 403. **Thesis.** Terms and hours to be arranged.

Mth 405. **Reading and Conference.** Terms and hours to be arranged.

Mth 407. **Seminar.** Terms and hours to be arranged.

Mth 411,412,413. **Pure Analysis.** (G) 3 hours each term. 3 ①
Logically rigorous examination of the differential and integral calculus. Prerequisite: Mth 203; 6 hours of upper division mathematics.

Mth 414. **Foundations of Elementary Mathematics.** (g) 3 hours. 3 ①
Fundamental concepts and logical structure of arithmetic, algebra and geometry. Prerequisite: 3 hours of upper division mathematics.

Mth 415. **History of Elementary Mathematics.** (g) 3 hours. 3 ①
Growth of concepts in arithmetic, algebra, and geometry from ancient times into the modern era. Prerequisite: 3 hours of upper division mathematics.

Mth 416. **History of the Calculus.** (G) 3 hours. 3 ①
Areas, volumes, rates from early Greek mathematics to modern times. Prerequisite: 6 hours of upper division mathematics.

Mth 417,418,419. **Mathematics for Secondary Teachers.** (g) 3 hours each term. 3 ①
Mth 417: Foundations of arithmetic. *Mth 418:* Algebra. *Mth 419:* Geometry, History, number systems, basic laws and operations, measurement, solution of equations, curve-tracing, geometrical proof and constructions, non-Euclidean geometry. Prerequisite: 3 hours of upper division mathematics. Enter any term. Equivalent to summer session courses Mth 591,592,593.

Mth 421. **Vector Analysis.** (G) 3 hours. 3 ①
Calculus of functions of two or more variables, approached by way of vector notation. Prerequisite: Mth 322.

Mth 422. **Orthogonal Series.** (G) 3 hours. 3 ①
Fourier series and their convergence; expansions in terms of other orthogonal functions. Prerequisite: Mth 322.

Mth 423. **Complex Functions.** (G) 3 hours. 3 ①
Theory of analytic functions of a complex variable, emphasizing applications. Prerequisite: Mth 323.

Mth 432,433. **Mathematical Methods in Statistics.** (G) 3 hours each term. 3 ①
Mathematical derivation of various formulas used in statistical analysis and some applications of these formulas to practical problems. Prerequisite: Mth 337, Mth 411.

Mth 434,435,436. **Numerical Calculus.** (G) 3 hours each term. 3 ①
Finite differences, interpolation, numerical differentiation and integration, numerical solution of differential equations, use of electronic digital computer. Prerequisite: Mth 322 and Mth 334.

Mth 441. **Matrices and Quadratic Forms.** (G) 3 hours. 3 ①
Vectors in n-dimensional linear spaces; linear transformations and matrices; matrix algebra: vector and matrix norms; determinants; quadratic forms, characteristic numbers and vectors, reduction to canonical form by orthogonal transformations. Prerequisite: 6 hours of upper division mathematics.

Mth 442. **Logic and Boolean Algebra.** (G) 3 hours. 3 ①
Logical constants and variables; sentences; sentential and designatory functions; quantifiers; connectives; truth functions; postulates for sentential calculus; postulates for Boolean algebra and examples; partial ordering, lattices. Prerequisite: 6 hours of upper division mathematics.

Mth 443. **Abstract Algebra.** (G) 3 hours. 3 ①
Mappings and semigroups, isomorphism, equivalence; groups, rings, integral domains, ideals; examples from number theory, algebra, logic, matrix theory and analysis. Prerequisite: 6 hours of upper division mathematics.

Mth 451,452,453. **Principles of Geometry.** (G) 3 hours each term. 3 ①
Hilbert's axioms; coordinate systems, linear transformations and matrices; the affine and projective groups and geometries. Mobius transformations; the elliptic, parabolic and hyperbolic groups, and representations of the geometries of Lobachevski and Riemann. Prerequisite: 6 hours of upper division mathematics.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit

Mth 501. **Research.** Terms and hours to be arranged. Staff.

Mth 503. **Thesis.** Terms and hours to be arranged. Staff.

Mth 505. **Reading and Conference.** Terms and hours to be arranged. Staff.

Mth 507. **Seminar.** Terms and hours to be arranged. Staff.

Mth 511,512,513. **Theory of Analytic Functions.** 3 hours. each term. 3 ①
Interchange of limits, analytic functions of a complex variable, continuation, conformal mapping, integral functions. Prerequisite: Mth 413 or Mth 421,422,423.

Mth 517,518,519. **Measure and Integration.** 3 hours each term. 3 ①
Measurable sets and functions. Lebesgue integral. Applications to such topics as Fourier series, surface area or probability. Prerequisite: Mth 413.

Mth 521,522,523. **Partial Differential Equations of Physics.** 3 hours each term. 3 ①
Second order partial differential equations governing various physical phenomena; orthogonal expansions, Green's functions. Prerequisite: Mth 423 or Mth 413.

Mth 524. **Calculus of Variations.** 3 hours. 3 ①
Minimization of integrals involving functions of one or more variables. Prerequisite: Mth 413 or Mth 421,422,423.

Mth 531,532,533. **Theory of Probability.** 3 hours each term. 3 ①
Random variables, central limit theorem. Distributions of standard statistics. Markov chains, continuous and discontinuous stochastic processes. Prerequisite: Mth 413 or Mth 433.

Mth 541,542,543. **Modern Algebra.** 3 hours each term. 3 ①
Advanced theory of matrices, finite groups, rings, and fields. Galois theory of equations; associative linear algebras, nonassociative algebras, group representations. Prerequisite: Mth 441,443.

Mth 551,552,553. **Differential Geometry.** 3 hours each term. 3 ①
Metric geometry of 3-space with introduction to tensor theory of Riemannian space. Prerequisite: Mth 321 322.

Mth 554,555,556. **Topology.** 3 hours each term. 3 ①
Point sets, metrisation, compactness, continua, mappings. homology, combinatorial topology. Prerequisite: Mth 413.

Mth 561,562,563. **Mathematics in Engineering and Physics.** 3 hours each term. 3 ①
Analytical methods in obtaining solutions of problems in engineering and physics. Dynamics, vibrating systems, boundary value problems in electricity and elasticity, operational calculus, numerical methods. Prerequisite: Mth 421,422,423.

Mth 574,575,576. **Theory of Functions of Complex Variables.** 3 hours each term. 3 ①
Advanced topics in theory of functions of one or several complex variables, such as differential equations in the complex domain, elliptic functions, Abelian integrals, conformal mapping. Prerequisite: Mth 511,512,513. Students who have not had prerequisites must have consent of instructor. Offered alternate years. Offered 1961-62.

Mth 577,578,579. **Limit Theorems and Stochastic Processes.** 3 hours each term. 3 ①
Limit theorems; central-limit problem in modern form; extensions to theory of stochastic processes. Prerequisite: Mth 533; Mth 573 or Mth 571,572,573 concurrently.

Natural Resources

The Department of Natural Resources offers courses for all students in resource and physical geography, techniques of geographic research, cartography, and conservation. The major curriculum prepares resource geographers for employment in such fields as area and industrial resource analysis, planning, government services, chamber of commerce, and teaching.

The undergraduate program is designed to provide background in related sciences, study of world resources as basis of man's economies, geographic point of view, experience in library and field research, and in report writing. At graduate level emphasis is placed on study of United States resources, practice in resource and area analysis, and in writing and making oral reports. Advanced students may develop concentration in systematic resource geography, in physical geography, and in selected areas.

Oregon State University offers outstanding facilities for the study of resource geography. As one of the nation's land-grant universities, the campus has specialists available for consultation and course work in many fields of technology and applied science dealing with specific resources, as well as strong faculties in the social sciences and business fields. The Library has an outstanding collection of scientific and technical source material and there is opportunity for a variety of field study.

Lower Division Courses

NR 261,262,263. **Cartography.** 3 hours each term. 1 ① 2 ②
Development and utility of cartography; tools and materials; study and practice in using, compiling, and drafting maps, charts, and diagrams; reproduction problems.

Upper Division Courses

NR 321,322,323. **Physical Geography Laboratory.** 1 hour each term. 1 ②
Laboratory to accompany NR 327,328,329; required of all majors and recommended for all students desiring more intimate knowledge of physical geography.

NR 327,328,329. **Physical Geography.** 3 hours each term. 3 ①
Physical aspects of earth's surface; their distribution, classification, interpretation, utility, and interrelationships. *Fall:* elements of climate. *Winter:* climates of the World. *Spring:* landforms. Prerequisite: upper division standing and one year of college geography or physical science.

NR 361. **Techniques of Field Research.** 5 hours spring. 1 ② 2 ③
Field practice in techniques of gathering, recording, classifying, and analyzing natural resources data.

NR 401. **Research.** Terms and hours to be arranged.

NR 403. **Thesis.** Terms and hours to be arranged.

NR 405. **Reading and Conference.** Terms and hours to be arranged.

NR 407. **Seminar.** Terms and hours to be arranged.

NR 411. **Conservation Principles and Practices.** 3 hours spring. 3 ①
Examination and appraisal of conservation; resources development practices and policies of public agencies and private enterprise. Prerequisite: upper division standing.

NR 413. **Aerial Photointerpretation.** 3 hours. 1 ① 2 ②
Identification, analysis, and interpretation of landscape elements from aerial photographs—topographical, industrial, and cultural; use of aerial photographs in geographic analysis, map compilation planning, and intelligence. Prerequisite: NR 329 or equivalent background. RUDD.

NR 421,422,423. **World Resources.** 3 hours each term. 3 ①
Resource inventory, distribution, development, and potentialities. *Fall:* forest, range, and sea. *Winter:* agricultural geography. *Spring:* minerals. Prerequisite: upper division standing. JENSEN, HIGHSMITH, HEINTZELMAN.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*)
may be taken for graduate credit

NR 501. **Research.** Terms and hours to be arranged.

NR 503. **Thesis.** Terms and hours to be arranged.

NR 505. **Reading and Conference.** Terms and hours to be arranged.

NR 507. **Seminar.** Terms and hours to be arranged.

NR 511. **Conservation in the United States.** 3 hours fall. 3 ①
Principles and needs of conservation. Prerequisite: graduate standing. HIGHSMITH.

NR 512. **Asiatic Pacific.** 3 hours. 3 ①
Resource geography of the Asiatic Pacific. HEINTZELMAN.

NR 513. **Pacific Latin America.** 3 hours. 3 ①
Resource geography of Pacific Latin America. JENSEN.

NR 524. **Physical Geography.** 3 hours fall. 2 ① 1 ②
Elements of physical environment and their interrelationships; investigation, interpretation, and classification systems. Prerequisite: NR 327,328,329. RUDD.

NR 527,528,529. **United States.** 3 hours each term. 3 ①
Resource inventory, distribution, development, and potentialities. *Fall:* agricultural geography. *Winter:* minerals. *Spring:* forest, range, and seas. Prerequisite: NR 327, 328,329 or equivalent. HIGHSMITH, JENSEN, HEINTZELMAN.

NR 538. **Soviet Union.** 3 hours. 3 ①
Strengths and weaknesses of Soviet Union; resource inventory distribution, development, potentialities, and problems. HIGHSMITH.

NR 561. **Research Techniques.** 3 hours fall. 1 ① 2 ②
Data gathering, analysis, and interpretation; practice with model studies in resource and area analysis; development of research reports. Graduate standing required. Prerequisite: NR 361. HIGHSMITH.

Oceanography

Oceanography, a composite subject, uses the sciences of physics, chemistry, biology, and geology to study the processes which are taking place in the ocean and estuaries. Oceanographers are usually specialists in one of the above sciences but are required to have some training in each of the others.

The Department of Oceanography aims to prepare students for: (1) government work under Civil Service; (2) research and technical positions at oceanographic laboratories; (3) advanced research and study in fisheries, geology, meteorology, or one of the other sciences with oceanographic applications.

The department offers work leading to the Ph.D. and M.S. degrees in Oceanography. Advanced students may specialize in the fields of physical oceanography, biological oceanography, or geological oceanography. Minors for both the Ph.D. and M.S. degrees are offered to students majoring in other fields. Candidates for the Ph.D. degree in the Department of General Science may choose oceanography as one of their fields of study and do thesis research in oceanography.

The prerequisites for graduate work leading to the M.S. degree in oceanography are: (1) a bachelor's degree in one of the following subjects—a physical science, a biological science, fisheries, or engineering; (2) mathematics through calculus; (3) general chemistry; and (4) general physics. Deficiencies in these prerequisites must be removed during the first year of study.

Students are expected to take part in field work and research projects carried out by the department.

Upper Division Courses

Oc 331. **Introduction to Oceanography.** 3 hours any term. 3 ①
Elective nontechnical course designed to give student broad general background. Emphasis on relationship between oceanography and other fields. Prerequisite: junior standing.

GS 431. **Physical Limnology.** (G) 3 hours spring. 3 ①
Physical and chemical processes in lakes and rivers; physical measurements; some field work. Prerequisite: senior or graduate standing, two years of biological science.

Oc 432. **Physical Oceanography.** (G) 3 hours fall. 3 ①
Physical processes in ocean and estuaries; some field work. Prerequisite: senior or graduate standing, one year of mathematics, one year of physics.

Oc 433. **Currents and Water Masses.** (G) 3 hours winter. 3 ①
Factors contributing to origin and preservation of water masses and currents of oceans; distribution of variables in the sea. Prerequisite: Oc 432.

Oc 434. **Estuarine and Shoreline Processes.** (G) 3 hours spring. 3 ①
Estuarine and nearshore processes. Waves, surf, and beach effects, tides and tidal currents; types and mechanism of estuarine circulation. Prerequisite: Oc 432.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit

Oc 501. **Research.** Terms and hours to be arranged.

Oc 503. **Thesis.** Terms and hours to be arranged.

Oc 505. **Reading and Conference.** Terms and hours to be arranged.

Oc 507. **Seminar.** Terms and hours to be arranged.

Physics

Undergraduate students may major in physics either for a liberal arts degree or as preparation for professional service in physics and allied fields. Students planning to major in physics should offer a maximum of high school mathematics and physics for entrance. Those planning for graduate study and research should lay foundations of a reading knowledge of German, Russian, or French, or all three. In special cases courses in related departments, involving considerable study of physical principles, may be accepted as part of a major in physics.

Lower Division Courses

Ph 191. **Rudiments of Meteorology.** 1 hour any term. 1 ①
A descriptive treatment of meteorological phenomena including winds, air masses, fronts, clouds, the wave cyclone, precipitation.

[1]Ph 201,202,203. **General Physics.** 4 hours each term. 2 ① 2 ②
Mechanics, sound, heat, light, electricity and magnetism. Prerequisite: Mth 101 prerequisite or parallel with Ph 201.

Ph 204,205,206. **Astronomy.** 3 hours each term. 2 ① 1 ②
Descriptive treatment. Coordinate systems; astronomical instruments; the solar system; star types and groupings.

[1]Ph 207,208,209. **Engineering Physics.** 4 hours each term. 2 ① 1 ② 1 ③
Studies in general and modern physics adapted to students in engineering. Prerequisite: GE 103; Mth 200; Mth 201,202,203 previously or parallel.

[1]Ph 211,212. **Abridged General Physics.** 3 hours each term. 1 ① 2 ②
Mechanics, heat, sound, light, electricity and magnetism. Sequence starts in fall and winter.

Upper Division Courses

2 ① 1 ②
Ph 311,312,313. **Introduction to Modern Physics.** 3 hours each term.
Kinetic theory, the electron, radioactivity, photoelectricity, thermionic emission, x-rays, electronic devices, gaseous conduction, cosmic rays, nuclear physics. Prerequisite: Ph 203 or 209, Mth 200; Mth 201,202,203 previously or parallel.

Ph 331,332. **Electricity and Magnetism.** 4 hours each term. 3 ① 1 ②
Electrical and magnetic theory and measurements. Prerequisite: Ph 203 or 209; Mth 321,322 previously or parallel.

Ph 334. **Fundamentals of Radio.** 3 hours. 2 ① 1 ②
Vacuum tubes and solid state electronic devices and circuits; antennas and wave propagation. Prerequisite: Ph 203 or 209.

Ph 353. **Thermodynamics and Heat Measurements.** 4 hours. 3 ① 1 ②
Prerequisite: Ph 203 or 209 Mth 203.

Ph 361. **Photography.** 3 hours any term. 1 ① 2 ②
Hand and miniature cameras and their uses; film processing, printing, toning, enlarging. Prerequisite: College chemistry or physics or approved photographic experience.

Ph 362. **Commercial Photography.** 3 hours winter. 1 ① 2 ②
View cameras; copying, photography of small objects, lighting, photo-sketching, photographic solutions. Prerequisite: Ph 361.

[1] The sequences Ph 201,202,203; Ph 207,208,209; and Ph 211,212 cover somewhat similar topics although in a different order, and credit cannot be obtained for duplication. For any combination of courses for which either Ph 203 or Ph 209 is a terminal course, a maximum of 12 term hours is allowed. Unless otherwise stated either consent of instructor is required or the preceding course in the same sequence is prerequisite for all sequence courses.

Ph. 363. **Commercial Photography.** 3 hours spring. 1 ① 2 ②
Continuation of Ph 362. Composition; exteriors, interiors, flashlights, infrared.

Ph 390. **Basic Meteorology.** 3 hours. 2 ① 1 ②
Weather phenomena; weather instruments. Prerequisite: Ph 202 or 208.

Ph 391,392,393. **Synoptic Meteorology.** 3 hours each term. 2 ① 1 ②
Weather analysis and forecasting techniques with laboratory applications to classical meteorological situations. Prerequisite: Ph 203 or 209.

Ph 401. **Research.** Terms and hours to be arranged.

Ph. 403. **Thesis.** Terms and hours to be arranged.

Ph 405. **Reading and Conference.** Terms and hours to be arranged.

Ph 407. **Seminar.** Terms and hours to be arranged.

Ph 414,415,416. **Biophysics.** (G) 3 hours each term. 2 ① 1 ②
Physical phenomena and measurements applied to biological problems. Prerequisite: one year of college physics; one year of college biology; senior standing in one of the biological or physical sciences.

Ph 424,425,426. **Mechanics.** 3 hours each term. 3 ①
Kinematics, dynamics of particles and rigid bodies; generalized coordinates. Prerequisite: Ph 203 or 209; Mth 322.

Ph 430. **Electronics.** 3 hours. 2 ① 1 ③
Thermionic and solid state electronic devices and circuits. Prerequisite: Ph 332.

1 ① 2 ②
Ph 434,435,436. **Experimental Electronics.** (G) 3 hours each term.
Special topics to fit needs of individual students. May include: microwaves; electronic and high-frequency techniques; modern electronic devices and research methods as applied to physics, chemistry, engineering, psychology, and medicine. Prerequisite: Ph 439 or EE 323. Offered alternate years. Offered 1961-62.

Ph 437,438,439. **Electronics and Radio.** 3 hours each term. 2 ① 1 ②
Alternating current theory; circuits; electron tubes and solid state electronic devices; amplification; radio frequency generators; modulation; timing circuits; transmission and radiation; measurements at audio and high frequencies. Prerequisite: Ph 332 or EE 203.

Ph 461,462,463. **Advanced Photography.** (G) 3 hours each term. 1 ① 2 ②
Color, x-ray, and ultraviolet photography; stereophotographs, photomicrography, photography of cathode ray screens. Students may enter any term. Prerequisite: Ph 362. Offered alternate years. Offered 1961-62.

2 ① 1 ②
Ph 465,466. **Geometrical and Physical Optics.** 3 hours each term.
Prerequisite: Ph 203 or 209; Mth 203.

Ph 468. **Spectroscopy.** (g) 3 hours. 2 ① 1 ③
Instruments, sources, spectra; qualitative and quantitative analysis. Prerequisite: Ph 313.

Ph 470. **X-Rays.** (G) 3 hours. 2 ① 1 ③
Production, absorption, scattering, spectra, application. Prerequisite: Ph 313,466.

3 ①
Ph 474,475,476. **Atomic and Nuclear Physics.** (g) 3 hours each term.
Atomic structure and atomic processes; introduction to quantum mechanics; properties of atomic nuclei; subatomic particles and their behavior. Prerequisite: Ph 313 and Mth 322 or graduate standing in chemistry or engineering and approval of instructor.

3 ①
[1]Ph 477,478,479. **Introduction to Field Theory.** (G) 3 hours each term.
Theories underlying the study of fields. Applications to the motion of rigid bodies, elasticity, fluid flow, heat flow, gravitation, electromagnetic fields and the theory of relativity. Prerequisite: Three years of approved physics; Mth 322.

[1] Required of all physics majors planning to earn the doctorate at OSU.

Ph 491,492,493. **Meteorology.** (G) 3 hours each term. 3 ①
Theories of atmospheric processes; structure of the atmosphere; theory of atmospheric measurements. Prerequisite: Ph 203 or 209; Ph 390 or 393; Mth 203.

Graduate Courses

Graduate courses are given only when warrented by demand. The dates are given when courses are offered alternate years. Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

Ph 501. **Research.** Terms and hours to be arranged.

Ph 503. **Thesis.** Terms and hours to be arranged.

Ph 505. **Reading and Conference.** Terms and hours to be arranged.

Ph 507. **Seminar.** Terms and hours to be arranged.

3 ①

[1]Ph 511,512,513. **Introduction to Theoretical Physics.** 3 hours each term.
A mathematical treatment of the theories of classical physics. Prerequisite: three years of approved physics; Mth 322.

Ph 515. **Relativity.** 3 hours. 3 ①
Application of Lorentz transformation theory to mechanics and electrodynamics; introduction to general relativity. Prerequisite: Ph 479 previously or parallel; Ph 522 or consent of instructor.

Ph 517,518,519. **Quantum Mechanics.** 3 hours each term. 3 ①
Transformation theory; quantum mechanical equations of motion and their solutions; transition probabilities; introduction to relativistic quantum theory; illustrative applications. Prereqnisite: Ph 476,479,521.

Ph 521,522. **Dynamics.** 3 hours each term. 3 ①
Lagrangian and Hamiltonian mechanics. Motion of rigid bodies; fluid flow; theory of small vibrations. Prerequisite: Ph 477,478 previously or parallel.

Ph 523. **Statistical Mechanics.** 3 hours. 3 ①
Prerequisite: Ph 521,558. Offered alternate years. Not offered 1961-62.

Ph 531,532. **Electromagnetic Theory.** 4 hours each term. 4 ①
Mathematical treatment of classical theories of electricity and radiation. Prerequisite: Ph 479 or 513 with consent of instructor. Offered alternate years. Offered 1961-62.

Ph 547,548. **Introduction to Solid State.** 3 hours each term. 3 ①
Dielectric properties; paramagnetism; free electron theory; semiconductors; transistor theory; imperfections. Prerequisite: Ph 313, 475 or graduate standing in chemistry, mathematics, or engineering.

Ph 549. **Conduction of Electricity Through Gases.** 3 hours. 3 ①
Processes taking place at electrodes, in the gas, and at walls of tube; glow arc, and spark discharges. Prerequisite: Ph 475 or graduate standing in chemistry, mathematics, or engineering.

Ph 557. **Thermodynamics.** 3 hours. 3 ①
Prerequisite: Ph 523. Offered alternate years. Not offered 1961-62.

Ph 558. **Kinetic Theory.** 3 hours. 3 ①
Prerequisite: three years of approved physics; Ph 426; Mth 322. Offered alternate years. Not offered 1961-62.

Ph 563. **Physical Optics.** 4 hours. 4 ①
Prerequisite: Ph 532. Offered alternate years. Offered 1960-61.

Ph 571,572,573. **Nuclear Physics.** 3 hours each term. 3 ①
Prerequisite: Ph 519. Offered alternate years. Offered 1961-62.

Ph 574. **Selected Topics in Theoretical Physics.** 3 hours. 3 ①
Topics vary from year to year. May be repeated for credit. Prerequisite: Ph 519.

[1] Required of all physics majors for whom the masters is to be a terminal degree. Not required for physics majors working toward the doctorate.

Ph 575,576,577. **Experimental Nuclear Physics.** 3 hours each term. 2 ③
Radiation detectors and detecting systems; characteristics and operation of cyclotrons and reactors; various experiments in nuclear physics using radioactive materials and the OSU machines. Prerequisite: Ph 571,572,573 previously or parallel. Offered alternate years. Offered 1961-62.

Science Education

Preparation for prospective teachers of biological and physical science and mathematics is offered by the Department of Science Education, a joint department within the School of Science and the School of Education. Students preparing to teach science in secondary schools may major in one of the sciences, or in general science, according to the degree or emphasis on subject matter or professional preparation. Combination of subjects to be taught and scope of preparation desired influence the choice of major school.

For description of courses see SCHOOL OF EDUCATION.

Statistics

The Department of Statistics offers three beginning courses, each designed to fit the needs of a particular group of students. St 311 is intended for the undergraduate student who desires only a cursory view of the field of statistics. The sequence St 314,315 is intended to acquaint the undergraduate student with the basic techniques of statistics. The sequence St 421,422,423 is designed for prospective research workers and is taught as the technology of the scientific method. Graduate students may take work leading to a master's degree in statistics, or to a minor for an advanced degree in another field. No undergraduate degrees in statistics are offered.

The department also offers consulting and computing services.

Upper Division Courses

St 311. **Descriptive Statistics.** 3 hours. 3 ①

ST 314,315. **Statistical Techniques.** 3 hours each term. 3 ①
Prerequisite: Junior standing; Mth 100 or equivalent.

St 401. **Research.** Terms and hours to be arranged.

St 405. **Reading and Conference.** Terms and hours to be arranged.

St 407. **Seminar.** Terms and hours to be arranged.

St 411. **Data Processing.** (G) 2 hours. 1 ① 1 ②
Machine processing of statistical data. Prerequisite: St 422. LINK.

St 421,422,423. **Statistical Inference.** (G) 3 hours each term. 3 ①
Prerequisite: Senior standing; Mth 100 or equivalent. LI.

St 431. **Design of Experiments.** (G) 3 hours. 3 ①
Principles used in designing experiments; general comparison of designs; interpretation of results. Prerequisite: St 423. LI.

St 441. **Sampling Methods.** (G) 3 hours. 3 ①
Simple and stratified random sampling, systematic sampling; estimates and their sampling errors; estimation of sample size. Prerequisite: St 315 or 422. CALVIN.

St 471,472,473. **Operations Research.** (G) 3 hours each term. 3 ①
Statistical methods, queue theory, linear programing, game theory. Prerequisite: Mth 203. LINK.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit

St 501. **Research.** Terms and hours to be arranged.

St 503. **Thesis.** Terms and hours to be arranged.

St 505. **Reading and Conference.** Terms and hours to be arranged.

St 507. **Seminar.** Terms and hours to be arranged.

St 521,522,523. **Theory of Statistics.** 3 hours each term. 3 ①
Sampling distributions, estimation and tests of hypotheses. Prerequisite: Mth 203. LINK.

St 524,525. **General Regression Analysis.** 3 hours each term. 3 ①
Application of the method of least squares to general linear regression models; analysis of nonorthogonal experiment data. Prerequisite: St 423. LI, PETERSEN.

Zoology

Basic requirements for an undergraduate major in zoology, whether for a liberal arts degree or as preparation for professional study at the graduate level, are included in the Curriculum in Zoology printed on a previous page. Approved electives in invertebrate zoology may be taken at a marine station.

The undergraduate major must also select two courses from group A below and one from group B, or *vice versa*:

A. Natural History of Oregon III (Z 376), Ornithology (Z 371), Mammalogy (Z 372), Herpetology (Z 473), Animal Ecology (Z 483).

B. Comparative Vertebrate Histology (Z 461), Microtechnique (Z 462), Experimental Embryology (Z 463).

Graduate students who have met the basic requirements for an undergraduate major in zoology may specialize in one of the following areas: (1) anatomy and embryology, (2) physiology, (3) invertebrate zoology and parasitology, (4) cellular biology, (5) natural history and ecology, (6) genetics. The department is well equipped for graduate study and research in each of these areas and is staffed by competent specialists.

Both undergraduate and graduate majors in zoology are urged to attend a summer session at a marine station or at an inland field laboratory. Candidates for the Ph.D. are strongly advised to spend one summer at a marine station.

Lower Division Courses

[1]Z 114,115,116. **Human Biology.** 3 hours each term. 3 ①
Science as a process; characteristics of living organisms; maintenance of the individual; maintenance of the species; interrelationships; human population; history of life on earth. MAYSHARK.

Z 117,118,119. **Human Biology Laboratory.** 1 hour each term. 1 ②
Laboratory work to accompany Z 114,115,116. ANDERSON.

[1]Z 200. **General Zoology.** 5 hours spring. 3 ① 2 ③
Introduction to basic topics in present-day zoology. For students of biology, agriculture, and others. OWCZARZAK.

[1] Credit is granted for only one of the following combinations: Z 114,115,116; or Z 201 202,203; or Z 200.

Z 201,202,203. **General Zoology.** 3 hours each term. 2 ① 1 ③
For zoology majors and premedical, predental, prenursing, pharmacy, physical education, psychology, fish and game management students, and others. HISAW.

Upper Division Courses

Z 321,322. **Elementary Human Anatomy.** 3 hours each term, fall and winter. 2 ① 1 ②
Designed especially to meet the needs of physical education students. Prerequisite: Z 114,115,116, or equivalent. ALLMAN.

Z 323. **Applied Human Anatomy.** 3 hours spring. 2 ① 1 ②
For physical education students. Prerequisite: Z 321,322. ALLMAN.

2 ① 2 ③
Z 324,325. **Comparative Vertebrate Anatomy.** 4 hours winter and spring.
Gross dissection and comparison of organ systems in representative vertebrates. Prerequisite: Z 200 or Z 203. HILLEMANN.

Z 326. **Comparative Vertebrate Embryology.** 4 hours fall. 2 ① 2 ③
Comparative study of development of several representative vertebrate forms. Prerequisite: Z 200 or Z 203. HILLEMANN.

2 ① 1 ②
Z 331,332. **Physiology.** 3 hours fall and winter, or winter and spring.
For students in home economics, medical technology, pharmacy, and physical education; not for zoology majors. Prerequisite: Z 200,203, or 116; or one year of any laboratory science as required in home economics. PRITCHARD, HISAW.

Z 336. **Applied Human Physiology.** 3 hours spring. 2 ① 1 ②
For students in physical education. Prerequisite: Z 331,332. ALLMAN.

Z 341. **Genetics.** 3 hours fall or spring. 3 ①
The gene as basis of variation and heredity; introduction to principles of genetics. Prerequisite; college course in zoology. botany, or biology. MOHLER.

Z 345. **Evolution.** 3 hours spring. 3 ①
Evidences and mechanisms of evolution, including genetic variation, selection, isolation. Prerequisite: College course in zoology, botany, or biology. MOHLER.

Z 371. **Ornithology.** 3 hours spring. 2 ① 1 ③
Structure, classification, distribution, and life habits of birds. Prerequisite: Z 200 or Z 203. Students who have not had prerequisites must have consent of instructor. STORM.

Z 372. **Mammalogy.** 3 hours winter. 2 ① 1 ③
Classification, distribution, life habits, and identification of mammals. Prerequisite: Z 200 or Z 203. STORM.

Z 374,375. **Natural History of Oregon I, II.** 3 hours each term, fall and winter. 2 ① 1 ③
Environment: influence of topography, climate, and plant cover on distribution of animals. Common invertebrates; local distribution, habits, collection and maintenance in laboratory. Prerequisite: one year of biology. GORDON.

Z 376. **Natural History of Oregon III.** 4 hours spring. 2 ① 2 ③
Identification, distribution, and habits of common land vertebrates. Prerequisite: Z 374, 375. Students who have not had prerequisites must have consent of instructor. GORDON.

Z 401. **Research.** Terms and hours to be arranged.

Z 403. **Thesis.** Terms and hours to be arranged.

Z 405. **Reading and Conference.** Terms and hours to be arranged.
Reading and reports on special topics.

Z 407. **Seminar.** 1 hour each term. 1 ①

Z 434,435,436. **General and Comparative Physiology.** (G) 3 hours each term. 2 ① 1 ③
Discussion of function both at the cellular and organismal level. Emphasis placed on comparison of physiological systems among major animal groups. Prerequisite: two years of zoology and one of chemistry. PRITCHARD.

Z 442. **Drosophila Genetics.** (G) 2 hours winter. 2 ③
Experiments on Drosophila to illustrate operation of hereditiary mechanisms. Prerequisite: Z 341. MOHLER.

Z 451,452. **Invertebrate Zoology.** (G) 5 hours each term, winter and spring. 3 ① 2 ③
Structure, classification, distribution, and life histories of the invertebrates. Prerequisite: two years of zoology. PRATT.

Z 456. **Parasites of Man.** (G) 4 hours fall. 2 ① 2 ③
Identification, bionomics, prophylaxis, treatment, and geographic distribution. Prerequisite: two years of biology. PRATT.

Z 457. **Parasites of Fish.** (G) 2 hours fall. 1 ① 1 ③
Life histories, identification, economic importance, and control of more common parasites of fish. Prerequisite: two years of biology. PRATT.

Z 461. **Comparative Vertebrate Histology.** (G) 5 hours fall. 3 ① 3 ②
Comparative microscopic study of tissues and organs, emphasizing evolutionary relationships and functional adaptations. Prerequisite: Z 324,325,326. OWCZARZAK.

Z 462. **Microtechnique.** (G) 4 hours winter. 1 ① 3 ③
Principles and practice in methods of preparing histological, embryological and cytological specimens for microscopic study. Prerequisite: two years of biology. OWCZARZAK.

Z 463. **Experimental Embryology.** (G) 4 hours spring. 3 ① 1 ③
Mechanics of cleavage and gastrulation; inductors and organizers; gradient fields; integration; regeneration; genic action. Prerequisite: Z 324,325,326. OWCZARZAK.

Z 473. **Herpetology.** (G) 3 hours fall. 2 ① 1 ③
Classification, distribution, life habits, and identification of amphibians and reptiles. Consent of instructor required. Prerequisite: two years of zoology. STORM.

Z 475. **Methods in Field Zoology.** (G) 4 hours spring. 2 ① 2 ③
Problems, principles, and methods in field zoology, including wildlife photography. Prerequisite: two years of upper division biology. STORM.

Z 483. **Animal Ecology.** (G) 3 hours fall. 2 ① 1 ③
Living animals in relation to their environment. Prerequisite: two years of biology. Students who have not had prerequisite must have consent of instructor. GORDON.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit

Z 501. **Research.** Terms and hours to be arranged.

Z 503. **Thesis.** Terms and hours to be arranged.

Z 505. **Reading and Conference.** Terms and hours to be arranged.

Z 507. **Seminar.** Terms and hours to be arranged.

Z 508. **Advanced Field Zoology.** 2 to 6 hours.
Special problems in field work; intensive studies of limited areas. Conducted field trips of variable length as conditions require. Consent of instructor required. Prerequisite: senior or graduate standing. GORDON and staff.

Z 510. **Zoological Literature.** 1 hour fall. 1 ①
Use of zoological literature; character of zoological journals and reference works. Prerequisite: one year of upper division zoology. OWCZARZAK.

Z 513. **History of Zoology.** 3 hours winter. 3 ①
Rise and development of zoological theories and laws. Prerequisite: one year of upper division zoology. HILLEMANN.

Z 521. **Organogeny and Fetal Physiology.** 4 hours fall. 2 ① 2 ③
Lectures on embryonic and fetal physiology; laboratory work on the later stages of morphogenesis (organogeny); student projects in developmental anatomy and physiology. Prerequisite: Z 331,332, and 326 or equivalent. HILLEMANN.

Z 531,532,533. **Mammalian Physiology.** 3 hours each term. 3 ①
Neuromuscular system, central nervous system, autonomic system, circulation, respiration, gastro-enterology, kidney secretion, metabolism. Prerequisite: general zoology, histology, comparative vertebrate anatomy. general chemistry or equivalents. KRUEGER.

2 ③

Z 534,535,536. **Mammalian Physiology Laboratory.** 2 hours each term.
Laboratory work accompanying Z 531,532,533. KRUEGER.

Z 537. **Endocrinology.** 3 hours fall. 3 ①
Influence of endocrine glands on the physiology of the animal body, with special reference to mammals. Prerequisite: physiology and organic chemistry. HISAW.

Z 538. **Endocrinology Laboratory.** 3 hours winter. 3 ③
Laboratory work to supplement Z 537. Prerequisite: Z 537. HISAW.

Z 542,543. **Theoretical Genetics.** 3 hours fall and winter. 3 ①
Genetical phenomena discussed at advanced levels with emphasis on contemporary problems in research. Prerequisite: Z 341 or equivalent. MOHLER.

Z 551. **Biology of Protozoa.** 3 hours fall. 2 ① 1 ③
Morphology, physiology, and ecology of freshwater, marine, terrestrial, and parasitic protozoa. Prerequisite: Z 451,452. PRATT.

Z 553. **Invertebrate Embryology.** 3 hours spring. 2 ① 1 ③
Cleavage, organogeny, and larval development of marine and freshwater invertebrates. Prerequisite: Z 451,452. PRATT.

Z 558. **Parasitology.** 3 hours winter. 2 ① 1 ③
Collection, preparation, and identification of parasites; culturing of parasitic forms; systematics; evolution and phylogeny of parasitism. Prerequisite: Z 456 or 457 or equivalent. PRATT.

Z 561,562,563. **Biology of the Cell.** 3 hours each term. 2 ① 1 ③
Structure, physics, and chemistry of cellular components; cellular physiology; chromosomes in genetics and evolution; problems of differentiation. Prerequisite: Z 461,462, 463. DORNFELD.

Z 565. **Selected Topics in Cellular Biology.** 3 hours. 1 ① 2 ③
Advanced laboratory training and theoretical discussion in the special fields of microscopic cytochemistry, tissue culture, electron microscopy, etc. Choice of topic variable and determined by demand. Prerequisite: Z 461,462,561,562,563, and biochemistry. DORNFELD, OWCZARZAK, NEWSTEAD.

Z 571,572,573. **Ichthyology.** 3 hours each term. 2 ① 1 ③
Taxonomy of orders and families of fishes; intensive study of morphology, distribution, and ecology of selected groups and species. Prerequisite: FG 274,275,276 or equivalent. BOND.

Z 581. **Zoogeography.** 3 hours winter. 3 ①
Factors affecting distribution of animals; general principles; faunal areas of world and of North America. Prerequisite: Z 371, 372, and 483. Students who have not had prerequisites must have consent of instructor. GORDON.

School of Agriculture

Faculty

As of January 1961

FREDERICK EARL PRICE, B.S., Dean of the School of Agriculture.

WILBUR TARLTON COONEY, M.S., Associate Dean of the School of Agriculture.

WILLIAM MARTIN LANGAN, B.S., Head Counselor.

Agricultural Economics: Professors WOOD (department head), BLANCH, CASTLE, DAVIS, HOLLANDS, KORZAN, MUMFORD, POTTER (emeritus); Associate Professors BECKER, BROWN, HALTER, PLATH,[1] SITTON;[2] Assistant Professor LANGMO.

Agricultural Education: Professor TEN PAS (department head); Assistant Professor DAVIS.

Agricultural Engineering: Professors RODGERS (department head), CROPSEY, LUNDE, SINNARD; Associate Professors BONNICKSEN, KIRK, LONG, WOLFE; Assistant Professors BOOSTER, CHRISTENSEN; Instructor SCHOOF.

Dairy and Animal Husbandry: Professors MILLER (department head), BOGART, HAAG, JONES,[3] KRUEGER,[4] MCKENZIE (emeritus), NELSON (emeritus), OLDFIELD, POULTON; Associate Professors ENGLAND, FOX, HEDRICK,[5] OLIVER (emeritus), WOLBERG; Assistant Professors CHURCH, HUETER, KENNICK, RALSTON, WU; Instructors BERGER, RUTLAND; Assistant In Range Management HALL; Assistant in Dairy Husbandry KLIEWER.

Extension Methods: Professor CHARLES W. SMITH.

Farm Crops: Professors COWAN (department head), FOOTE, FORE, HILL (emeritus), POULTON; Associate Professors FURTICK, HEDRICK,[1] JENSEN, MCGUIRE, METZGER; Assistant Professors CHING, FRAKES; Instructor CALLIHAN; Assistant In Farm Crops TAYLOR; Assistant In Range Management HALL.

Fish and Game Management: Professors DIMICK (department head), DOUDOROFF, RAYNER; Associate Professors BOND, KUHN, LONG, WARREN; Assistant Professors CAMPBELL, LIGHTFOOT; Instructor HORTON; Graduate Assistant BROWN.

Food and Dairy Technology: Professors SCHULTZ (department head), CAIN, LITWILLER, RICHARDSON, WIEGAND (emeritus), WILSTER (emeritus); Associate Professors ONSDORFF, SAMUELS, SINNHUBER, STEIN, WILDER, WORTHINGTON,[6] YANG; Assistant Professors DAY, DIETZ, SATHER, YOUNG.

Horticulture: Professors APPLE (department head), BOUQUET (emeritus), COMPTON, FRAZIER, HANSEN, HARTMAN (emeritus), ROBERTS; Associate Professors BLANEY, WADSWORTH, WESTWOOD, ZIELINSKI; Assistant Professors BAGGETT, CRABTREE, GARREN, LAGERSTEDT, MACK.

Poultry Husbandry: Professors PARKER (department head), BERNIER, HARPER; Associate Professor ARSCOTT; Assistant Professor MCCLUSKEY.

Soils: Professors CHENEY (department head), JOHNSGARD, POWERS (emeritus), RUZEK (emeritus), STEPHENSON (emeritus), YOUNGBERG; Associate Professors ALBAN, DAWSON, EVANS,[6] HARWARD, JACKSON, KNOX; Assistant Professors BOERSMA, MOORE; Instructors ASHCROFT, JAMES, STAMMERS.

Veterinary Medicine: Professors DICKINSON (department head), SHAW (emeritus); Associate Professors BABCOCK, BONE, PETERSON; Assistant Professor KNAPP; Instructor HARR.

General Statement

High school preparation. Because of ever-increasing technical developments in agriculture, all students, regardless of major interest, should come to college prepared to study basic sciences, particularly chemistry, bacteriology, botany, zoology, and entomology. In many programs of study, physics is essential. Each student should possess a good understanding of fundamental principles of grammar and be able to demonstrate these principles through effective oral and written expression. He should also be able to demonstrate a reasonable degree of competence in arithmetic, algebra, and geometry. Study in agriculture re-

[1] On leave until August 1961.
[2] On leave.
[3] On sabbatical leave 1960-61.
[4] On leave 1960-61.
[5] On leave until September 1961.
[6] On leave 1961-62.

quires an ability to perceive, analyze, and work with problems involving surface areas, configurations, volumes, and equations in which at least one unknown exists. The ability to work with problems involving fractions, percentages, and proportions is necessary. Students in agriculture should be completely familiar with weights and measures in the metric system. The ability to read rapidly with good comprehension and to study effectively is extremely valuable.

Individual counseling. Since every student is considered an important individual, his or her study program will be developed with the aid of efficient and sympathetic faculty advisers. Initial or early counseling will be based upon the student's high school record and all placement test scores. When preparation is found to be inadequate, the student will be encouraged to enroll in courses providing the education, training, and experience necessary to help assure success at the university level even though such work may require the student to take one or more additional quarters to complete a prescribed 4-year curriculum. School of Agriculture faculty try to help each student to discover and develop an appreciation of social, aesthetic, and ethical values through the many courses offered on the campus and through extracurricular activities. This school is dedicated to the philosophy of promoting the well-being of each student to the extent of his capacity.

Degree requirements. A student is expected to meet all general institutional requirements for a baccalaureate degree. In addition, he or she will complete a prescribed program of study in harmony with one of the curricula that follow. Prior to advancement to senior standing within the School of Agriculture, students are required to pass a comprehensive examination in English composition. Eligibility to take this examination comes with the completion and acceptance of 90 college or university term hours.

Navy ROTC. In any of the curricula which follow, students desiring to register for Naval Science instead of Air or Military Science should consult with the dean of Agriculture.

Curricula for Undergraduates

Common Freshman Year

	Term hours		
	F	W	S
General Chemistry (Ch 101,102,103)	3	3	3
General Botany (Bot 201,202)	3	3	....
Intermediate Algebra (Mth 100) or equivalent	....	....	4
Elements of Hort (Hrt 111), Intro to Agricultural Economics (AEc 111)	3	3	(3)
[1]Introduction to Dairy and Animal Science (DAH 121), Poultry Production (P 121), Extempore Speaking (Sp 111)	3	3	3
Air or Military Science	1	1	1
Physical Education	1	1	1
	14	14	12

[1] Students may take only one of these courses any one term.

Common Sophomore Year

	Term hours F	W	S
English Composition (Wr 111,112,113)	3	3	3
[1]Biochemistry, Statistics, or Journalism	5	(3–5)	(3)
[2]Crop Production (FC 211), or Plant Propagation (Hrt 311)	(3–5)	3–5	(3–5)
Soils (Sls 211,212)	3	3	....
[3]General Zoology (Z 200), or Physical Geology (G 200), or General Bacteriology (Bac 204)	(3)	(3)	3–5
[4]Principles of Econ (Ec 201,202,203) or Outlines of Economics (Ec 212); Practical Psychology (Psy 212); Introduction to Sociology (Soc 212)	3	3	3
[5]Agricultural Engineering Survey (AE 211)	(3)	3	(3)
Principles of Farm Management (AEc 211)	(5)	....	5
Air or Military Science	1	1	1
Physical Education	1	1	1
	14–16	17–19	16–18

General Agriculture

B.S. Degree

(See Common Freshman and Sophomore years)

Junior Year

	Hours
General Bacteriology (Bac 204)	4
Economic Entomology (Ent 314)	4
Genetics (Z 341)	3
American Governments (PS 201)	3
Journalism (J 111)	3
Basic Accounting and Financial Analysis (BA 217)	3
Food Industry Survey (FDT 340)	3
[6]Electives	30

Senior Year

	Hours
Prin of Agri Marketing (AEc 341)	3
Farm Buildings (AE 361), or House Planning and Architectural Drawing (AA 178)	3
Real Estate Law (BA 414)	3
Diseases of Livestock (VM 341) or Plant Pathology (Bot 351)	4–5
Elective in Animal or Plant Nutrition	3
[6]Electives	34–33

General Agriculture with Minor in Journalism

Junior Year

	Hours
Soil Mgt and Conservation (Sls 314)	4
Ed Writing (J 223) or App Elective	3
Public Information Methods (J 318)	3
Journalism (J 112)	3
Journ Proj (J 351,352,353) or app electives	6
Photography (Ph 361)	3
Prin of Agric Marketing (AEc 341)	3
Economic Entomology (Ent 314)	4
Upper Division Courses in Agriculture	9
Electives	14

Senior Year

	Hours
Special Feature Articles (J 317)	3
Radio Speaking (Sp 361,362,363)	9
Technical Writing (J 319)	3
American Governments (PS 201)	3
Soil Fertility Lectures (Sls 424)	3
Farm Crops (upper division)	3
Horticulture (upper division)	3
Upper Division DAH	6
Electives	16

[1] Dairy, animal, and poultry husbandry students take Organic Chemistry (Ch 226,350 or 251,252); agricultural economics students take Fundamentals of Accounting (BA 214,215); agricultural journalism students take Journalism (J 111); soils students take Abridged General Physics (Ph 211, 212).

[2] Horticulture students take Plant Propagation (Hrt 311). Poultry students may take Incubation (P 321) as sophomores and Crop Production (FC 211) as juniors.

[3] Dairy, animal, and poultry husbandry students take General Zoology (Z 200). Soils students take Basic Accounting and Financial Analysis (BA 217) and Physical Geology (G 200); Agricultural Economics students take General Bacteriology (Bac 204).

[4] Agricultural Economics students take Principles of Economics (Ec 201,202,203) plus Practical Psychology (Psy 212) and American Governments (PS 201).

[5] Agricultural Economics students may substitute Production (BA 311).

[6] Electives selected in conference with adviser and dean to include a total of at least 45 upper division hours with 24 in agriculture.

Agricultural Economics

B.S. Degree

Farm and Ranch Management *Agricultural Business Management*

General Agricultural Economics

(See Common Freshman and Sophomore years)

Farm and Ranch Management

Junior Year	Hours	Senior Year	Hours
Applied Agricultural Econ (AEc 312)	3	Farm Organization (AEc 414)	3
Principles of Agricultural Marketing (AEc 341)	3	Agricultural Finance (AEc 431)	3
Agricultural Cooperation (AEc 342)	3	Federal Programs and the Farmer (AEc 418) or Conservation of Agricultural Resources (AEc 461) or Agricultural Land Economics (AEc 462)	3
Soil Mgt and Conservation (SIs 314)	4	Agricultural Appraisal (AEc 425)	3
[1]Statistics	3	Agricultural Prices (AEc 451)	3
Farm Income Tax Mgt (AEc 311)	2	Agricultural Policy (AEc 411)	3
Sociology of Rural Life (Soc 364)	3	Seminar (AEc 407)	3
Agriculture—upper division. Not Agricultural Economics	9	Curr Ec Theory and Prob (Ec 475,476)	6
Humanities Electives	9	Electives	20
Electives	12		

Agricultural Business Management

Junior Year	Hours	Senior Year	Hours
Applied Agricultural Econ (AEc 312)	3	Agricultural Finance (AEc 431)	3
Prin of Agric Marketing (AEc 341)	3	Agricultural Prices (AEc 451)	3
Agricultural Cooperation (AEc 342)	3	Agricultural Policy (AEc 411)	3
[1]Statistics	6	Consumers and the Market (AEc 412)	3
Sociology of Rural Life (Soc 364)	3	Marketing Efficiency Analysis (AEc 421)	3
Production (BA 311)	4	Seminar (AEc 407)	3
Finance (BA 312)	4	Current Economic Theory and Problems (Ec 475,476)	6
Business Electives	7	Business Law (BA 411,412,413)	9
Humanities Electives	9	Electives	19
Electives	12		

In cooperation with production departments concerned, students may emphasize the marketing of fruits, vegetables, dairy products, poultry, livestock, or farm crops.

General Agricultural Economics

Junior Year	Hours	Senior Year	Hours
Applied Agricultural Econ (AEc 312)	3	Farm Organization (AEc 414)	3
Principles of Agricultural Marketing (AEc 341)	3	Agricultural Finance (AEc 431)	3
Agricultural Cooperation (AEc 342)	3	Federal Programs and the Farmer (AEc 418), or Conservation of Agricultural Resources (AEc 461), or Agricultural Land Economics (AEC 462)	3
Sociology of Rural Life (Soc 364)	3	Agricultural Appraisal (AEc 425)	3
[1]Statistics	6	Agricultural Policy (AEc 411)	3
Agriculture—upper division. Not Agricultural Economics	6	Seminar (AEc 407)	3
Business Electives	6	Curr Econ Theory & Prob (Ec 475,476, 477)	9
Humanities Electives	9	Electives	21
Electives	12		

Agricultural Education

B.S. Degree

For Curriculum see SCHOOL OF EDUCATION

[1] In School of Business or School of Science.

Dairy and Animal Husbandry

B.S. Degree

Dairy Husbandry *Animal Husbandry* *Range Management* *(See page 153)*

(See Common Freshman and Sophomore years)

Dairy Husbandry

Beginning in the junior year, students interested in allied fields of Dairy and Animal Husbandry are encouraged to select elective courses in other departments and schools which will prepare them for opportunities in business and industry related to their major field of interest.

Junior Year	Hours
General Bacteriology (Bac 204)	3
Anat & Phys Dom An (VM 320,321)	8
Diseases of Livestock (VM 341)	4
Dairy Herd Management (DAH 322)	3
Genetics (Z 341)	3
Market Milk (FDT 310)	3
Tech Rpt Writ (Wr 227) or Jour (J 111)	3
American Governments (PS 201)	3
Electives	20

Senior Year	Hours
Animal Nutrition II (DAH 411)	4
Principles of Agricultural Marketing (AEc 341)	3
Seminar (DAH 407)	2
Dairy and Animal Husbandry Electives	12
Science and Social Science Electives	9
Electives	18

Animal Husbandry

Junior Year	Hours
Genetics (Z 341)	3
Anat & Phys Dom An (VM 320,321)	8
General Bacteriology (Bac 204)	3
Animal Fertility (DAH 316)	3
Prin of Agric Mktg (AEc 341)	3
Business Law (BA 411)	3
Tech Rpt Writ (Wr 227) or Jour (J 111)	3
Electives	24

Senior Year	Hours
Animal Nutrition II (DAH 411)	4
Range Management (DAH or FC 341)	3
Seminar (DAH 407)	2
American Governments (PS 201)	3
Dairy and Animal Husbandry Electives	12
Diseases of Livestock (VM 341)	4
Electives	20

Farm Crops

B.S. Degree

Junior Year	Hours
Genetics (Z 341)	3
Plant Pathology (Bot 351)	5
Cereal Crops (FC 322)	4
Plant Physiology (Bot 331)	5
Prin of Agric Marketing (AEc 341)	3
General Bacteriology (Bac 204)	4
Economic Entomology (Ent 314)	4
Journalism (J 111)	3
Soil Mgt and Conservation (Sls 314)	4
Forage Crops (FC 324)	3
Weed Control (FC 317)	4
Seed Identification (FC 332)	3
Electives	12

Senior Year	Hours
Seed Production (FC 414)	3
Crop Inspection (FC 411)	4
Plant Breeding (FC 415)	3
American Governments (PS 201)	3
Animal Nutrition I (DAH 311) or Animal Nutrition II (DAH 411)	4
Seminar (FC 407)	3
Electives	28

Fisheries

B.S. Degree

Freshman Year	Hours
English Composition (Wr 111,112,113)	9
General Zoology (Z 201,202,203)	9
Wildlife Conservation (FG 251,252)	6
Wildlife Technique (FG 261)	3
Gen Bot (Bot 201) and Field Bot (Bot 203)	6
Agric Engineering Survey (AE 211)	3
Intermediate Algebra (Mth 100)	4
Air or Military Science	3
Physical Education	3

Sophomore Year	Hours
Economic Ichthyology (FG 274,275,276)	9
Journalism (J 111)	3
Extempore Speaking (Sp 111)	3
Principles of Econ (Ec 201,202,203)	9
General Chemistry (Ch 101,102,103)	9
Wildlife Mgt (FG 281,282,283)	9
Descriptive Statistics (St 311)	3
Air or Military Science	3
Physical Education	3

Junior Year

	Hours
Commercial Fisheries (FG 464,465,466)	9
Abridged General Physics (Ph 211,212)	6
Aquatic Plants (Bot 316)	3
Organic Chemistry (Ch 251,252)	8
Quantitative Analysis (Ch 234)	5
General Bacteriology (Bac 204)	4
Aquatic Entomology (Ent 341)	3
American Governments (PS 201)	3
Genetics (Z 341)	3
Electives	6

Senior Year

	Hours
Management of Game Fish (FG 454,455, 456)	9
Invertebrate Zoology (Z 451,452)	10
Technical Writing (J 319)	3
Sanitary Water Measurements (CE 414)	
Animal Nutrition I (DAH 311)	3
Parasites of Fish (Z 457)	2
Seminar (FG 407)	3
Electives	16

Food and Dairy Technology

B.S. Degree

Common Freshman Year

	hours
Food Grades and Standards (FDT 271)	3
English Composition (Wr 111,112,113)	9
Gen Chem (Ch 101,102,103 or 204,205, 206)	9–15
Mathematics (Mth 101,102)	8
Calculus with Anal Geom (Mth 200)	4
Food and Dairy Technology (FDT 111)	3
Elements of Horticulture (Hrt 111) or Introduction to Dairy and Animal Science (DAH 121)	3
Physical Education, General Hygiene	3
Air, Military, or Naval Science (men)	3–9

Common Sophomore Year

	Hours
General Bacteriology (Bac 204)	4
Organic Chemistry (Ch 226,227)	10
Food Mfg Methods (FDT 221,222,223)	9
Gen Bot (Bot 201) or Gen Zool (Z 200)	3–5
American Governments (PS 201)	3
Extempore Speaking (SP 111)	3
Food Plant Graphics (AE 351)	3
Outlines of Economics (Ec 212)	3
Quantitative Analysis (Ch 234)	5
Physical Education	3
Air, Military, or Naval Science (men)	3–9

Food Technology

Junior Year

	Hours
Biochemistry (Ch 350)	3
Biochemistry Laboratory (Ch 353)	1
Food Sanitation Bacteriology (Bac 411)	4
Principles of Agric Mktg (AEc 341)	3
Fund of Accounting (BA 214,215)	6
Abridged Gen Physics (Ph 211,212)	6
Technical Writing (J 319)	3
Food Bacteriology (Bac 460)	4
Food Science (FDT 342,343)	8
Approved Social Science	3
Approved Electives	9

Senior Year

	Hours
Refrigeration & Cold Storage (ME 335)	3
Statistical Techniques (St 314,315)	6
Detergency & Waste Disposal (FDT 412)	3
Food Plant Mechanics (AE 352)	3
Heat Transfer in Food Mfg (FDT 433)	4
Seminar (FDT 407)	3
Food Packaging (FDT 431)	3
Food Analysis (FDT 423)	4
Fed and State Food Reg (FDT 421)	2
Approved Course in Nutrition	3
Approved Electives	15

Dairy Technology

Junior Year

	Hours
Biochemistry (Ch 350)	3
Biochemistry Laboratory (Ch 353)	1
Food Sanitation Bacteriology (Bac 411)	4
Fund of Accounting (BA 214,215)	6
Abridged General Physics (Ph 211,212)	6
Technical Writing (J 319)	3
Dairy Bacteriology (Bac 412)	4
Dairy Chemistry (Ch 457)	3
Dairy Chemistry Laboratory (Ch 458)	2
Market Milk (FDT 310)	3
Approved Social Science	3
Approved Course in Nutrition	3
Approved Electives	9

Senior Year

	Hours
Principles of Agricultural Marketing (AEc 341)	3
Refrigeration & Cold Storage (ME 335)	3
Statistical Techniques (St 314,315)	6
Detergency and Waste Disposal (FDT 412)	3
Food Plant Mechanics (AE 352)	3
Heat Transfer in Food Manufacturing (FDT 433)	4
Seminar (FDT 407)	3
Dairy Products Processing (FDT 441, 442,443)	15
Approved Electives	12

Horticulture

B.S. Degree

Pomology and Vegetable Crops *Floriculture and Nursery Management*
Landscape Construction and Maintenance

Pomology and Vegetable Crops

(See Common Freshman and Sophomore years)

Junior Year

	Hours
Basic Horticulture (Hrt 315)	3
Fruit and Nut Production (Hrt 333)	4
Commercial Vegetable Production (Hrt 342)	4
Plant Physiology (Bot 331)	5
Economic Entomology (Ent 314)	4
Plant Pathology (Bot 351)	5
Food Industry (FDT 340)	3
Genetics (Z 341)	3
General Bacteriology (Bac 204)	4
Home-Ground Planning (LA 279)	3
Electives	16

Senior Year

	Hours
[1]Systematic Pomology (Hrt 433) or Systematic Vegetable Crops (Hrt 443)	4–3
[1]Fruit Handling and Dist I (Hrt 431) or Veg Handling and Dist (Hrt 441)	4–3
Spraying, Dusting, and Fumi (Hrt 415)	3
Plant Materials (LA 326)	3
History and Lit of Hort (Hrt 317)	2
Horticultural Plant Breeding (Hrt 413) or Business Law (BA 413)	3
Prin of Agric Mktg (AEc 341)	3
American Governments (PS 201)	3
Principles of Accounting (BA 211)	3
Journalism (J 111)	3
Electives	17

Floriculture and Nursery Management

Freshman Year

	Hours
General Botany (Bot 201,202) Field Botany (Bot 203)	9
General Chemistry (Ch 101,102,103)	9
English Composition (Wr 111,112,113)	9
Elements of Horticulture (Hrt 111)	3
General Floriculture (Hrt 151)	3
Intermediate Algebra (Mth 100) or equivalent	4
Physical Education, General Hygiene	3
Air or Military Science (men)	3

Sophomore Year

	Hours
Landscape Design Theory (LA 280)	3
Soils (Sls 211,212)	6
[2]Organic Chemistry (Ch 251)	5
Outlines of Economics (Ec 212)	3
American Governments (PS 201)	3
Approved Social Science	3
Plant Propagation (Hrt 311)	3
Greenhouse Constr and Mgt (Hrt 313)	3
Basic Horticulture (Hrt 315)	3
Herbaceous Plant Materials (Hrt 355)	3
Flower Arrang (Hrt 253) or Approved Elective	3
Plant Physiology (Bot 331)	5
Journalism (J 111)	3
Physical Education	3
Air or Military Science (men)	3

Junior Year

	Hours
Applied Landscape Design (LA 290)	9
[3]Commercial Floriculture (Hrt 351,352) or Nursery Mgt (Hrt 361,362)	6–8
Commercial Floriculture (Hrt 353) or approved elective	3
Plant Materials (LA 326,327,328)	9
Hist and Lit of Horticulture (Hrt 317)	2
Spraying, Dusting, Fumi (Hrt 415)	3
Plant Pathology (Bot 351)	5
Economic Entomology (Ent 314)	4
Genetics (Z 341)	3
Electives	6

Senior Year

	Hours
Principles of Accounting (BA 211,212)	6
Horticultural Plant Breeding (Hrt 413)	3
Business Law (BA 413)	3
Extempore Speaking (Sp 111)	3
Salesmanship (BA 465)	3
Handling and Distribution of Florist Crops (Hrt 453) or Plant Ecology (Bot 341)	3–4
Flower Shop Operation (Hrt 451) or Land Drainage (AE 319)	3
Electives	23

[1] Pomology majors take Hrt 433 and Hrt 431. Vegetable crops majors take Hrt 443 and Hrt 441.
[2] Other science courses may be substituted for Ch 251 with approval of major professor.
[3] Students majoring in nursery management will take Nursery Management (Hrt 361,362) instead of commercial floriculture.

Two-Year Curriculum in Nursery Management

The American Association of Nurserymen, after study of more than 100 universities, has selected Oregon State University as one of seven best situated and prepared to offer a 2-year curriculum which will help meet a nationwide need. The curriculum is as follows:

First Year	Hours
General Chemistry (Ch 101,102,103)	9
General Botany (Bot 201,202), Field Botany (Bot 203)	9
English Composition (Wr 111,112,113)	9
Elements of Horticulture (Hrt 111)	3
Plant Propagation (Hrt 311)	3
Home-Ground Planning (LA 279)	3
Air or Military Science	3
Physical Education	3

Second Year	Hours
Nursery Management (Hrt 361,362)	8
Plant Materials (LA 326,327,328)	9
Soils (Sls 211,212)	6
Herbaceous Plant Materials (Hrt 355)	3
Plant Pathology (Bot 351)	5
Economic Entomology (Ent 314)	4
Spraying, Dusting, Fumi (Hrt 415)	3
Prin of Acctg (BA 211) or Basic Acct and Finan Analysis (BA 217)	3
Greenhouse Constr and Mgt (Hrt 313)	3
Real Estate Law (BA 414)	3
Air or Military Science	3
Physical Education	3

Landscape Construction and Maintenance

Freshman Year	Hours
General Botany (Bot 201,202), Field Botany (Bot 203)	9
General Chemistry (Ch 101,102,103)	9
English Composition (Wr 111,112,113)	9
Lower Division Architectural Design (AA 297)	3
Elements of Horticulture (Hrt 111)	3
Home-Ground Planning (LA 279)	3
Intermediate Algebra (Mth 100)	4
Physical Education, General Hygiene	3
Air or Military Science (men)	3

Sophomore Year	Hours
Applied Landscape Design (LA 290)	6
Hist and Lit of Landscape Arch (LA 356,357,358)	6
Soils (Sls 211,212)	6
Photography (Ph 361)	3
Surveying for Landscape Architecture Students (CE 224,225)	6
Basic Acctg and Finan Anal (BA 217)	3
American Governments (PS 201)	3
Approved Social Science	6
Physical Education	3
Air or Military Science (men)	3

Junior Year	Hours
Intermediate Landscape Design (LA 390)	9
Maintenance and Construction (LA 359, 360,361)	9
Plant Materials (LA 326,327,328)	9
Plant Propagation (Hrt 311)	3
Real Estate Law (BA 414)	3
Basic Horticulture (Hrt 315)	3
[1]Electives	14

Senior Year	Hours
Planting Plans (LA 392,393,394)	6
Layout of Small Prop (LA 382,383,384)	6
Plant Pathology (Bot 351)	5
Economic Entomology (Ent 314)	4
Principles of Plant Ecology (Bot 341)	4
Nursery Management (Hrt 361,362)	8
Lawns and Turfs (FC 313)	2
Land Drainage (AE 319)	3
[1]Electives	11

Mechanical Technology in Agriculture

B.S. Degree

Freshman Year	Hours
Mech Prob in Agric (AE 101,102,103)	6
General Chemistry (Ch 101,102,103)	9
Elements of Horticulture (Hrt 111)	3
Farm Mechanics (AE 221)	3
Intro to Dairy and Ani Sci (DAH 121) & Poultry Prod (P 121)	6
Intermediate Algebra (Mth 100)	4
General Botany (Bot 201)	3
Crop Production (FC 211)	5
Extempore Speaking (Sp 111)	3
Engineering Drawing (GE 115)	3
Physical Education, General Hygiene	3
Air or Military Science	3

Sophomore Year	Hours
English Composition (Wr 111,112,113)	9
Mathematics (Mth 101,102)	8
Plane Surveying (CE 226)	3
Abridged General Physics (Ph 211,212)	6
House Planning and Architectural Drawing (AA 178)	3
Outlines of Economics (Ec 212)	3
Machine Tool Practices (IE 260)	2
Soils (Sls 211,212)	6
Principles of Farm Management (AEc 211)	5
Physical Education	3
Air or Military Science	3

[1] To meet minimum requirements set forth in the training program of the National Landscape Nurserymen's Association students must elect at least 4 term hours of Construction (AA 218,219) and 3 approved term hours of business administration. Suggested electives: AA 160,161,295; AA 211,212; AE 451; Hrt 315,355.

Junior Year

	Hours
General Bacteriology (Bac 204)	4
Gen Bac (Bac 205) or Sci Elective	3
Social Science	6
Engines and Tractors (AE 311)	3
Motor Vehicles (AE 313)	3
Farm Electricity (AE 331)	3
Jour (J 111) or Tech Rep Writing (Wr 227)	3
Elementary Hydraulics (CE 322)	3
Farm Implements (AE 391)	3
Soil Water and Irrigation (Sls 311)	3
Basic Acctg and Finan Anal (BA 217)	3
Air or Military Science or Electives	9
Electives	3

Senior Year

	Hours
Business Law (BA 411)	3
Farm Buildings (AE 361)	3
Seminar (AE 407)	2
Pumps and Irrigation Equipment (AE 321)	3
Land Drainage (AE 319)	3
Household Utilities (AE 435)	3
Air or Military Science or Electives	9
Electives	18

Poultry Husbandry

B. S. Degree

(See Common Freshman and Sophomore years)

Junior Year

	Hours
Genetics (Z 341)	3
Prin of Agric Marketing (AEc 341)	3
[1]Turkey Management (P 351)	3
The Chick Embryo (P 321)	3
Basic Acctg and Finan Anal (BA 217)	3
Journalism (J 111)	3
Anat and Physi of the Fowl (VM 311)	3
American Governments (PS 201)	3
[1]Poultry Judging (P 341)	3
Diseases of Poultry (VM 351)	4
Brooding and Broiler Prod (P 322)	3
Electives	19

Senior Year

	Hours
Poultry Feeding (P 411,412)	4
[1]Marketing Poultry Products (P 421)	3
[1]Poultry Plant Management (P 431)	3
[1]Poultry Breeding (P 441)	3
Seminar (P 407)	2
Electives	33

Range Management

B.S. Degree

Administered jointly by Dairy and Animal Husbandry and Farm Crops Departments

Freshman Year

	Hours
General Chemistry (Ch 101,102,103)	9
General Botany (Bot 201,202), Field Botany (Bot 203)	9
Extempore Speaking (Sp 111)	3
English Composition (Wr 111,112,113)	9
General Zoology (Z 200)	5
Intro to Dairy and Ani Sci (DAH 121)	3
Physical Education	3
Air or Military Science	3

Sophomore Year

	Hours
Organic Chemistry (Ch 251)	5
Principles of Econ (Ec 201,202,203)	9
Systematic Botany (Bot 321)	4
General Bacteriology (Bac 204)	4
Soils (Sls 211,212)	6
Intermed Algb and Trig (Mth 100,102)	8
Crop Production (FC 211)	5
Physical Education	3
Air or Military Science	3

Junior Year

	Hours
Range Management (DAH or FC 341)	3
Range Improvement (DAH or FC 342)	3
Range Plants (DAH-FC 343)	3
Forest Engineering (FE 123)	3
Plant Physiology (Bot 331)	5
Plant Ecology (Bot 341)	4
Agrostology (Bot 314)	3
Farm Forestry (F 344)	3
Forest Wildlife Mgt (FG 310,311)	6
Tech Rep Writ (Wr 227) or Jour (J 111)	3
Statistical Techniques (St 314)	3
Electives	10

Senior Year

	Hours
Range Methods (DAH or FC 441)	4
Beef Cattle Production (DAH 424)	3
Animal Nutrition II (DAH 411)	4
Agricultural Land Economics (AEc 462)	3
American Governments (PS 201)	3
Diseases of Livestock (VM 341)	4
Genetics (Z 341)	3
Elective (Range Management) (DAH or FC)	3
Electives	21

[1] Offered alternate years. May be taken in junior or senior year.

Soils

B.S. Degree

(See Common Freshman and Sophomore years)

Junior Year

	Hours
General Bacteriology (Bac 204)	4
Plant Physiology (Bot 331)	5
Rocks and Minerals (G 350)	3
Soil Water and Irrigation (Sls 311)	3
Soil Mgt and Conservation (Sls 314)	4
American Governments (PS 201)	3
Organic Chemistry (Ch 251) or Quantitative Anal (Ch 234)	5
Journalism (J 111)	3
Electives	20

Senior Year

	Hours
Land Drainage (AE 319) or Pumps and Irrigation Equipment (AE 321)	3
Soil Fertility Lectures (Sls 424)	3
Soil Survey (Sls 432)	4
Soil Seminar (Sls 407)	2
Genetics (Z 341)	3
Economic Entomology (Ent 314) or Plant Pathology (Bot 351)	4
Weed Control (FC 317)	4
Electives	25

Wildlife Management

B.S. Degree

Freshman Year

	Hours
English Composition (Wr 111,112,113)	9
General Zoology (Z 201,202,203)	9
Wildlife Conservation (FG 251,252)	6
Wildlife Technique (FG 261)	3
Tree Identification (F 153)	3
Elements of Agronomy I (FC 111)	3
Intermediate Algebra (Mth 100)	4
Agric Engineering Survey (AE 211)	3
Air or Military Science	3
Physical Education	3

Sophomore Year

	Hours
Economics and Social Sciences	9
General Chemistry (CH 104,105,106)	12
Wildlife Mgt (FG 281,282,283)	9
General Botany (Bot 201,202), Field Botany (Bot 203)	9
Economic Ichthyology (FG 274)	3
Mammalogy (Z 372)	3
Ornithology (Z 371)	3
Air or Military Science	3
Physical Education	3

Junior Year

	Hours
Mgt of Game Birds (FG 451,452,453)	9
Aquatic Plants (Bot 316)	3
Plant Ecology (Bot 341)	4
Aquatic Entomology (Ent 341)	4
Anat and Phys of Dom An (VM 320,321)	8
Descriptive Statistics (St 311)	3
Genetics (Z 341)	3
Animal Nutrition I (DAH 311)	3
Journalism (J 111)	3
Extempore Speaking (Sp 111)	3
Electives	11

Senior Year

	Hours
Management of Game Fish (FG 454, 455,456)	9
Management of Big Game (FG 457,458)	6
Management of Fur Bearers (FG 460)	3
Parasitic Diseases of Domestic and Game Animals (VM 361)	4
American Governments (PS 201)	3
Technical Writing (J 319)	3
Seminar (FG 407)	3
Electives	17

Two-Year Terminal Curriculum

Certificate in Agriculture

First Year

	Hours
Biological or Physical Science	9
Elements of Horticulture (Hrt 111)	3
Introduction to Dairy and Animal Science (DAH 121,122)	5
Poultry Production (P 121)	3
Agricultural Engineering Survey (AE 211)	3
Air or Military Science	3
Physical Education	3
Electives	16

Second Year

	Hours
Prin of Farm Management (AEc 211)	5
Basic Acctg and Finan Anal (BA 217)	3
Crop Production (FC 211)	5
Diseases of Livestock (VM 341)	4
Farm Buildings (AE 361) or House Planning and Arch Draw (AA 178)	3
American Governments (PS 201)	3
Public Speaking	3
Air or Military Science	3
Physical Education	3
Electives	13

Agricultural Economics

The Department of Agricultural Economics emphasizes the business and economic aspects of agriculture. Electives permit a student to choose courses in the agricultural sciences, social sciences, business, or education. Thus he can adapt his study program to his interests and needs.

Freshmen and sophomore students generally follow a common program. During the last two years, however, each student selects an area of concentration by choosing one of these options:

The **farm and ranch management** option serves for those preparing for employment as farmers or ranchers, farm or ranch managers, county extension agents, or soil conservation supervisors.

The **agricultural business management** option prepares for employment in business serving agriculture.

The option in **general agricultural economics** prepares for employment with State and Federal services and land-grant colleges and universities or departments of agriculture. It also is for those who desire a more general background than either farm and ranch management or agricultural business management provides.

The options also prepare students for graduate study aimed at a professional career as a teacher, a research worker, or an extension specialist in agricultural economics. Graduate study is integrated with research. The Department gives major emphasis to training graduate students in applying scientific methodology to obtain realistic solutions to problems of farmers and agricultural industry. A student working for an M.S. or Ph.D. degree in agricultural economics may emphasize agricultural marketing, agricultural policy, agricultural finance, agricultural prices, land economics, or production economics and farm management and may carry out a research project in any one of these areas. A graduate student in another department may take a minor in agricultural economics.

Lower Division Courses

AEc 111. **Introduction to Agricultural Economics.** 3 hours. 3 ①
Nature of agricultural resources and their management, buying of farm production supplies, selling of farm products, financing of farm operations, and introduction to farm policies and programs. Staff.

AEc 211. **Principles of Farm Management.** 5 hours spring. 5 ①
Farming as a business; reasons for success and failure; what and how much to produce; acquiring and combining land, labor, and capital resources. Prerequisite: sophomore standing in agriculture. CASTLE, BECKER.

Upper Division Courses

AEc 311. **Farm Income Tax Management.** 2 hours spring. 1 ① 1 ②
Management and accounting procedures as influenced by Federal income tax laws and regulations. Computation of taxable income. Prerequisite: AEc 211. BECKER.

AEc 312. **Applied Agricultural Economics.** 3 hours fall. 3 ①
Use of economic principles in solving problems of costs and returns of specific farm enterprises; capital, labor, size of business; yields, feeding; production possibilities and markets. Prerequisite: Ec 203 or equivalent. HALTER.

AEc 331. **Food and Agriculture.** 3 hours fall. 3 ①
Role of agriculture in meeting population and industrial growth in a developing economy; influence of technology in production and marketing. Offered alternate years. Offered 1961-62. HOLLANDS.

3 ①

AEc 341. **Principles of Agricultural Marketing.** 3 hours fall or winter.
Marketing farm products; markets, marketing services, prices; role of producers, middlemen, and consumers; improving the marketing of major agricultural products. Prerequisite: Ec 203 or 212. Students who have not had prerequisites must have consent of instructor. HOLLANDS.

AEc 342. **Agricultural Cooperation.** 3 hours fall. 3 ①
Organization, financing, management, price policies, membership and public relations, and factors affecting success of cooperative associations with emphasis on Oregon cooperatives. Prerequisite: AEc 341. KORZAN.

AEc 401. **Research.** Terms and hours to be arranged.

AEc 405. **Reading and Conference.** Terms and hours to be arranged.

AEc 407. **Seminar.** Terms and hours to be arranged.

Ec 407. **Seminar.** (g) 3 hours spring.

AEc 408. **Workshop.** (g) Terms and hours to be arranged.
Application of agricultural economics to specific locality in Oregon in areas of agricultural marketing, policy, finance, and farm management.

AEc 411. **Agricultural Policy.** (g) 3 hours spring. 3 ①
Application of economic principles to agricultural problems, and particularly to agricultural policies established by State and Federal agencies. Prerequisite: Ec 203 or 214. WOOD.

AEc 412. **Consumers and the Market.** 3 hours winter. 3 ①
Theory of consumer behavior, the consumer in the market, consumption patterns, business and pricing practices, with laboratory periods devoted to sound buying practices discussed by representatives of businesses and professions. Prerequisite: Ec 203 or 212. Students who have not had prerequisites must have consent of instructor. HOLLANDS.

AEc 414. **Farm Organization.** (G) 3 hours fall. 2 ① 1 ③
Application of farm management principles to the organization of the individual farm; trips to farms showing specific organizational features; organization plans for selected farms. Prerequisite: AEc 211. BLANCH.

1 ① 1 ②

AEc 418. **Federal Programs and the Farmer.** (G) 3 hours winter.
Federal and State programs (ASC, SCS, FHA, AMS, State and county committees) as they affect the operation of Oregon farms. Prerequisite: senior standing. MUMFORD.

AEc 421. **Marketing Efficiency Analysis.** (G) 3 hours winter. 3 ①
Techniques for determining costs and efficiency of marketing and processing operations of agricultural products; reducing costs and improving efficiency through work methods, equipment, materials handling, and plant layout. Prerequisite: senior standing; Ec 212; AEc 341. LANGMO.

AEc 425. **Agricultural Appraisal.** (G) 3 hours spring. 2 ① 1 ③
Appraisal principles and purposes. Commercial and Federal appraisal methods; field work in appraisal of land and farms of different types. Consent of instructor required. Prerequisite: senior standing. BLANCH.

AEc 431. **Agricultural Finance.** (G) 3 hours spring. 3 ①
Principles of credit and finance as applied to agriculture; credit requirements of agriculture; existing credit agencies, strength and weakness. Prerequisite: Ec 203; upper division standing. BLANCH.

AEc 440. **Livestock Economics.** (G) 3 hours fall. 3 ①
Economic and financial phases of the livestock industry, trends in investment, cost-price relationships, and development of market functions and institutions. Prerequisite: upper division standing.

AEc 444. **Marketing Dairy Products.** (G) 3 hours winter. 3 ①
Trends in production and consumption, agencies and institutions in marketing, current research and development, and marketing as affected by present State and Federal regulations. Prerequisite: AEc 341. Offered alternate years. Not offered 1961-62. CHRISTENSEN.

AEc 451. **Agricultural Prices.** (g) 3 hours spring. 3 ①
Price trends; prices of agricultural and nonagricultural products; prices in relation to production and marketing; elasticity functions. Prerequisite: St 311; AEc 341. KORZAN.

3 ①

AEc 461. **Conservation of Agricultural Resources.** (G) 3 hours winter.
Benefits and costs of developing and conserving water, soil, and timber resources; types of management necessary to attain various public and private ends. Prerequisite: upper division standing. Offered alternate years. Offered 1961-62. CASTLE.

AEc 462. **Agricultural Land Economics.** (g) 3 hours winter. 3 ①
Supply of and demand for agricultural land; population pressure on land; economic principles governing value and use of land; institutional factors. Prerequisite: Ec 203; upper division standing.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit. See also courses in Department of Economics which may be taken as part of a graduate major in agricultural economics.

AEc 501. **Research.** Terms and hours to be arranged.

AEc 503. **Thesis.** Terms and hours to be arranged.

AEc 505. **Reading and Conference.** Terms and hours to be arranged.

AEc 507. **Seminar.** 1 hour. 1 ①

AEc 508. **Workshop.** Terms and hours to be arranged.
Application of agricultural economics to specific locality in Oregon in areas of agricultural marketing, policy, finance, and farm management.

Ec 512,513. **Economic History.** 3 hours each term. 3 ①
Economic history of Europe and United States (alternate years) with emphasis on major trends in agriculture, manufacturing, trade, transportation, money, banking, and finance. Limited to candidates for advanced degrees in Department of Agricultural Economics.

3 ①

Ec 514,515,516. **Contemporary Economic Thought.** 3 hours each term.
Twentieth century economics; value theory, welfare economics, imperfect competition; institutionalism; theory of employment, money, national income, economic fluctuations; growth; innovations in methodology. Prerequisite: Ec 475,476,477, or equivalent. Limited to candidates for advanced degrees in Department of Agricultural Economics.

AEc 520. **Research Methodology.** 3 hours winter. 3 ①
Logic of the sciences; deduction and induction in research; use of theory and statistics in research, with particular attention to integrating deductive and inductive phases of research; preparation of research reports. Prerequisite: consent of instructor. BROWN.

AEc 521,522. **Agricultural Production Economics.** 3 hours fall and winter 3 ①
AEc 521: Principles of production economics applied to individual farms; conditions of risk and uncertainty. *AEc 522:* Principles applied to agricultural industry; obstacles to efficiency; functioning of land, capital, and labor markets. CASTLE, BROWN, HALTER.

AEc 523. **Analysis of Agricultural Policies.** 3 hours spring. 3 ①
Economic and social criteria for public policy; value conflicts; welfare and efficiency goals in agricultural policy; development of policy; integration of economic and political objectives; critical appraisal of current and proposed agricultural policies. WOOD.

Ec 527,528. **History of Economic Thought.** 3 hours each term. 3 ①
Contribution of greatest economic thinkers from earliest times to present with particular attention to schools of thought. Limited to candidates for advanced degrees in Department of Agricultural Economics.

AEc 562. **Advanced Agricultural Land Economics.** 3 hours winter. 3 ①
Contemporary land problems and policies; distribution of major land uses, reclamation, conservation, land planning and classification. Prerequisite: AEc 462.

AEc 572. **Advanced Agricultural Marketing.** 3 hours fall. 3 ①
Functions of the market, characteristics of demand and supply in marketplace; establishment of guideposts in development of marketing programs; analysis of selected research results in marketing farm products. HOLLANDS.

AEc 573. **Agricultural Price Analysis.** 3 hours spring. 3 ①
Supply and demand theory; market prices under perfect and imperfect competition; relation of price research to production and distribution of agricultural commodities. Prerequisite: two terms of statistics: Ec 475, 476, 477; AEc 451 or equivalent. KORZAN.

Agricultural Education

The Department of Agricultural Education is a joint department within the Schools of Agriculture and Education. It trains teachers and supervisors of agriculture for secondary schools and for schools and classes of adult farmers and young men not enrolled in regular day schools. For requirements, graduate credit, and course listing see SCHOOL OF EDUCATION.

Agricultural Engineering

Mechanical Technology in Agriculture

The Department of Agricultural Engineering, a joint department within the Schools of Agriculture and Engineering, offers three types of instruction: (1) A curriculum leading to a Bachelor of Science degree in Mechanical Technology in Agriculture. (2) A curriculum leading to a Bachelor of Science degree in Agricultural Engineering. (SEE SCHOOL OF ENGINEERING.) (3) Service courses for students majoring in other departments.

The curriculum in Mechanical Technology in Agriculture provides a broad course of study which will enable a student to acquire a background in the agricultural sciences, business, communicative and manipulative skills, and elementary engineering principles. This study qualifies him for work of an applied nature in industry and in public and self-employment. Students majoring in other departments may take courses in this department if they have proper prerequisites or consent of instructor.

The increasing importance of modern agricultural machinery in reducing production costs and improving rural living conditions necessitates more complete and effective utilization of fundamental principles of agricultural and engineering sciences. Accordingly, there are facilities available for teaching and experimental work in farm power and machinery, soil and water control and conservation, farm structures, rural electrification, and crop processing. Adequate facilities are also available for teaching farm and automobile mechanics. The farm power laboratory is equipped with an engine-testing dynamometer, several makes and types of internal combustion engines, sectionalized automobile and tractor motors, and accessories. Farm machinery distributors loan the very latest farm equipment for study and observation. The department has samples of many different kinds and types of building material. Models of farm water systems and centrifugal and turbine pumps for sprinkler irrigation systems are available for study.

Lower Division Courses

AE 101,102,103. **Mechanical Problems in Agriculture.** 2 hours each term. 1 ① 1 ②
Lectures and elementary problems in the mechanics of agriculture. LONG.

AE 211. **Agricultural Engineering Survey.** 3 hours any term. 1 ① 2 ②
Principles of mechanics, hydraulics, soil conservation, and electricity applied to farm problems. Prerequisite: Mth 100 or equivalent. LONG.

1 ① 2 ③

AE 213. **Mechanical Applications in Agriculture.** 3 hours spring.
Practical field work in farm surveying, mechanics, maintenance of equipment, and dehydration problems. Prerequisite: AE 211. LONG.

AE 221. **Farm Mechanics.** 3 hours any term. 1 ① 2 ③
Use of hand and power tools for wood and metal working, roof framing, arc and acetylene welding, construction of wood and metal farm appliances, concrete work. KIRK.

AE 222. **Farm Mechanics.** 3 hours spring. 1 ① 2 ③
Maintenance and adjustment of farm machinery; construction of farm equipment; maintenance and use of farm-type electrical equipment. Prerequisite: AE 221. CHRISTENSEN.

Upper Division Courses

AE 311. **Engines and Tractors.** 3 hours any term. 2 ① 1 ③
Internal combustion engine as used in agriculture; engine principles, construction; parts, accessories, lubrication and fuels; tractor design and construction. Cannot be taken for credit if credit has previously been earned in AE 312. LUNDE.

AE 312. **Motor Vehicles.** 3 hours fall. 2 ① 1 ③
The automobile, its parts, and accessory units; their design, function, operation, adjustment, lubrication and fuels; current developments. Cannot be taken for college credit if credit has previously been earned in AE 311. LUNDE.

AE 313. **Motor Vehicles.** 3 hours any term. 1 ① 2 ③
Practical problems in preventive maintenance procedures for automotive equipment. Maintenance schedules, lubrication, adjustments, engine tuneup, carburetion, brake service, chassis and accessory unit repairs. Prerequisite: AE 311 or 312. LUNDE.

AE 314. **Motor Vehicles.** 3 hours spring. 2 ① 1 ③
Study and use of precision diagnostic, test, and repair equipment and tools for automotive vehicle maintenance. Engine and other major unit rebuilding procedures; electrical systems. Prerequisite: AE 313. LUNDE.

AE 319. **Land Drainage.** 3 hours spring. 2 ① 1 ③
Planning and surveying for surface and subsurface farm drainage systems; soil erosion control. Prerequisite: Sls 212. SCHOOF.

AE 321. **Pumps and Irrigation Equipment.** 3 hours fall. 2 ① 1 ③
Selection, operation, and testing of pumps, household water systems, and sprinkler irrigation equipment; planning sprinkler and gravity irrigation systems; farm water systems. Recommended: Sls 311; CE 322. SCHOOF.

AE 331. **Farm Electricity.** 3 hours winter. 2 ① 1 ③
Fundamentals of electricity, wiring, electric motors, and the use of electricity on the farm. Prerequisite: AE 211 or equivalent. CROPSEY.

AE 341. **Use of Explosives.** 2 hours winter. 1 ① 1 ③
Use of explosives in removing stumps, constructing drainage ditches, and rock blasting; 30 hours of field work arranged on Saturdays. SCHOOF.

AE 351. **Food Plant Graphics.** 3 hours winter. 1 ① 2 ③
Mechanical and architectural drawing; blueprint reading; reproduction processes; bill of materials; food plant layout. BONNICKSEN.

AE 352. **Food Plant Mechanics.** 3 hours winter. 2 ① 1 ③
Equipment used in food processing industry; demonstrations and practice in performing related shop operations. Prerequisite: Ph 212 or consent of instructor. KIRK.

AE 361. **Farm Buildings.** 3 hours spring. 1 ① 2 ②
Materials and types of construction; services, uses, and economics of farm buildings; farmstead and building planning. BONNICKSEN.

AE 371. **Seed Processing.** 3 hours fall. 2 ① 1 ③
Effective seed cleaning requirements; seed separation principles and characteristics; machinery operation and plant layout. Prerequisite: AE 211. BOOSTER.

AE 381,382,383. **Farm Skills.** 1 hour each term. 1 ②
Farm arc and gas welding techniques; application for high school farm mechanics instruction in repair and construction of farm machinery and equipment. CHRISTENSEN.

AE 391. **Farm Implements.** 3 hours fall or spring. 2 ① 1 ③
Construction, operation, hitching of equipment used for seed-bed preparation and for planting, fertilizing, cultivation, and harvesting. Prerequisite: Mth 100 or equivalent. RODGERS.

AE 401. **Research.** Terms and hours to be arranged.

AE 405. **Reading and Conference.** Terms and hours to be arranged.

AE 406. **Projects.** Terms and hours to be arranged.

AE 407. **Seminar.** Terms and hours to be arranged.

AE 408. **Workshop.** Terms and hours to be arranged.

AE 435. **Household Utilities.** (g) 3 hours spring. 2 ① 1 ③
Home utilities, their functions and economy. Heating, air conditioning, plumbing, and electricity. Prerequisite: AE 361 or AA 178, or senior standing. CROPSEY.

AE 451. **Rural House Planning.** (g) 3 hours winter. 1 ① 2 ②
Structural materials and methods of construction; fundamental design of typical dwellings using planning and building standards developed by Agricultural Experiment Station and other research. Prerequisite: AA 178 and senior standing. SINNARD.

Graduate Courses
Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

AE 501. **Research.** Terms and hours to be arranged.

AE 503. **Thesis.** Terms and hours to be arranged.

AE 505. **Reading and Conference.** Terms and hours to be arranged.

AE 506. **Projects.** Terms and hours to be arranged.

AE 507. **Seminar.** Terms and hours to be arranged.

AE 508. **Workshop.** Terms and hours to be arranged.

Dairy and Animal Husbandry

Courses in dairy and animal husbandry are designed to acquaint students with the importance and place of farm animals in our total agricultural and national economy. Principles of breeding, feeding, management, and marketing of farm animals and their products are stressed. Courses in range management and improvement are integrated with the Farm Crops Department to provide sound training in livestock and range problem areas.

The department maintains extensive purebred herds and flocks of dairy cattle, beef cattle, sheep, and swine, and an experimental mink farm. Well-equipped laboratories supplement the herds and flocks for advanced training and research in physiology, genetics, nutrition, meats, wool, and production problems. Graduate students under supervision of staff members work on Agricultural Experiment Station research problems in pursuit of advanced

degrees and all students have opportunity to observe progress and results of research in all areas of dairy and animal husbandry.

Major and minor curricular options are planned for specialized training in livestock and dairy production, farm and ranch management, and for positions in allied industries. Students interested in advanced degrees elect courses which prepare them for graduate programs leading to the M.S. and Ph.D. degrees.

Specialized training in range management is offered at the B.S., M.S., or Ph.D. level in a program jointly administered through the Departments of Dairy-Animal Husbandry and Farm Crops. This program integrates plant, animal, and soil science into a sound training for wise use, improvement, and management of range resources. Graduates of the program are in demand with employment opportunities in governmental management and research agencies, extension, colleges and universities, livestock ranching, wildlife habitat management, and businesses serving the livestock industry.

Lower Division Courses

DAH 121. **Introduction to Dairy and Animal Science.** 3 hours any term. 3 ①
WOLBERG.

DAH 122. **Dairy and Animal Science Laboratory.** 2 hours spring. 2 ②
Prerequisite: DAH 121, prerequisite or parallel.

DAH 200. **Livestock Management.** 2 hours spring. 2 ②
Livestock skills necessary in operation of an efficient enterprise. Prerequisite: DAH 121. Staff DAH and VM.

DAH 221. **Horse Husbandry.** 3 hours fall. 2 ① 1 ②
Feeding, care, and management of light horses.

DAH 231. **Selection of Farm Animals.** 2 hours spring. 3 ②

Upper Division Courses

DAH 311. **Animal Nutrition.** 3 hours fall. 3 ①
Animal nutrition; digestion and metabolism of nutrients; nutritional deficiencies. Not recommended for animal, dairy, or poultry husbandry majors. Credit will not be given for both DAH 311 and 411. Prerequisite: Ch 103. CHURCH.

DAH 316. **Animal Fertility.** 3 hours winter. 3 ①
Male and female genital organs; fertility complex and control over breeding efficiency.

DAH 321. **Evaluation of Farm Animals.** 2 hours spring. 2 ③
Livestock performance compared with some of the ideals used in show-ring evaluation of farm animals.

DAH 322. **Dairy Herd Management.** 3 hours fall. 3 ①
Factors influencing dairy herd production. Prerequisite: DAH 121. JONES.

DAH 331. **Market Livestock Evaluation.** 3 hours winter. 1 ① 2 ③
Evaluation of meat animals in terms of their carcass merit. Prerequisite: DAH 121. KENNICK.

DAH 351. **Meats.** 3 hours fall or spring. 1 ① 2 ③
Slaughtering, cutting, sanitation and inspection, packing houses, retail markets. Prerequisite: junior standing and consent of instructor. KENNICK.

DAH 352. **Wholesale and Retail Meat.** 3 hours winter. 2 ① 1 ③
Identification, selection, and utilization. Prerequisite: junior standing. KENNICK. Offered alternate years. Not offered 1961-62.

DAH 401. **Research.** Terms and hours to be arranged.

DAH 405. **Reading and Conference.** Terms and hours to be arranged.

DAH 407. **Seminar.** 1 hour fall, winter, or spring. Staff. 1 ②

DAH 411. **Animal Nutrition.** (g) 4 hours fall. 3 ① 1 ②
Nutrition principles; requirements for growth, maintenance, reproduction, lactation; functions and metabolism of nutrients in animal body; relation of chemical composition of feeds to their functions. Prerequisite: Ch 251. Recommended: Ch 252. OLDFIELD.

DAH 412. **Livestock Feeding.** (G) 3 hours winter. 3 ①
Application of nutrition principles to livestock feeding; reference to research at agricultural experiment stations and elsewhere. Prerequisite: DAH 311 or 411. OLDFIELD.

DAH 413. **Dairy Cattle Feeding.** (G) 3 hours spring. 3 ①
Rations for growth, maintenance, reproduction, and milk production; experimental studies and techniques. Prerequisite: DAH 322, 411. JONES.

DAH 414. **Breeding Dairy Cattle.** (G) 3 hours winter. 3 ①
Origin and development of dairy cattle; systems of breeding; inherited characteristics; progeny tests; planning breeding program. Prerequisite: Z 341. JONES.

DAH 422. **Sheep Production.** (G) 3 hours winter. 2 ① 1 ②
Prerequisite: Z 341 and DAH 311 or 411. FOX.

DAH 423. **Swine Production.** (G) 3 hours winter. 2 ① 1 ②
Prerequisite: Z 341 and DAH 311 or 411. ENGLAND.

DAH 424. **Beef Cattle Production.** (G) 3 hours spring. 2 ① 1 ②
Prerequisite: Z 341 and DAH 311 or 411. MILLER.

DAH 426. **Stock Judging.** 1 hour fall. 1 ③
Judging and selection of swine, sheep, horses, beef and dairy cattle. Prerequisite: DAH 321 or equivalent.

DAH 427. **Artificial Insemination.** 3 hours winter. 1 ① 2 ②
Consent of instructor required. Prerequisite: DAH 316. WOLBERG.

DAH 432. **Milk Secretion.** (G) 3 hours spring. 2 ① 1 ③
The anatomical, physiological, and biochemical aspects of milk secretion. Prerequisite: VM 321; Ch 252. Offered alternate years. Offered 1961-62. HUETER.

DAH 433. **Pedigree and Herd Records.** (G) 3 hours spring. 2 ① 1 ②
Blood lines of dairy breeds and interpretation of production records. Prerequisite: DAH 322; Z 341. Offered alternate years. Not offered 1961-62. JONES, WOLBERG.

DAH 476. **Reproduction Problems.** (G) 3 hours spring. 1 ① 2 ②
Breeding efficiency of livestock; effect of nutritional, genetic, and physiological factors. Prerequisite: DAH 316. WU.

DAH 478. **Livestock Improvement.** (G) 3 hours spring. 3 ①
Application of genetics, breeding systems, and selection principles to livestock improvement. Prerequisite: Z 341. BOGART, ENGLAND.

DAH 481. **Wool Production.** (G) 3 hours fall. 2 ① 1 ②
Preparation, sorting, grading, scouring, and manufacturing. FOX.

DAH 483. **Wool Technology.** (G) 2 hours spring. 1 ① 1 ③
Techniques in evaluating physical properties. Prerequisite: DAH 481. FOX.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

DAH 501. **Research.** Terms and hours to be arranged.

DAH 503. **Thesis.** Terms and hours to be arranged.

DAH 505. **Reading and Conference.** Terms and hours to be arranged.

DAH 507. **Seminar.** Terms and hours to be arranged.

DAH 511. **Animal Nutrition.** 5 hours winter. 5 ①
Nutritional research methods; energy concepts; protein metabolism; mineral and vitamin requirements; dietary deficiency disorders. Prerequisite: Ch 251; DAH 411; or their equivalents. Offered alternate years. Not offered 1961-62. HAAG.

DAH 550,551,552. **Topics in Animal Nutrition.** 2 hours each term. 2 ①
Recent advances in areas of animal nutrition. Different topic covered each term. Prerequisite: DAH 411. OLDFIELD, CHURCH, HUETER.

DAH 573. **Physiology of Reproduction in Domestic Animals.** 3 hours spring. 3 ①
Physiology of gonads, germ cells and fertilization; role of inheritance, environment, hormones, nutrition, and management in reproduction. Prerequisite: DAH 476. Offered alternate years. Offered 1961-62. BOGART, KRUEGER, OLDFIELD, WU.

DAH 574. **Growth in Domestic Animals.** 3 hours fall. 3 ①
Endocrines and growth; bioenergetics and differentiation; genetic, bacterial, and nutritional aspects of growth. Prerequisite: Ch 452; Z 533; DAH 411, 578. Offered alternate years. Not offered 1961-62. BOGART, KRUEGER, OLDFIELD, WU.

DAH 578. **Livestock Genetics.** 4 hours spring. 2 ① 2 ②
Inheritance of anatomical and physiological abnormalities; genetic significance of breeding methods; genetic, physiological interrelations. Prerequisite: Z 341. BOGART.

COURSES IN RANGE MANAGEMENT

Upper Division Courses

DAH or FC 341. **Range Management.** 3 hours fall or winter. 2 ① 1 ②
Principles and practices of range and pasture management, orientation in land-use management. Prerequisite: junior standing.

DAH or FC 342. **Range Improvement.** 3 hours winter. 2 ① 1 ②
Reseeding, improvement, and maintenance of range, cutover, overflow, marginal, and other grazing lands. Prerequisite: DAH or FC 341.

DAH or FC 343. **Range Plants.** 3 hours spring. 3 ②
Occurrence, physiology, ecology, and nutritive value of important grass, forb, and browse plants on U. S. and Oregon ranges. Prerequisite: Bot 321; DAH or FC 341.

DAH or FC 441. **Range Methods.** (g) 4 hours spring. 3 ① 1 ③
Methods in evaluating ranges; techniques for measurement of forage utilization, range condition, and trend and inventory; field problems; use of aerial photographs and application of sampling theory. Prerequisite: DAH or FC 341.

DAH or FC 442. **Range Management Planning.** (G) 3 hours winter. 2 ① 1 ③
Administration and management of range lands; application to actual problems and plan execution. Prerequisite: DAH or FC 441. Offered alternate years. Not offered 1961-62.

DAH or FC 443. **Range Management.** (G) 3 hours winter. 1 ① 2 ②
See description under FARM CROPS.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

DAH or FC 541. **Range Research Methods.** 3 hours spring. 3 ①
Problem analysis approach to range and pasture investigations; techniques used to facilitate integration of plant and animal research. Prerequisite: St 421,422; DAH 441. Offered alternate years. Not offered 1961-62.

DAH or FC 543. **Range Management.** 3 hours winter. 1 ① 2 ②
Physiological, sociological, and nutritional problems in range management. Land use philosophies on a worldwide basis with emphasis on the role of range management. Offered alternate years. Not offered 1961-62.

Extension Methods

Instruction in extension methods provides training for positions as county extension agents in agriculture, as 4-H Club and home economics extension workers, as extension specialists, and as specialists in similar fields where extension methods are commonly used. It also gives students in other fields an understanding of how to take advantage of services of county extension agents.

An extension worker must know not only subject matter but also methods by which extension work succeeds. He must be able to give or know how to obtain authoritative advice for his community or county on problems related to his field of service. He must know the technique of platform speaking and demonstration, radio speaking, conducting discussions, and publicizing the extension program. Combining a major in agriculture or home economics with training in journalism, speech and dramatics, economics, sociology, and other departments, supplemented by work in extension methods, should materially assist in meeting the need for better trained extension workers.

Upper Division Courses

EM 405. **Reading and Conference.** Terms and hours to be arranged.

EM 411. **Extension Methods.** (G) 3 hours winter. 3 ①
Philosophy and organization of extension work; methods employed by extension specialists, county agricultural and home demonstration agents, 4-H Club leaders, etc.

EM 412. **Extension Methods.** (G) 3 hours winter. 3 ①
Application of knowledge and skills gained in EM 411 and other college courses such as journalism, radio, etc., in the fields of agriculture and home economics extension. Offered alternate years. Offered 1961-62.

EM 453. **Field Work in Home Economics Extension.** (G) Terms and hours to be arranged
Field practice in county extension work under supervision of professor of extension methods and county extension agents. Prerequisite: EM 411. MACK.

Graduate Courses

Courses numbered *400-499* and designated *(g)* or *(G)* may be taken for graduate credit.

EM 505. **Reading and Conference.** Terms and hours to be arranged.

Farm Crops

The work of the Department of Farm Crops is closely related to six important fields: (1) daily food supply for our human population; (2) feed requirements of all classes of farm animals; (3) growth of plants for textiles; (4) seed and special crops such as drug plants; (5) plant problems of soil conservation; (6) range and wildlife food crops.

Problems of production, improvement, marketing, manufacture, and use of each of field crops produced for food, forage, textile, and special purposes are dealt with by this department. The primary purpose of the major curriculum is to teach students scientific, practical, and economical methods of crop production, marketing, and improvement. The courses make constant application of scientific principles from such fields of study as soils, physics, chemistry, bacteriology, plant pathology, and plant physiology.

The curricula are designed to enable men to fit themselves for business positions in connection with the marketing of seeds and other farm crops;

for civil service positions in agronomy, forage crops, soil conservation, range management, grain standardization, plant breeding, and crop marketing; and for experiment station, extension, and teaching work. The object is to develop men trained for leadership in agriculture and to provide scientific training in professional and technical agriculture. Considerable flexibility in electives and the study of original problems is encouraged.

Lower Division Course

FC 211. **Crop Production.** 5 hours. 3 ① 2 ②
Field crop production including seeding, establishment, tillage, rotations, culture, production hazards, improvement and quality of cereals, forage, and other field crops. Prerequisite: Bot 201.

Upper Division Courses

FC 311. **Potato Growing.** 2 hours winter. 2 ①
Production; improvement; storage; cost; marketing; distribution; uses; experimental work; varietal studies; identification, judging, and scoring.

FC 313. **Lawns and Turfs.** 2 hours fall. 1 ① 1 ②
Turf plants and seeds; seedbed preparation, seeding, fertilization management, weed and pest control for lawns, golf courses, grass nurseries, etc.

FC 317. **Weed Control.** 4 hours spring. 3 ① 1 ②
Weed types; habits of growth; legislation; prevention, control, and eradication; noxious, persistent, perennial, and poisonous weeds of ranch and range.

FC 322. **Cereal Crops.** 4 hours winter. 3 ① 1 ②
Production, distribution, adaptation, ecological relationships, morphological and taxonomic relationships, markets, utilization and quality aspects of cereal grains. Prerequisite: FC 211.

FC 324. **Forage Crops.** 3 hours spring. 2 ① 1 ②
Cultivated hay and pasture; grasses and legumes; pasture establishment and management; hay and silage production; forage crop improvement. Prerequisite: FC 211.

FC 331. **Seed Testing Technique.** 3 hours spring. 1 ① 1 ④
Techniques of determining seed quality; use and care of laboratory equipment. Prerequisite: FC 211.

FC 332. **Seed Identification.** 3 hours winter. 2 ① 1 ②
Identification of seeds of field crops and weeds by external characteristics and internal structures. Prerequisite: FC 211; Bot 203 or 321.

FC or DAH 341. **Range Management.** See page 153.

FC or DAH 342. **Range Improvement.** See page 153.

FC or DAH 343. **Range Plants.** See page 153.

FC 401. **Research.** Terms and hours to be arranged.

FC 403. **Thesis.** Terms and hours to be arranged.

FC 405. **Reading and Conference.** Terms and hours to be arranged.

FC 407. **Seminar.** 1 hour each term. 1 ①

FC 411. **Crop Inspection.** (G) 4 hours winter. 2 ① 2 ②
Commodity grading and standardization with special emphasis on inspection, grading, and evaluation of cereals, hay, forage, potatoes, beans, seeds, etc. Prerequisite: FC 211, 322, 323; Ch 251, or equivalent.

FC 414. **Seed Production.** (G) 3 hours fall. 3 ①
Production, distribution, and use of seed crops; inspection, certification, and legislation. Prerequisite: FC 211; senior standing.

FC 415. **Plant Breeding.** (g) 3 hours spring. 2 ① 1 ②
Practical application of genetics to improvement of field and horticultural plants. Consent of instructor required. Prerequisite: Z 341; senior standing.

FC 419. **Industrial Crops.** (g) 3 hours winter. 3 ①
Production of field crops for industrial uses and products; emphasis on adaptation, agronomic practices, and special qualities. Prerequisite: FC 322.

[1]FC or DAH 441. **Range Methods.** (g) See page 153.

[1]FC or DAH 442. **Range Management Planning.** (G) See page 153.

FC or DAH 443. **Range Management.** (G) See page 153.

For the 4-year curriculum in Range Management see page 143.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

FC 501. **Research.** Terms and hours to be arranged.

FC 503. **Thesis.** Terms and hours to be arranged.

FC 505. **Reading and Conference.** Terms and hours to be arranged.

FC 507. **Seminar.** 1 hour each term. 1 ①

FC 515. **Plant Breeding.** 3 hours fall. 3 ①
Underlying genetic and cytogenetic principles, methodologies, and theories in improvement of cereal and forage crops. Consideration is given to current literature. Prerequisite: Z 341; FC 517 or equivalent.

FC 516. **Field-Plot Technique.** 3 hours spring. 2 ① 1 ②
Experimental procedures, methods, and techniques of field-plot experimentation; application of experimental designs to field crop research; interpretation of experimental results. Prerequisite: St 421, 422 or equivalent.

FC 517. **Plant Genetics.** 3 hours winter. 2 ① 1 ②
Theories and principles of plant inheritance studies. Prerequisite: Z 341 and consent of instructor.

FC 518. **Herbicides and Plant Growth Regulators.** 3 hours fall. 3 ①
Chemicals for weed control and other agronomic purposes; growth regulators, defoliants, and preharvest sprays and their physiological effects; research methods. Prerequisite: FC 317; Ch 252; Bot 331; senior standing. Offered alternate years. Not offered 1961-62.

FC 519. **Crop Seed Physiology.** 4 hours spring. 2 ① 2 ②
Metabolic changes and affecting factors during stages of seed development, storage, and germination. Prerequisite: Bot 331, 431; Ch 252.

FC 520. **Conservation Cropping.** 2 hours fall. 2 ①
Crops and cropping systems which replenish and maintain soil organic matter and provide maximum protection against soil losses; plants for dike and streambank protection, sodded waterways, slope maintenance. Prerequisite: FC 211 and senior standing.

FC 521. **Concepts of Crop Science.** 3 hours spring. 3 ①
Emphasis on history and current literature relative to understanding the concepts of crop production and its role in agriculture. Prerequisite: FC 317, 322, 324.

FC or DAH 541. **Range Research Methods.** See page 153.

FC or DAH 543. **Range Management.** See page 153.

[1] For course description see DAIRY AND ANIMAL HUSBANDRY, page 153.

Fish and Game Management

Major students in this department are prepared mainly for professional careers in wildlife management and in fisheries as biologists, managers, and administrators with State and Federal agencies, land- and water-using industries, and public-health organizations. The curriculum in wildlife management emphasizes the ecological requirements of wild birds and mammals of recreational and economic importance in relation to multiple-use principles of land and water management. An additional curriculum is offered for students planning to enter the fields of commercial and game fisheries.

Strategically located for the study of fish and game management, the Department has within easy access State fish hatcheries, a game farm, refuges, the E. E. Wilson Game Management Area, a fish physiology and toxicity laboratory, and a marine fishery station. Most forms of Oregon's varied wildlife are only a few hours' travel from Corvallis. Research by the U. S. Fish and Wildlife Service and the Oregon State Game Commission conducted at Oregon State in cooperation with the Agricultural Experiment Station is of basic value to the instructional programs. Cooperative water-pollution investigations with the Fish Toxicology and Physiology Unit of the U. S. Public Health Service are important aspects of the graduate studies program.

Lower Division Courses

FG 251,252. **Wildlife Conservation.** 3 hours each term, fall and winter. 3 ①
Wildlife as a valuable economic and social resource; need for its conservation through scientific administration and manipulation; general problems of wildlife management; an introduction to important wild animal groups of birds, mammals, and fishes.

FG 261. **Wildlife Technique.** 3 hours each term, fall or spring. 3 ① 1 ②
Techniques and equipment used by sportsmen in harvesting the game and fish crop; shotguns and elementary ballistics; bait and fly casting; hunting dogs; dressing and caring for flesh of game and fish.

FG 274,275,276. **Economic Ichthyology.** 3 hours each term. 3 ① 1 ②
Classification and distribution of fishes; general consideration of orders and families with special attention to those of economic and recreational importance in North America and adjacent marine areas. Prerequisite: Z 203.

FG 281,282,283. **Wildlife Management.** 3 hours each term. 2 ① 1 ②
Management principles applied to wildlife species; measurements of animal populations and productivity; refuge management, hunting and predatory control, food and cover improvements, and other techniques used in controlling wild animal populations. Prerequisite: Z 203; FG 252.

Upper Division Courses

FG 310,311,312. **Forest Wildlife Management.** 3 hours each term. 3 ①
Management in forest areas; measurement and diagnosis of productivity; control of factors inimical to wildlife species; environmental improvements. *Fall term:* big game and fur animals. *Winter term:* game and forest birds. *Spring term:* game fishes.

FG 319. **History and Literature of Wildlife Management.** 3 hours. winter. 3 ①
Brief history of wildlife conservation; survey of literature of wildlife management; sources of wildlife management literature.

FG 320. **Rodent Control Methods.** 3 hours spring. 2 ① 1 ②
Classifications, life histories, and control of rodents important in human disease transmission and in destruction of agricultural crops. Prerequisite: Z 372.

FG 340. **Field Work.** 1 to 6 hours to be arranged.
Practical field work between sophomore and senior years carried on with public agencies and private concerns; written report based on an approved outline. Student registers in absentia. See page 30.

FG 341. **Fish and Game Law Enforcement.** 3 hours spring 2 ① 1 ②
National and State game laws; law enforcement and scientific methods of evidence collection, preservation, and presentation.

FG 401. **Research.** Terms and hours to be arranged.

FG 405. **Reading and Conference.** Terms and hours to be arranged.

FG 407. **Seminar.** Terms and hours to be arranged.

FG 440. **Field Studies.** (G) 1 to 6 hours to be arranged.
Advanced field problems assigned to meet specific needs of senior and graduate students assigned to field stations. Prerequisite: FG 283 or equivalent.

2 ① 1 ②

FG 451,452,453. **Management of Game Birds.** 3 hours each term.
Identification, distribution, life histories, ecology, and management of important game bird species. Waterfowl and related forms, fall and winter terms; upland birds, spring term. Prerequisite: Z 371; FG 283.

2 ① 1 ②

FG 454,455,456. **Management of Game Fish.** (G) 3 hours each term.
Freshwater fishes of North America; trout, salmon, and spiny-rayed fishes; biologies of important species; limnology; dams, fishladders, diversion ditches; pollution; farm fish ponds; and hatchery methods and techniques. Prerequisite: FG 274.

2 ① 1 ②

FG 457,458. **Management of Big Game.** (G) 3 hours fall and spring.
Species of game mammals; habits, distribution, management under natural conditions; values; laws. Prerequisite: Z 372; FG 283.

FG 460. **Management of Fur Bearers.** (G) 3 hours winter. 2 ① 1 ②
Species of wild fur-bearing mammals, identification, life histories, habits, distributions, economic importance and management. Prerequisite: Z 372; FG 283.

FG 464,465,466. **Commercial Fisheries.** 3 hours each term. 2 ① 1 ②
Biologies of important species; values; harvesting; regulating fisheries resources. Prerequisite: FG 276.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

FG 501. **Research.** Terms and hours to be arranged.

FG 503. **Thesis.** Terms and hours to be arranged.

FG 505. **Reading and Conference.** Terms and hours to be arranged.

FG 507. **Seminar.** Terms and hours to be arranged.

2 ① 1 ③

FG 567,568,569. **Fisheries Research Methods.** 3 hours each term.
Scientific methods, techniques, and apparatus used in fishery investigations; growth, numbers, and availability of fishes; theories and application of sampling, experimental design, and interpretation of data. Prerequisite: one term of statistics and senior or graduate standing. WARREN.

FG 570. **Pollution Problems in Fisheries.** 3 hours. 2 ① 1 ②
Biology of polluted waters; sources, measures, biological indices, and abatement of water pollution affecting fisheries; water requirement and toxicology of fishes and associated aquatic organisms. Prerequisite: FG 456 or equivalent. DOUDOROFF.

Z 571,572,573. **Ichthyology.** 3 hours each term. 2 ① 1 ③
For course description see ZOOLOGY.

Food and Dairy Technology

Food technology is the application of the sciences and engineering to the manufacture, preservation, storage, transportation, and consumer use of food products. **Dairy technology** deals specifically with milk and milk products.

Processing of the basic raw materials—fruits, vegetables, seafoods, meats, milk, and grains—into consumer products by canning, freezing, dehydrating, fermenting, fabricating, etc., is taught with emphasis on basic principles rather than on specific procedures. Therefore, young men and women who plan to enter food technology or dairy technology must have an interest in the sciences, particularly chemistry, bacteriology, and biology.

Because of the emphasis on the scientfic aspects of foods, those who complete one of these curricula have excellent opportunities in the major fields of technology in the largest industry in the world—the food industry. These include operation of food or dairy products manufacturing plants, research and development in industry, government, or college, and regulation of food quality through government agencies and within companies.

A 4-year program (page 140) leads to the Bachelor of Science degree. Students following the food technology or the dairy technology curriculum take courses in common during the freshman and sophomore years and many courses in common during the junior and senior years. However, the dairy technology program is more specialized in the last 2 years. Students having an interest in food plant management may select courses related to business as their electives. Students wishing to study a specific phase of foods should enroll for a fifth year leading to the Master of Science degree.

Graduate programs leading to the Master of Science and Doctor of Philosophy degrees in *food technology, dairy technology,* or *food science* permit intensified study in the subject areas of special interest. Students whose undergraduate major emphasis was in one of the sciences will usually follow the food science program which is concerned with pure science and basic research involving the chemical, physical, and microbiological properties of foods. The Department of Food and Dairy Technology, in cooperation with other departments as well as with the Agricultural Experiment Station, affords excellent leadership and facilities for solving both fundamental and applied research problems relating to foods.

The Department is housed in two modern buildings designed to provide functional facilities for different types of food and dairy manufacturing. They include well equipped laboratories and pilot plants for teaching and research. In one branch of the Department, the Seafoods Laboratory at Astoria, students may supplement their work at Corvallis by becoming acquainted with various phases of the seafoods industry.

Lower Division Courses

FDT 111. **Food and Dairy Technology.** 3 hours winter. 3 ①
Food industry and role of food and dairy technologies in its development; nature of foods and the relationship of science and engineering to food manufacture.

2 ① 1 ③

FDT 221,222,223. **Food Manufacturing Methods.** 3 hours each term.
Unit operations and unit processes applied to food manufacture and preservation.

FDT 271. **Food Grades and Standards.** 3 hours fall or winter. 3 ②
Federal, State, and industrial food inspection; quality grading; dairy products standards. Fall, for FDT students; Winter, for non-FDT students.

Upper Division Courses

FDT 310. **Market Milk.** 3 hours fall. 2 ① 1 ③
Methods of producing and processing milk; sanitation; legal standards; milk and cream testing. Prerequisite: Bac 204.

2 ① 1 ③
FDT 311. **Food Manufacturing Plants and Equipment.** 3 hours fall.
Designing plants and estimating costs; location, construction, equipment, operation; field trips to processing plants. Prerequisite: FDT 223; AE 351; or consent of instructor.

FDT 318. **Judging Dairy Products.** 1 hour fall. 1 ②
Advanced judging of dairy products to qualify for intercollegiate contests and commercial and government grading work. Prerequisite: FDT 271.

FDT 340. **Food Industry Survey.** 3 hours fall. 3 ①
Nature, extent, and economic significance of the food industry and its problems; manufactured food products. For students who will not have opportunity for any other food and dairy technology course.

FDT 342, 343. **Food Science.** 4 hours winter and spring. 3 ① 1 ③
Physical, chemical, and microbiological principles governing manufacture, preservation, and deterioration of foods. Prerequisite: FDT 223; Bac 204; Ch 350, 353.

FDT 350. **Principles of Food Preservation.** 4 hours spring. 3 ① 1 ③
Scientific factors in food manufacture, preservation, and deterioration. For students in fields other than food and dairy technology. Prerequisite: Ch 103; Bac 204.

FDT 372. **Extraneous Materials in Foods.** 3 hours fall. 1 ① 2 ②
Principles of detection, extraction, and identification of extraneous materials in foods. Maximum of eight students per laboratory section. Prerequisite: Bac 204.

FDT 401. **Research.** Terms and hours to be arranged.

FDT 405. **Reading and Conference.** Terms and hours to be arranged.

FDT 407. **Seminar.** 1 hour each term. 1 ①

FDT 412. **Detergency and Waste Disposal.** (G) 3 hours winter. 2 ① 1 ③
Detergency and methods of evaluating detergents and chemical sterilizers; water conditioning; waste disposal. Prerequisite: Bac 411; Ch 227, 234.

FDT 413. **Dairy Products Analysis.** (G) 3 hours spring. 2 ① 1 ③
Chemical and physical methods for laboratory control of dairy products and processes; tests for quality of dry milks, casein, dried whey, and other byproducts; methods of analysis of dairy products. Prerequisite: Ch 457. Ch 234 recommended. Offered alternate years. Offered 1961-62.

FDT 417. **Dairy Foods.** 3 hours spring. 3 ①
Principles and procedures for processing major dairy foods. For students in fields other than dairy technology. Prerequisite: Bac 204.

FDT 421. **Federal and State Food Regulations.** (g) 2 hours spring. 2 ①
Laws and regulations dealing with the manufacture of foods; labeling, adulteration, misbranding, food standards, case problems. Prerequisite: senior standing.

FDT 423. **Food Analysis.** (g) 4 hours winter. 2 ① 2 ③
Systematic analysis of foods other than dairy products; practice in the physical, chemical, and organoleptic laboratory techniques. Prerequisite: FDT 343; Ch 234, 350, 353.

FDT 424. **Food Analysis.** (g) 3 hours spring. 1 ① 2 ③
Continuation of FDT 423. Prerequisite: FDT 423.

FDT 430. **Utilization of Dairy Products.** (G) 3 hours spring. 3 ①
Evaluation of milk and milk products; principles of preserving nutritive quality; byproducts, their composition and utilization in food and nonfood products. Prerequisite: Ch 457. Students who have not had prerequisite must have consent of instructor. Offered alternate years. Not offered 1961-62.

FDT 431. **Food Packaging.** (G) 3 hours fall. 2 ① 1 ③
Objectives, requirements, composition, characteristics, merits, selection, and adaptation of packaging materials and packages; chemical and physical properties; adhesives, lacquers, plasticizers, sizers, coatings, laminates, and closures. Prerequisite: FDT 223, 343, or 310; Ch 234.

3 ① 1 ③

FDT 433. **Heat Transfer in Food Manufacturing.** (G) 4 hours spring.
Heat transfer in canning, dehydration, evaporation, and freezing. Prerequisite: FDT 223; Ph 212; ME 335; AE 352.

3 ① 1 ⑤

FDT 441,442,443. **Dairy Products Processing.** (g) 5 hours each term.
Application of basic science to current industrial processing of butter, cheese and cheese products, frozen dairy products, concentrated milk products, and market milk products. Prerequisite: Ph 212; Ch 234, 350; Bac 411.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

FDT 501. **Research.** Terms and hours to be arranged.

FDT 503. **Thesis.** Terms and hours to be arranged.

FDT 505. **Reading and Conference.** Terms and hours to be arranged.

FDT 507. **Seminar.** Terms and hours to be arranged.

FDT 511. **Food Industries Research Methods.** 3 hours winter. 3 ①
Scientific research; industrial research; personal effectiveness in selection, design, interpretation, and reporting of experiments; creativity and attitudes; industrial research management. Prerequisite: upper division science; upper division food technology; and St 422. Offered alternate years. Offered 1961-62.

FDT 521. **Color and Flavor Evaluation.** 3 hours winter. 2 ① 1 ③
Basic theory as foundation for actual practice in measurement of food qualities and consumer acceptance; advantages and limitations of various techniques. Prerequisite: Ch 350, 353. Offered alternate years. Not offered 1961-62.

FDT 523. **Quality Control Methods and Systems.** 3 hours fall. 2 ① 1 ③
Scope, general principles, organization, and functioning of quality control systems; types of controls and points of application; sampling in specific food industries; development of objective tests; field trips. Prerequisite: FDT 271, 423; St 421. Offered alternate years. Not offered 1961-62.

FDT 542. **Food Fermentation.** 3 hours spring. 2 ① 1 ③
Industrial utilization of fermentable foods and food wastes. Prerequisite: FDT 342. Offered alternate years. Offered 1961-62.

FDT 551. **Thermal Processing of Canned Foods.** 3 hours fall. 2 ① 1 ③
Thermal processes; graphical, mathematical, nomogram methods; time-temperature relationships; convection, conduction, and high-temperature short-time processes. Prerequisite: Bac 460; Mth 102; Ph 212. Offered alternate years. Offered 1961-62.

Horticulture

The Department of Horticulture offers courses of study which represent the major phases of Oregon's extensive and highly diversified horticultural industry and affords students a wide choice of vocations and careers.

Curricula in pomology and vegetable crops cover the fields of fruit, nut, and vegetable growing, distribution, and marketing. They prepare students for fruit and vegetable farming and for technical and executive positions. Adjustments of curricula are made to accommodate students preparing for research and technical work with State and Federal agencies, colleges and experiment stations, private laboratories, or research foundations.

Curricula in floriculture and nursery management provide intensive instruction in scientific and applied phases of these professions and offer a fairly wide range of subjects to provide a liberal or cultural background. They prepare students for participation in various branches of the florist and nursery business and for positions as teachers, research workers, and technicians. The 2-year terminal curriculum in Nursery Management provides instruction and training for those students interested in doing general nursery management work as nursery foremen, propagators, planting foremen, assistant nursery superintendents, and in related positions.

The curriculum in landscape construction and maintenance prepares for professional careers in the laying out, planting, care, and supervision of country and municipal homes, parks, playground areas, and highway landscape developments. Emphasis is laid on practical application of landscape knowledge and on fundamentals of ornamental plant culture.

Lower Division Courses

Hrt 111. **Elements of Horticulture.** 3 hours. 2 ① 1 ②
Principles underlying the culture and utilization of fruits, nuts, vegetables, and ornamental plants. Prerequisite to all horticultural courses except Hrt 253.

Hrt 151. **General Floriculture.** 3 hours winter. 2 ① 1 ②
Acquaints student with the field, its developments, its branches, and opportunities it offers as a vocation.

Hrt 253. **Flower Arrangement.** 3 hours fall or spring. 2 ① 1 ②
Basic principles of flower arrangement as applied to florist work.

Upper Division Courses

Hrt 311. **Plant Propagation.** 3 hours winter. 1 ① 2 ②
Methods of propagating or perpetuating plants by means of seeds, cuttings, layers, tubers, bulbs, budding, grafting; practice in greenhouse, nursery, field, and orchard. 2 ① 1 ②

Hrt 313. **Greenhouse Construction and Management.** 3 hours spring.
Details of planning, layout, construction, and heating of modern greenhouses; factors involved in the efficient operation of a greenhouse range. Offered alternate years. Not offered 1961-62.

Hrt 315. **Basic Horticulture.** 3 hours fall. 2 ① 1 ②
Continuation of Hrt 111. Consideration and application of principles underlying horticultural practices and techniques.

Hrt 317. **History and Literature of Horticulture.** 2 hours winter. 2 ①
Brief history of horticulture; systematic survey of the literature of horticulture acquainting the student with the source of horticultural knowledge.

Hrt 333. **Fruit and Nut Production.** 4 hours spring. 3 ① 1 ②
Problems of fruit and nut production; economics and geography of fruit and nut growing; heat, water, and light requirements of fruit plants; winter hardiness and frost prevention; orchard soil management; pollination, thinning, pruning, and other practices.

Hrt 341. **Principles of Vegetable Gardening.** 4 hours winter. 3 ① 1 ②
Seeding; plant production; varieties; soil and climatic influences; home vegetable gardens. Basic course for students specializing in vegetable production; adapted to vocational agriculture and extension studies.

Hrt 342. **Commercial Vegetable Production.** 4 hours spring 3 ① 1 ②
Problems of vegetable production; economic aspects of vegetable industry; environmental effects; seed, plant production, irrigation, nutrition, and other aspects of major vegetable crop plants. Offered alternate years. Offered 1961-62.

Hrt 351,352,353. **Commercial Floriculture.** 3 hours each term. 2 ① 1 ②
Culture of cut flowers, pot plants, and forced bulbous crops grown on a commercial scale; modern techniques and recent research findings. Offered alternate years. Offered 1961-62.

Hrt 355. **Herbaceous Plant Materials.** 3 hours spring. 2 ① 1 ②
Annual, biennial, and perennial flowering plants; their use, arrangement, and culture in commercial and home-garden production.

Hrt 361,362. **Nursery Management.** 4 hours fall and winter. 3 ① 1 ②
Organization and management of nurseries; propagation techniques, planting, culture, digging, packing, and storing of nursery stock; inspection, quarantine regulations; transportation and marketing.

Hrt 401. **Research.** Terms and hours to be arranged.

Hrt 403. **Thesis.** Terms and hours to be arranged.

Hrt 405. **Reading and Conference.** Terms and hours to be arranged.

Hrt 407. **Seminar.** Terms and hours to be arranged.

Hrt 413. **Horticultural Plant Breeding.** 3 hours spring. 2 ① 1 ②
Application of principles of genetics to improvement of horticultural plants; origin of horticultural strains and varieties; breeding techniques as applied to horticultural plants.

2 ① 1 ②
Hrt 415. **Spraying, Dusting, and Fumigation.** (g) 3 hours spring.
Insect and disease control; preparation and application of sprays, dusts, and fumigants; spray combinations and compatibility; equipment; spray calendars and programs.

3 ① 1 ②
Hrt 431. **Fruit Handling and Distribution I.** (g) 4 hours winter.
Problems of fruit handling; harvesting, grading, packing, inspection, storage, transportation, and marketing.

Hrt 433. **Systematic Pomology.** (G) 4 hours fall. 2 ① 2 ②
Fruit taxonomy; fruit groups and botanical relationships; variety description, nomenclature and classification; judging and displaying. Offered alternate years. Offered 1961-62.

2 ① 1 ②
Hrt 441. **Vegetable Handling and Distribution.** (G) 3 hours winter.
Harvesting; grading; packing; inspection; transportation; storage and distribution.

Hrt 443. **Systematic Vegetable Crops.** (G) 3 hours fall. 1 ① 2 ②
Botanical relationships; variety descriptions and values; identification; classification; displaying and judging. Offered alternate years. Offered 1961-62.

Hrt 451. **Flower Shop Operation.** 3 hours fall. 2 ① 1 ②
Efficient operation of florist shops; advanced work in design of floral pieces. Restricted to students majoring in floriculture and nursery management. Offered alternate years. Not offered 1961-62.

2 ① 1 ②
Hrt 453. **Handling and Distribution of Florist Crops.** 3 hours winter.
Problems of precooling, packaging, storing, transporting, and distributing florist crops. Offered alternate years. Not offered 1961-62.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

Hrt 501. **Research.** Terms and hours to be arranged.

Hrt 503. **Thesis.** Terms and hours to be arranged.

Hrt 505. **Reading and Conference.** Terms and hours to be arranged.

Hrt 507. **Seminar.** Terms and hours to be arranged.

Hrt 511. **Horticultural Genetics Lectures.** 3 hours fall. 3 ①
Special attention to application of genetic theories and fundamental principles in development of horticultural plants. Inheritance studies; mutation phenomenon; polyploidy and interspecific hybridization. Prerequisite: Hrt 413; Z 341. Offered alternate years. Offered 1961-62. ZIELINSKI.

Hrt 512. **Horticultural Genetics Laboratory.** 2 hours. 2 ②
Reports; field and laboratory problems involving hybridization, artificial induction of mutations, data analyses, readings, and genetics and cytological techniques. Prerequisite: Hrt 413, 511; Z 341. Offered alternate years. Offered 1961-62.

Hrt 513. **Horticultural Genetics Lectures.** 3 hours winter. 3 ①
Continuation of Hrt 511. Offered alternate years. Offered 1961-62. ZIELINSKI.

Hrt 514. **Horticultural Genetics Laboratory.** 2 hours winter. 2 ②
Continuation of Hrt 512. Offered alternate years. Offered 1961-62. ZIELINSKI.

Hrt 515. **Methods of Research.** 3 hours winter. 3 ①
Horticultural investigative work; research problems; experimental design; statistics in horticultural research; weighing of experimental evidence; briefs and outlines; research publications. Prerequisite: St 422 or equivalent. Offered alternate years. Not offered 1961-62.

Hrt 516. **Horticultural Plant Nutrition Problems.** 4 hours. 4 ①
Plant nutrition as applied to horticultural crop production. Prerequisite: Hrt 315, Bot 433, or equivalent, or consent of instructor. Offered alternate years. Not offered 1961-62.

Hrt 531. **Fruit Handling and Distribution.** 4 hours spring. 4 ①
Fundamentals of fresh fruit handling. One period, other periods to be arranged. Prerequisite: Hrt 431 or equivalent; consent of instructor. Offered alternate years. Offered 1961-62. HANSEN.

Hrt 533. **Fruit and Nut Production.** 4 hours spring. 4 ①
One period, other periods to be arranged. Prerequisite: Hrt 315, 333; Bot 331; Ch 251; or equivalents. Offered alternate years. Offered 1961-62.

Hrt 541. **Vegetable Crop Problems.** 4 hours. 4 ①
Lectures, current research, review and discussions of literature. Student has choice of two areas of study; (1) breeding, or (2) environment, nutrition, culture, in relation to growth, yield, quality. Consent of instructor required. Prerequisite: Hrt 315, 341, or their equivalent. Offered alternate years. Offered 1961-62. FRAZIER, APPLE.

Poultry Husbandry

With the development of the chicken and turkey industries has come a demand for persons trained in poultry husbandry. Besides the actual production of eggs, broilers, and turkeys for market there are opportunities for efficient hatchery operators as well as chicken and turkey breeders. There is an increasing demand for Federal and State extension and experiment station workers, field service men and feed specialists with feed companies, and personnel for processing concerns and cooperative associations.

A well trained staff and excellent physical facilities enable the department to offer unusual educational opportunities to both undergraduate and graduate students. The department has two chicken farms and one turkey farm, flocks of popular breeds of chickens and turkeys, and various types of buildings and equipment including modern mammoth incubators and mechanical feeders.

Lower Division Course

P 121. **Poultry Production.** 3 hours any term. 2 ① 1 ②
Various phases of poultry industry; kinds of poultry; physiology, reproduction, feeding, housing, brooding, and management practices. PARKER, MCCLUSKEY.

Upper Division Courses

P 321. **The Chick Embryo.** 3 hours winter. 2 ① 1 ②
Development and environmental requirements of embryos of the domestic fowl. Students may work on a selected problem. Prerequisite: P 121. Offered alternate years. Not offered 1961-62. BERNIER.

P 322. **Brooding and Broiler Production.** 3 hours spring. 3 ①
Brooding requirements of chickens and turkey poults; types of brooding equipment; commercial broiler production. Prerequisite: P 121. McCLUSKEY.

P 341. **Poultry Judging.** 3 hours winter. 2 ① 1 ②
Judging poultry for standard and production qualities. Prerequisite: P 121. Offered alternate years. Offered 1961-62. PARKER.

P 351. **Turkey Management.** 3 hours fall. 2 ① 1 ②
Practical details in the breeding, feeding, rearing, and marketing of turkeys. Prerequisite: P 121. Offered alternate years. Not offered 1961-62. HARPER.

P 403. **Thesis.** Terms and hours to be arranged.

P 405. **Reading and Conference.** Terms and hours to be arranged.

P 407. **Seminar.** 1 hour winter and spring. 1 ①

P 411. **Poultry Feeding.** (g) 3 hours fall. 3 ①
Systems of feeding poultry, and nutritional requirements; formulation of rations; common nutritional deficiencies. Prerequisite: P 121. ARSCOTT.

P 412. **Poultry Feeding Laboratory.** (g) 1 hour. 1 ②
Laboratory work to accompany P 411.

P 413. **Poultry Nutrition.** (G) 3 hours spring. 3 ①
Proteins, minerals, energy, vitamins, antibiotics, other feed additives in chicken and turkey nutrition. Digestion and metabolism of these substances. Prerequisite: nutrition and organic or biochemistry. ARSCOTT.

P 421. **Marketing Poultry Products.** (g) 3 hours fall. 2 ① 1 ②
Preparation of poultry and eggs for market. Commercial handling of poultry products. Prerequisite: P 121. Offered alternate years. Offered 1961-62. HARPER.

P 431. **Poultry Plant Management.** (g) 3 hours spring. 3 ①
Location, layout, and arrangement of buildings and equipment. Management practices, visits to commercial poultry farms. Prerequisite: P 121 and one other poultry course. Offered alternate years. Not offered 1961-62. PARKER.

P 441. **Poultry Breeding.** (g) 3 hours fall. 3 ①
Inheritance of egg and meat production in domestic fowls. Prerequisite: P 121. Offered alternate years. Offered 1961-62. BERNIER.

P 442. **Population Genetics and Breeding Improvement.** (G) 3 hours spring. 3 ①
Population genetics and application to selection and mating for improvement of quantitative characters. Prerequisite: Z 341; St 421,422 or equivalent. BERNIER.

P 451. **Commercial Practices.** (G) 3 hours winter. 3 ①
Operations and practices in commercial poultry production. Prerequisite: senior standing. PARKER and staff.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

P 501. **Research.** Terms and hours to be arranged.

P 503. **Thesis.** Terms and hours to be arranged.

P 505. **Reading and Conference.** Terms and hours to be arranged.

P 507. **Seminar.** Terms and hours to be arranged.

Soils

Intelligent development, management, and conservation of Oregon soil and water resources are essential for the State's welfare. The curriculum in soils gives students a scientific and practical understanding of soils and their management, with training in related fields of agriculture and science. A total of 45 elective hours in junior and senior years permits the student to adapt the program to his interests and needs.

Soils majors may prepare for work in soil conservation planning, soil survey, land appraisal, fertilizer sales, irrigation work, or as field men with vegetable and fruit processing or other commercial organizations. They may prepare for more technical soils positions, such as teaching or research in colleges or universities, research in other State or Federal agencies and industry, or other specialized soils positions requiring a strong background in the basic sciences. Such positions usually require graduate training.

Students in soils interested in farming or positions as county extension agents requiring a broad knowledge of agriculture may take work in closely related fields of agriculture, and in social science.

Students interested in preparing for graduate studies in soils should consult with head of department as early in their college programs as possible. A sequence of courses will be developed to meet the student's particular needs, including: Mth 101, 102, 200, 201, 202, 203; Ch 204, 205, 206, 232, 233; Ph 201, 202, 203. Where desirable, certain substitutions will be arranged. Students capable of maintaining a high scholastic record in basic sciences and desiring intensive training in a specialized field will be encouraged to adopt this type of program. Graduate work is offered leading to the degrees of M.S. and Ph.D. in soils. Students majoring in other departments may minor in soils. Soil fertility, soil physics, soil chemistry, irrigation, forest soils, or soil genesis, morphology, and classification may be emphasized in graduate programs.

Lower Division Courses

Sls 211,212. **Soils.** 3 hours fall and winter. 2 ① 1 ③
Soil origin, formation, classification; physical, chemical, and biological characteristics; effects of tillage, drainage, irrigation, and organic matter; plant nutrients and fertilizers; rotations. Prerequisite: Ch 103; Mth 100. DAWSON.

Sls 214. **Forest Soils.** 4 hours spring. 3 ① 1 ③
Origin, development, characteristics, and classification of forest soils, relation of soils to forest types, to rate of forest growth and methods of forest management, to vegetation, moisture reaction and fertility; soil management and conservation. Prerequisite: Ch 102. YOUNGBERG.

Upper Division Courses

Sls 311. **Soil Water and Irrigation.** 3 hours fall. 2 ① 1 ③
Basic soil-water-plant relationships; management of soil-water and crops for permanent irrigation agriculture. Prerequisite: Sls 212. EVANS.

Sls 314. **Soil Management and Conservation.** 4 hours spring. 3 ① 1 ③
Identifying, analyzing, and solving soil management and conservation problems; maintaining and increasing soil productivity; conservation farming; climate, topography, vegetation, slope, soil; drainage, irrigation, erosion control, tillage, fertility, organic matter, crop rotation, salinity-alkalinity. Prerequisite: Sls 212. DAWSON.

Sls 401. **Research.** Terms and hours to be arranged.

Sls 405. **Reading and Conference.** Terms and hours to be arranged.

Sls 407. **Seminar.** 1 hour each term. 1 ①

Sls 408. **Workshop.** (g) Terms and hours to be arranged.
Soils information designated either for specific locality in Oregon or to cover selected topics in soils, such as soil management, soil survey, soil fertility, soil physics, irrigation.

Sls 412. **Soils Chemistry.** (G) 3 hours fall. 3 ①
Important chemical phenomena in soils; basic structures and properties of main type of clays; exchange reactions; chemical phenomena of individual elements in soils. Prerequisite: Sls 212; Ch 234 or equivalent. HARWARD.

Sls 421. **Soil Physics.** (G) 3 hours fall. 3 ①
Physical properties of soil including structure, moisture, temperature, and aeration, and their measurement. Prerequisite: Sls 212; Mth 101. ASHCROFT.

Bac 421,422. **Soil Bacteriology.** (G) 4 and 3 hours. 4 ①; 3 ①
See MICROBIOLOGY AND HYGIENE for course description.

Sls 422. **Soil Physics Laboratory.** (G) 2 hours winter. 2 ③
Techniques for examining or evaluating various physical properties of soil. Prerequisite: Sls 421. ASHCROFT.

Sls 424. **Soil Fertility Lectures.** (g) 3 hours winter. 3 ①
Chemical, physical, and biological properties of soils in relation to the availability of nutrient elements; soil amendments, fertilizers, manure and crop rotations in a fertility management program. Prerequisite: Sls 212. CHENEY.

Sls 425. **Soil and Plant Analysis.** (g) 3 hours spring. 1 ① 2 ③
Chemical methods, interpretation and correlation of analyses with crop response, current literature on methods. Prerequisite: Sls 424; Ch 234. ALBAN.

Sls 432. **Soil Morphology and Survey.** (g) 4 hours. 3 ① 1 ③
Soils in place; distribution patterns; morphology of major soil groups; soil survey techniques. Two all-day field trips required. Prerequisite: Sls 212 and course in geology. KNOX.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

Sls 501. **Research.** Terms and hours to be arranged.

Sls 503. **Thesis.** Terms and hours to be arranged.

Sls 505. **Reading and Conference.** Terms and hours to be arranged.

Sls 507. **Seminar.** Terms and hours to be arranged.

Sls 511. **Soil Genesis and Classification.** 3 hours. 3 ① 1 ③
Genetic features and their formation; principles of classification; classification systems. One all-day field trip required. Physical geography and rocks and minerals courses recommended. Offered alternate years. Not offered 1961-62. KNOX.

Sls 512. **Soil Colloids.** 4 hours winter. 3 ① 1 ③
Structures of clay minerals, methods of identification including X-ray diffraction, chemistry of weathering and formation, physical and colloidal chemistry of soils, hydration of soil colloids, electro-kinetic properties. Prerequisite: Sls 212, 412; Ch 234 or equivalents. Ch 442 recommended. Offered alternate years. Offered 1961-62. HARWARD.

Sls 513. **Soil Fertility.** 3 hours winter. 3 ①
Concepts and approaches to soil fertility; relations of soil chemistry, plant physiology, and crop sciences to soil fertility; current literature. Prerequisite: Sls 424. Sls 412 recommended. Offered alternate years. Not offered 1961-62. MOORE.

Sls 514. **Forest Soils.** 3 hours winter. 3 ①
Forest growth; physical, chemical, and biological properties in occurrence and growth of forests. Prerequisite: consent of instructor. Soil survey and forest ecology courses recommended as preparation. Offered alternate years. Offered 1961-62. YOUNGBERG.

Sls 521. **Soil Physics.** 3 hours spring. 3 ①
Theoretical and applied soil physics with special attention to flow problems. Prerequisite: Sls 421; calculus. Offered alternate years. Offered 1961-62. BOERSMA.

Sls 522. **Soil Physical Conditions and Plant Growth.** 3 hours spring. 3 ①
Relations of soil moisture, temperature, air, and mechanical impedence to seed germination, shoot emergence, and plant growth. Prerequisite: Sls 421. Offered alternate years. Not offered 1961-62. EVANS.

Veterinary Medicine

The courses in veterinary medicine aim to fit the student for successful handling of livestock. Anatomy and physiology of domestic animals familiarize him with 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 study of diseases is taken up from the standpoint of the livestock owner. The student learns to recognize disease, to care for sick animals, and to prevent disease through proper methods of sanitation and management. Importance of quarantine, different methods of control and eradication of disease, and role of stock owners in maintaining this work are considered. The department does not train men to enter the veterinary profession.

Upper Division Courses

2 ① 1 ②

VM 311. **Anatomy and Physiology of the Fowl.** 3 hours winter.
Structure and physiology of body of fowl.

VM 320,321. **Anatomy and Physiology of Domestic Animals.** 4 hours fall and winter. 1 ① 3 ②; 2 ① 2 ②

VM 341. **Diseases of Livestock.** 4 hours fall. 4 ①
Elementary consideration of hygiene, sanitation, and other methods of livestock disease control for students not majoring in animal production.

VM 351. **Diseases of Poultry.** 4 hours spring. 3 ① 1 ②
Poultry hygiene and sanitation; nature and cause of common poultry diseases; relation of management to control of diseases. Prerequisite: VM 311. Offered alternate years. Offered 1961-62.

VM 355. **Diseases of Game Birds.** 3 hours spring. 2 ① 1 ②
Similar to VM 351, but concerned with game birds. Prerequisite: VM 311.

VM 361. **Parasitic Diseases of Domestic and Game Animals.** 4 hours winter. 2 ① 2 ②
Intensive study of common parasitic diseases of domestic animals.

3 ① 1 ②

VM 441,442. **Sanitation and Disease Control.** (g) 4 hours fall and winter.
Predisposing and primary causes of disease, epizoology, and practical disease control. Prerequisite: VM 321.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

VM 501. **Research.** Terms and hours to be arranged.

VM 503. **Thesis.** Terms and hours to be arranged.

VM 505. **Reading and Conference.** Terms and hours to be arranged.

VM 507. **Seminar.** Terms and hours to be arranged.

School of Business and Technology

Fully accredited by the American Association of Collegiate Schools of Business.

Faculty

As of January 1961

CLIFFORD ELGES MASER, Ph.D., Dean of the School of Business and Technology.

LOUIS L. EDWARDS, M.E., Head Counselor and Placement Director.

Business Administration: Professors LEMASTER (department chairman), CAMPBELL, CRAIG, GODDARD, MASER, NEWTON, PFANNER, SEATON; Associate Professors EASTON,[1] MENGLER, STRICKLER; Assistant Professors ABRAHAMS, ALLAN, BACON, BARTLEY, DALBEY, DAVIDSON, HOPEMAN, O'ROURKE, MCCORMICK, SCHREIMA, SJOGREN; Instructors BURTCH, EDWARDS.

Business Education: Professors YERIAN (department head), LARSE, WINGER; Assistant Professor BARBER.

Secretarial Science: Professors YERIAN (department head), LARSE, WINGER; Associate Professors STUTZ (emeritus), Assistant Professors BARBER, JONES, ORNER; Instructors PERKINS, WIPER.

Statement of Objectives

THE OBJECTIVE *of the Oregon State University School of Business and Technology is to help prepare those it serves to find self-fulfillment, to accept responsible membership and leadership in a free democratic society, and to function effectively in a free enterprise business community. This goal is approached through activities in resident instruction, services rendered to the business community, and through professional activity and scholarly research on the part of its faculty.*

The School of Business and Technology offers: (1) major work in business administration in combination with a technology; (2) major work in secretarial science; (3) in conjunction with the School of Education, major work in business education for the preparation of teachers.

Educational Objective Defined

In working toward its objective the School of Business and Technology, as an undergraduate collegiate School of Business, accepts its primary responsibility to be that of resident instruction. The most important means of accomplishment is through its professional curricula. These include the following approaches to the achievement of the School's stated aims:

1. To prepare those it serves for responsible entrepreneurial or professional management roles in the modern free enterprise business community. Courses offered by the Department of Business Administration in the basic principles and applications of business organization, management, and control are included in the curriculum to help achieve this objective. Functionally specialized courses are purposely held to a minimum in favor of the broadest possible liberal and professional education.

2. To prepare men and women for the teaching of business subjects in the secondary schools and for responsible secretarial or office management positions. Courses offered by the Departments of Business Education and Secretarial

[1] on sabbatical leave 1960-61.

Science, in both principles and techniques, are designed to help achieve this objective.

3. To acquaint those it serves with a basic knowledge of the vocabulary, materials, methods, and techniques of industry to the end that, as prospective business managers, they may understand the technological aspects of the enterprise in which they may be engaged and may adequately communicate concerning them. Courses offered by the Schools of Agriculture, Engineering, Forestry, Home Economics, and Science, are built, as technical minors, into the curriculum of each business administration student for the purpose.

4. To stimulate each individual it serves to: work at his intellectually creative best, keep his imagination free, measure his judgments against well considered value standards, and find articulate self-expression. Humanities courses in the curriculum help the student to reach this goal.

5. To bring to those it serves an awareness of the functions and problems of the human society so that they may live to appreciate its worth and contribute to the opportunities and freedom it provides. Social science courses are included in the curriculum to help achieve this objective.

6. To explain to those it serves the nature of the universe about them so that they may better understand some of the wonders of creation and the relationship of the human being to his physical environment. An integrated course in the biological and physical sciences is included in the curriculum to help achieve this objective.

7. To build the foundation for further, more highly specialized, business studies at the graduate level.

General Statement

High School Preparation. A student intending to major in the School of Business and Technology would do well to complete the following courses in high school: English, four years; algebra, two years; history and social studies, three years; typing, one year; natural science, two years.

Transfer Students. A student transferring into the School of Business and Technology should do so prior to or during the sophomore year. Experience indicates that the fulfillment of course requirements within the normal 4-year period becomes progressively more difficult to accomplish with each term that is completed prior to transfer. Most transfers that take place as late as the third term of the sophomore year will almost unavoidably result in an added term or terms of work.

Counseling. Each student in the School of Business and Technology is assigned a faculty adviser immediately after registering in the school. The adviser stands ready at all times to assist the student in such matters as career requirements and opportunities, course and curricular requirements, and academic counseling. The student may exercise the prerogative of asking to be assigned to a different adviser if, after having become better acquainted with the staff, it seems preferable to make such a change.

Placement. The Placement Director of the School of Business and Technology operates through the Office of the Dean. His services are available to all students seeking information concerning placement opportunities, interviews with visiting firms, and general information concerning career objectives.

Double Degrees. Increasing numbers of students majoring in agriculture, engineering, forestry, home economics, and science have come to the con-

clusion that preparation in business administration, in addition to work in their original major field, will prove to be of great value. As a result, a significant number have been completing requirements for degrees in more than one field.

The requirements which a student would need to fulfill in order to qualify for two or more Baccalaureate degrees are listed on page 25. Through a careful use of the elective courses available to a student in the original major field, the time necessary to fulfill the requirements for the second degree may be considerably reduced.

Major Fields

Business Administration and Technology. The major curricula in business administration consist of a core of required courses. Introduction to Business, Accounting, Finance, Production, Marketing, Statistics, Business Law, Human Relations in Business and Industry, Government Relations in Business and Industry, and Business and Industrial Policy. In addition, the student must complete, during his junior and senior years, 18 term hours of upper division business or related courses, selected in terms of his career objectives. These courses may be chosen with a view to gaining a broad general training in business, or may be selected from one of five areas of concentrated study: Industrial Accounting and Cost Control, Industrial Finance, Production Management, Industrial Marketing and Selling, Industrial Relations and Personnel Management.

Students majoring in Business Administration and Technology combine any one of the major business curricula with a technical minor of 27 term hours, over and above such prerequisite and related courses as mathematics, physics, and chemistry. Technical minors and their specific course requirements are listed on pages 177-182. No graduate work is offered for majors in business administration and technology. Graduate students majoring in other fields may apply toward their minor requirements courses designated (g).

The School of Business Administration at the University of Oregon offers major work, both undergraduate and graduate, in all fields of business where the interests of a student do not demand that technical training be taken in combination with business administration.

Business Education. The Department of Business Education offers a 4-year major curriculum designed to prepare high school business teachers. The fact that students completing this curriculum are prepared to enter both the teaching and the secretarial fields has made this program of study increasingly attractive. Both fields offer excellent opportunities to men and women.

For requirements for a State Teacher's Certificate, a list of teaching minors, and further information in regard to both undergraduate and graduate work in this department see SCHOOL OF EDUCATION.

Secretarial Science. Responsible secretarial and allied positions such as office manager, administrative assistant, and research assistant, are going more and more to the college-trained person. Such positions require, in addition to the secretarial skills, background training in business administration, English and business correspondence, economics, psychology, and liberal arts. Students who come with previous training in typing and stenography are permitted to register in advanced classes according to their abilities. Many high school graduates begin with second-year stenography. Special 1- and 2-year terminal programs are arranged for those who do not plan to be graduated.

Curriculum in Business Administration and Technology

B.S., B.A., Degrees

Freshman Year	Term hours F	W	S
Introduction to Business and Industry, BA 111	4	---	---
[1]Intermediate Algebra, Mth 100	---	4	---
[2]Natural Science Sequence	3	3	3
[3]Social Science Sequence	3	3	3
[4]Social Science Electives	---	3	3
[5]English Composition, Wr 111,112,113	3	3	3
Electives	3	---	3
[6]Air, Military, or Naval Science (men) –S 111,112,113	1–3	1–3	1–3
[7]Physical Education, PE 190,190,190	1	1	1
	17–18	17–18	16–17

Sophomore Year			
Principles of Economics, Ec 201,202,203	3	3	3
Principles of Accounting, BA 211,212,213	3	3	3
Production, BA 311	4	(4)	(4)
Finance, BA 312	(4)	4	(4)
Marketing, BA 313	(4)	(4)	4
[8]Technical Minor	3–0	3	3
Electives	3	3	3
[6]Air Military, or Naval Science (men), –S 211,212,213	1–3	1–3	1–3
Physical Education, PE 190,190,190	1	1	1
	17–18	17–18	17–18

Junior Year			
Business Law, BA 411,412,413	3	3	3
Business and Industrial Statistics, BA 431,432	3	3	---
[9]Business Administration (Concentration)	3	3	3
Business Administration Elective	---	---	3
Technical Minor	3	3	3
[10]Electives	3–6	3–6	3–6
	15–18	15–18	15–18

Senior Year			
Human Relations in Business and Industry, BA 497	3	(3)	(3)
Government Relations in Business and Industry, BA 498	(3)	3	(3)
Business and Industrial Policy, BA 499	(3)	(3)	3
Business Administration (Concentration)	3	3	3
[3]Social Science Sequence	3	3	3
Technical Minor	3	3	3
[10]Electives	3–6	3–6	3–6
	15–18	15–18	15–18

[1] Students required to complete Elementary Algebra, Mth 10, as result of mathematics placement test, will move Intermediate Algebra, Mth 100, to spring term.

[2] Natural science sequence must be completed through selection from science group courses listed on page 56. Mathematics and psychology are precluded from such selection.

[3] Social science sequences must be completed through the selection of group courses listed on pages 56-57. SSc 101,102,103, is precluded from such selection.

[4] Electives in the social sciences may be chosen from any of the courses offered by the Social Science Departments, excluding SSc 101,102,103.

[5] Students who do not earn a minimum rating in the English placement examination are advised to take extra work concurrently with Wr 111; students who show exceptional ability on this examination are placed in honors sections.

[6] Students registered for naval science courses will defer to the junior year the social science sequence listed in the freshman year and may drop the technical minor courses listed for the sophomore year. Upper division naval science courses may be taken to fulfill the technical minor courses requirement in the junior and senior years.

[7] General Hygiene (PE 150, 1 term hour, or PE 160, 2 term hours, for men; PE 160, 2 term hours, for women) is taken one term in place of physical education.

[8] At the beginning of their sophomore year, students majoring in business administration and technology are required to select a technical minor. See pages 177-182.

[9] Students majoring in business administration and technology are required to choose an area of concentration at beginning of junior year. See pages 173, 174.

[10] It is strongly recommended to all students who have a grade-point average of 2.50 or above that they add a maximum number of elective hours.

Areas of Concentration

Students in the Department of Business Administration must complete 18 term hours of upper division business administration or related courses in an area of concentration. This concentration of courses may be satisfied in either of two ways: I. General Business and Industry or II. In one of five functional areas of business administration.

I. GENERAL BUSINESS AND INDUSTRY CONCENTRATION

The student in the General Business and Industry concentration will be expected to program his 18 hours of upper division business administration or related courses at the beginning of his junior year in terms of his career objectives, after consultation with and the approval of his faculty adviser.

A maximum of three approved upper division courses in economics may be accepted in lieu of approved business administration courses.

	Term hours F	W	S
Junior year: Approved Business Administration courses	3	3	3
Senior year: Approved Business Administration courses	3	3	3

II. FUNCTIONAL AREAS OF BUSINESS CONCENTRATION

Some substitution of courses may be permitted for exceptionally well-qualified students or for students with unusual objectives.

Industrial Accounting and Cost Control

Junior Year	Term hours F	W	S
Advanced Accounting (BA 321,322,323)	3	3	3
Senior Year			
Industrial Cost Accounting (BA 421,422)	3	3	....
Industrial Auditing (BA 427,428)	3	3	....

RELATED COURSES

Industrial Cost Accounting (BA 423)
Accounting Theory (BA 424)
Analysis of Financial Statements (BA 425)
Accounting Systems (BA 426)
Controllership (BA 429)
Income Tax Procedure (BA 434)
Typing (SS 121,122,123)
Business Machines (SS 215,216)

Industrial Finance

Junior Year	Term hours F	W	S
General Insurance (BA 435)	....	3	....
Investments (BA 436)	....	....	3
Related Course	3	....	....
Senior Year			
Industrial Finance (BA 437,438)	3	3	....
Case Problems in Industrial Finance (BA 439)	....	....	3

RELATED COURSES

Real Estate Law (BA 414)
Analysis of Financial Statements (BA 425)
Credits and Collections (BA 433)
Income Tax Procedure (BA 434)
Business Fluctuations (Ec 421)
Money and Banking (Ec 424)
Public Finance (Ec 427)

Production Management

Junior Year	Term hours F	W	S
Industrial Cost Accounting (BA 421)	3	....	....
Labor Problems (Ec 425)	....	4	....
Related Course	....	....	3
Senior Year			
Production Management (BA 441,442)	3	3	....
Case Problems in Production Management (BA 449)	....	....	3

RELATED COURSES

Industrial Purchasing (BA 461)
Coll Bargaining & Labor Legis (Ec 426)
Safety in Industry (IE 390)
Methods and Motion Study (IE 391)
Time Study (IE 392)
Materials Handling (IE 394)

Industrial Marketing and Selling

	Term hours F	W	S
Junior Year (Marketing Management Option)			
Related Courses	3	3	3
Senior Year (Marketing Management Option)			
Industrial Marketing (BA 467,468)	3	3	....
Case Problems in Marketing (BA 469)	....	....	3

RELATED COURSES

Industrial Purchasing (BA 461)
Retail Merchandising (BA 463)
Advertising (BA 464)
Salesmanship (BA 465)
Sales Management (BA 466)
Export and Import Management (BA 473)
Office Organization and Management (SS 422)
Transportation (Ec 435)
International Trade (Ec 443)

	Term hours F	W	S
Junior Year (Selling Option)			
Advertising (BA 464)	3	....	....
Salesmanship (BA 465)	....	3	....
Sales Management (BA 466)	....	....	3
Senior Year (Selling Option)			
Related Courses	3	3	....
Case Problems in Marketing (BA 469)	....	....	3

RELATED COURSES

Credits and Collections (BA 433)
Retail Merchandising (BA 463)
Industrial Marketing (BA 467,468)
Export and Import Management (BA 473)
Office Organization and Management (SS 422)

Industrial Relations and Personnel Management

	Term hours F	W	S
Junior Year			
Labor Problems (Ec 425)	....	4	....
Collective Bargaining and Labor Legislation (Ec 426)	....	....	4
Related Course	3	....	....
Senior Year			
Personnel Management (BA 451,452)	3	3	....
Case Problems in Personnel Management (BA 459)	....	....	3

RELATED COURSES

Courses in Psychology
Courses in Sociology
Family Relationships (FL 422)
Marriage (FL 222)
Courses in Industrial Engineering
Office Organ & Management (SS 422)

Agricultural Business Management

	Term hours F	W	S
Junior Year			
Food and Agriculture (AEc 331)	3	....	....
Principles of Agricultural Marketing (AEc 341)	....	3	....
Agricultural Cooperation (AEc 342)	....	....	3
Senior Year			
Agricultural Prices (AEc 451)	3	....	....
Agricultural Policy (AEc 411)	....	....	3
Agricultural Finance (AEc 431)	....	....	3

RELATED COURSES

Applied Agricultural Economics (AEc 312)
Consumers and the Market (AEc 412)
Marketing Efficiency Analysis (AEc 421)
Livestock Economics (AEc 440)
Marketing Dairy Products (AEc 444)
Agricultural Land Economics (AEc 462)
Money and Banking (Ec 424)

Curriculum in Business Education

B.A., B.S. Degrees

NOTE: Male students not otherwise exempt are required to register for Air, Military, or Naval Science in first two years.

	Term hours F	W	S
Freshman Year			
[1]Typing (SS 121,122,123)	2	2	2
[1]Stenography (SS 111,112,113)	3	3	3
English Composition (Wr 111,112,113)	3	3	3
Introduction to Business and Industry (BA 111)	4	(4)	(4)
Group Requirement in Literature or Science	3	3	3
Physical Education	1	1	1
[2]Electives	----	3	3
	16	15	15
Sophomore Year			
Field Experience (Ed 200)	2	(2)	(2)
Applied Stenography (SS 211,212,213)	3	3	3
Principles of Accounting (BA 211,212,213)	3	3	3
Principles of Economics (Ec 201,202,203)	3	3	3
General Psychology (Psy 201,202)	----	3	3
Business English (Wr 214)	3	(3)	(3)
[3]Physical Education	2	1	1
Extempore Speaking (Sp 111)	(3)	(3)	3
Electives	----	3	----
	16	16	16
Junior Year			
Office Procedure (SS 311 312,313)	4	4	4
School in American Life (Ed 310)	3	(3)	(3)
Educational Psychology: Learning (Ed 312)	3	(3)	(3)
Methods in Reading (Ed 350)	(3)	3	(3)
Special Secondary Methods (Ed 408) (Nonskill and Bookkeeping)	(3)	----	3
Special Secondary Methods (Ed 408) (Typewriting)	----	3	(3)
Special Secondary Methods (Ed 408) (Shorthand)	----	(3)	3
Business Law (BA 411,412,413)	3	3	3
Human Development (Psy 311)	3	(3)	(3)
Electives	----	3	3
	16	16	16
Senior Year			
[4]Office Organization and Management (SS 421,422)	3	(3)	3
Seminar (SS 407)	1	(1)	(1)
Secretarial Problems (SS 411)	----	3	(3)
Production (BA 311)	4	(4)	(4)
Finance (BA 312)	(4)	4	(4)
Marketing (BA 313)	(4)	(4)	4
Business and Industrial Statistics (BA 431)	3	(3)	(3)
Student Teaching (Ed 416)	(9)	(9)	9
Seminar (BEd 407) (Student Teachers)	(1)	(1)	1
Electives in Science or Social Science	3	3	----
[5]Electives	3	6	----
	17	16	17

[1] Students who have had previous training in stenography and typing will be placed in classes commensurate with their abilities.

[2] The student should decide during the first year whether he desires the Bachelor of Science or the Bachelor of Arts degree. This decision will influence his choice of electives.

[3] General Hygiene (PE 150, 1 term hour for men; PE 160, 2 term hours for women) is taken one term in place of physical education.

[4] SS 421 offered fall and winter terms.

[5] The student should select by the beginning of the sophomore year one of the teaching minors (excluding Business Administration) listed in SCHOOL OF EDUCATION section under "Teaching Majors and Minors in High School Fields," and "Additional Teaching Minors." His elective hours can be used toward the teaching minor.

Curriculum in Secretarial Science

B.A., B.S. Degrees

NOTE: Male students, not otherwise exempt are required to register for Air, Military, or Naval Science the first two years.

Freshman Year	Term hours F	W	S
[1]Stenography (SS 111,112,113)	3	3	3
[1]Typing (SS 121,122 123)	2	2	2
Introduction to Business and Industry (BA 111)	4	(4)	....
[1]Group Requirement in Literature or Science	3	3	3
English Composition (Wr 111,112,113)	3	3	3
Physical Education	1	1	1
Electives	....	3	3
	16	15	15
Sophomore Year			
Applied Stenography (SS 211,212,213)	3	3	3
Principles of Economics (Ec 201,202,203)	3	3	3
Principles of Accounting (BA 211,212,213)	3	3	3
American Governments (PS 201)	3	(3)	(3)
History of American Civilization (Hst 226)	....	....	3
Business English (Wr 214)	(3)	3	(3)
[2]Physical Education	2	1	1
Electives	3	3	3
	17	16	16
Junior Year			
Office Procedure (SS 311,312,313)	4	4	4
Business Law (BA 411,412,413)	3	3	3
General Psychology (Psy 201,202)	3	3	....
Applied Psychology (Psy 205)	....	....	3
Science or Social Science Electives	3	3	3
Electives	3	3	3
	16	16	16
Senior Year			
Technical Reporting (SS 321)	....	3	....
Seminar (SS 407)	1	(1)	(1)
Secretarial Problems (SS 411)	....	3	(3)
Secretarial Practice (SS 412)	(3)	(3)	3
[3]Office Organization and Management (SS 421,422)	3	(3)	3
Business and Industrial Statistics (BA 431)	3	(3)	(3)
Retail Merchandising (BA 463)	3	(3)	(3)
Production (BA 311)	4	(4)	(4)
Finance (BA 312)	(4)	4	(4)
Marketing (BA 313)	(4)	(4)	4
Science or Social Science Electives	....	3	3
Electives	3	3	3
	17	16	16

[1] See notes 1 and 2 on previous page.

[2] General Hygiene (PE 150, 1 term hour for men; PE 160, 2 term hours for women) will be taken any term in place of physical education.

[3] SS 421 offered fall and winter terms.

Technical Minors

Technical fields in which minors are authorized are: Agriculture, Applied Physics, Engineering, Forestry, Home Economics, Industrial Chemistry, Mining or Petroleum Geology. In addition to the technical minors in these fields outlined below, similar technical minors within these authorized fields may be arranged where necessary to meet the objectives of individual students. A special technical minor in Naval Science can be arranged.

SCIENCE:
- *Applied Physics*
- *Industrial Chemistry*
- *Mining or Petroleum Geology*

AGRICULTURE:
- *Animal Husbandry and Farm Crops*
- *Dairy Technology*
- *Farm Crops*
- *Floriculture*
- *Food Technology*
- *Horticulture*
- *Mechanical Technology in Agriculture*
- *Poultry Husbandry*

ENGINEERING AND INDUSTRIAL ARTS:
- *Industrial Arts—Building Construction*
- *Industrial Arts—Metal Option*
- *Industrial Arts—Woodworking*

FORESTRY:
- *General Forestry*

HOME ECONOMICS:
- *Clothing, Textiles, and Related Arts*
- *Institution Management*

Applied Physics [AP]

Professor E. A. YUNKER, Adviser

Sophomore year:			
College Algebra (Mth 101)	4	....	....
Trigonometry (Mth 102)	....	4	....
Calculus with Analytic Geometry (Mth 200)	....	....	4
General Physics (Ph 201,202,203) or Engineering Physics (Ph 207, 208,209)	4	4	4
Junior year:			
Introduction to Modern Physics (Ph 311 312,313)	3	3	3
Calculus with Analytic Geometry (Mth 201,202,203)	4	4	4
Senior year:			
Electricity and Magnetism (Ph 331,332) or			
Electronics and Radio (Ph 437,438,439) or			
Fundamentals of Radio (Ph 334) and Geometrical and Physical Optics (Ph 465,466) or			
Commercial Photography (Ph 361,362,363) or			
Synoptic Meteorology (Ph 391,392,393)	3	3	3

Clothing and Textiles [CT]

(For men and women)

Professor FLORENCE E. PETZEL, Adviser

	Term hours		
	F	W	S
Sophomore year:			
Color and Composition (AA 160)	3	(3)	(3)
Textiles (CT 250)	(3)	3	(3)
Men: Clothing Construction (CT 216)			
Women: Clothing Construction (CT 210 or 218)	(3)	(3)	3
Junior year:			
Clothing Selection (CT 211)	3	(3)	(3)
Consumer Buying in Clothing and Textiles (CT 350)	(3)	3	(3)
Related Course	(3)	(3)	3
Senior year:			
The Clothing Buyer (CT 470)	....	....	3
Related Courses	3	3	(3)

RELATED COURSES

Color and Composition (AA 161)
Display Design (AA 296)

Other Clothing and Textiles Courses

Dairy and Animal Husbandry and Farm Crops [DAH-FC]

Professor C. E. POULTON, Adviser

	Term hours F	W	S
Sophomore year:			
General Botany (Bot 201)	3	(3)	....
General Chemistry (Ch 101,102)	(3)	3	3
Junior year:			
Crop Production (FC 211)	....	5	....
Soils (Sls 211,212)	3	3	....
Introduction to Dairy and Animal Science (DAH 121)	(3)	(3)	3
Senior year:			
Animal Nutrition I (DAH 311)	3	....	....
Range and Pasture Management (DAH or FC 341)	3	(3)	....
Related Courses	(3)	3	3

RELATED COURSES

Weed Control (FC 317)
Forage Crops (FC 324)
Genetics (Z 341)
Range Improvement (DAH or FC 342)
Wholesale and Retail Meat (DAH 352)
Livestock Feeding (DAH 412)
Seed Production (FC 414)
Sheep Production (DAH 422)
Beef Cattle Production (DAH 424)

Dairy Technology [DT]

Professor J. O. YOUNG, Adviser

Sophomore year:			
General Chemistry (Ch 101,102,103)	3	3	3
Junior year:			
Food Manufacturing Methods (FDT 221,222 223)	3	3	3
Senior year:			
General Bacteriology (Bac 204)	4	....	....
Market Milk (FDT 310)	3	....	....
Food Grades and Standards (FDT 271)	....	3	....
Marketing Dairy Products (AEc 444)	....	3	....
Dairy Foods (FDT 417)	....	....	3
Related Course	(3)	(3)	3

RELATED COURSES

Dairy and Animal Science (DAH 121)
Food Sanitation Bacteriology (Bac 411)
Dairy Bacteriology (Bac 412)
Principles of Food Preservation (FDT 350)
Federal and State Food Regulations (FDT 421)

Farm Crops [FC]

Professor J. RITCHIE COWAN, Adviser

Sophomore year:			
General Chemistry (Ch 101,102,103)	3	3	3
Junior year:			
General Botany (Bot 201)	3	....	....
Crop Production (FC 211)	....	....	5
Soils (Sls 211,212)	3	3	....
Related Course in Farm Crops or Soils	....	3	....
Senior year:			
Seed Production (FC 414)	3	....	....
Cereal Crops (FC 322)	....	4	....
Crop Inspection (FC 411)	....	4	....
Related Course	....	....	3

RELATED COURSES

Animal Nutrition I (DAH 311)
Soil Water and Irrigation (Sls 311)
Soil Management and Conservation (Sls 314)
Weed Control (FC 317)
Forage Crops (FC 324)
Reading and Conference (FC 405)

Floriculture [Fl]

Professor STANLEY E. WADSWORTH, Adviser

	Term hours F	W	S
Sophomore year:			
Elements of Horticulture (Hrt 111)	3	....	....
General Floriculture (Hrt 151)	....	3	....
Flower Arrangement (Hrt 253)	....	....	3
Junior year:			
Commercial Floriculture (Hrt 351,352,353) or Flower Shop Operation (Hrt 451) Plant Propagation (Hrt 311) Herbaceous Plant Materials (Hrt 355)	3	3	3
Senior year:			
Handling and Distribution of Florist Crops (Hrt 453)	3	....	....
Greenhouse Construction and Management (Hrt 313) or Basic Design (AA 295)	....	3	....
Reading and Conference (Hrt 405)	....	....	3

Food Technology [FT]

Professor C. E. SAMUELS, Adviser

Sophomore year:			
General Chemistry (Ch 101,102,103)	3	3	3
Junior year:			
Food Manufacturing Methods (FDT 221,222,223)	3	3	3
Senior year:			
General Bacteriology (Bac 204)	4	(4)	....
Food Grades and Standards (FDT 271)	....	3	....
Principles of Food Preservation (FDT 350)	....	....	4
Federal and State Food Regulations (FDT 421)	....	....	2
Related Courses	3	3	(3)

RELATED COURSES

Meats (DAH 351)
Dairy Foods (FDT 417)
Elements of Horticulture (Hrt 111)
Fruit Handling and Distribution I (Hrt 431)
Vegetable Handling and Distribution (Hrt 441)
Food Manufacturing Plants and Equipment (FDT 311)

Forestry [Fo]

Professor W. I. WEST, Adviser

Sophomore year:			
Conservation of Natural Resources (F 260)	3	....	....
Trigonometry (Mth 102)	(4)	4	(4)
[1]Tree Identification (F 153)	....	....	3
Junior year:			
Forest Engineering (FE 123)	3	....	....
Forest Mensuration (F 224)	....	5	....
Wood Technology (FP 210)	....	....	3
Senior year:			
Wood Utilization (FP 310)	3	....	....
Logging Methods (FE 392)	....	3	....
Forest Economics (F 412)	....	....	3

[1] Must precede all forestry courses except F 260; may be interchanged in sequence. All other forestry subjects should be taken in order indicated; deviation may be permitted if prerequisites are met and upon consulting adviser.

Horticulture [Hrt]

Professor SPENCER B. APPLE, Adviser

	Term Hours F	W	S
Sophomore year:			
General Chemistry (Ch 101,102)	3	3	....
Elements of Horticulture (Hrt 111)	....	....	3
Junior year:			
Basic Horticulture (Hrt 315)	3	....	....
Plant Propagation (Hrt 311)	....	3	....
Soils (Sls 211)	3	....	....
Senior year:			
Systematic Pomology (Hrt 433) or Systematic Vegetable Crops (Hrt 443)	4–3	....	....
Fruit Handling and Distribution I (Hrt 431)	....	4	....
Fruit and Nut Production (Hrt 333)	....	....	4
Commercial Vegetable Production (Hrt 342)	....	....	4

Industrial Arts—Building Construction [IAB]

Professor G. B. COX, Adviser

Sophomore year:			
House Planning and Architectural Drawing (AA 178,179,180)	3	3	3
Junior year:			
Methods in Woodworking (IE 112,113)	....	3	3
Construction (AA 219,220)	....	2	2
Senior year:			
Mill Work: Machine Woodwork (IE 311)	3	....	....
Carpentry and Building Construction (IE 333)	....	3	....
Building Cost Estimating (AE 465)	....	....	3

RELATED COURSES

Home Furnishings (CT 231)
Home-Ground Planning (LA 279)
Farm Buildings (AE 361)
Rural House Planning (AE 451)
Elements of Interiors (AA 223)

Industrial Arts—Metal Option [IAM]

Professor MILTON C. SHEELY, Adviser

Sophomore year:			
Engineering Drawing (GE 121,122)	3	3	....
Pattern Making (IE 111)	....	....	3
Junior year:			
Foundry Practices (IE 140)	3	....	....
Forging and Welding (IE 150)	....	3	....
Machine Tool Practices (IE 160)	....	....	3
Senior year:			
Methods and Motion Study (IE 391)	3	....	....
Time Study (IE 392)	....	3	....
Materials Handling (IE 394) or Safety in Industry (IE 390)	....	....	3–2

RELATED COURSES

Abridged General Physics (Ph 211,212) or General Physics (Ph 201,203)
Motor Vehicles (AE 312,313,314)
Casting Processes (IE 344)
Welding Processes and Applications (IE 354)
Mass Production Methods (IE 361)
Sheet Metalwork (IE 380)

Industrial Arts—Woodworking [IAW]

(Including Furniture Construction)

Professor G. B. Cox, Adviser

	Term Hours F	W	S
Sophomore year:			
Engineering Drawing (GE 121,122)	3	3	....
Industrial Arts Drawing and Design (AA 281)	....	....	3
Junior year:			
Pattern Making (IE 111)	3	....	....
Methods in Woodworking (IE 112,113)	....	3	3
Senior year:			
Mill Work: Machine Woodwork (IE 311)	3	....	....
Furniture Design and Construction (IE 312,313,314)	2	2	2

RELATED COURSES

Elements of Interiors (AA 223)
Home Furnishing (CT 231)
Textiles (CT 250)

Industrial Chemistry [IC]

Professor Bert E. Christensen, Adviser

Sophomore year:			
College Algebra (Mth 101)	4	....	....
General Chemistry (Ch 101,102,103)	3	3	3
Junior year:			
Organic Chemistry (Ch 226,227)	5	5	....
Elementary Physical Chemistry (Ch 340)	....	....	3
Senior year:			
Biochemistry (Ch 350,351,352)	3	3	3

Institution Management [IM]

Professor Helen Mulhern, Adviser

Sophomore year:			
General Chemistry (Ch 101)	3	....	....
Food Preparation (FN 211,212)	....	3	3
Junior year:			
Quantity Cookery (IM 311)	4	....	....
General Bacteriology (Bac 204)	....	4	....
Nutrition (FN 225)	....	....	3 ....
Senior year:			
Institution Organization and Administration (IM 430)	3	....	....
Purchasing for Institutions (IM 440)	....	3	....
Institution Experience (IM 450)	....	....	4
Related Course	3	(3)	(3)

RELATED COURSES

General Chemistry (Ch 102,103)
Principles of Food Preservation (FDT 350)
Meats (DAH 351)
Meat Identification and Selection (DAH 352)
Food Grades and Standards (FDT 271)
Food Sanitation Bacteriology (Bac 411)
Quality Textile Purchasing (CT 351)

Mechanical Technology in Agriculture [MTA]

Professor J. B. RODGERS, Adviser

	Term Hours F	W	S
Sophomore year:			
[1]Engineering Drawing (GE 121)	3	----	----
Farm Mechanics (AE 221)	----	3	----
Agricultural Engineering Survey (AE 211)	----	----	3
Junior year:			
Farm Implements (AE 391)	3	----	----
[1] Abridged General Physics (Ph 211)	----	3	----
Mechanical Applications in Agriculture (AE 213)	----	----	3
Senior year:			
Engines and Tractors (AE 311) or Motor Vehicles (AE 312)	3	----	----
Farm Electricity (AE 331) or Motor Vehicles (AE 313)	----	3	----
Related Courses	3	----	3

RELATED COURSES

Motor Vehicles (AE 314)
Land Drainage (AE 319)
Pumps and Irrigation Equipment (AE 321)
Farm Buildings (AE 361)
Household Utilities (g) (AE 435)
Rural House Planning (g) (AE 451)

Mining or Petroleum Geology [MPG]

Professor W. D. WILKINSON, Adviser

Sophomore year:			
Geology (G 201,202,203)	3	3	3
Geology Laboratory (G 204,205,206)	1	1	1
Junior year:			
Mineralogy and Rock Study (G 315,316,317)	3	3	3
Senior year:			
Oil Geology (G 423)	----	----	3
Mining Geology and Industrial Minerals (G 421,422)	3	3	----

Poultry Husbandry [PH]

Professor W. H. MCCLUSKEY, Adviser

Sophomore year:			
Poultry Production (P 121)	3	----	----
The Chick Embryo (P 321)	----	3	----
Brooding and Broiler Production (P 322)	----	----	3
Junior year:			
Poultry Feeding (P 411)	3	----	----
Anatomy and Physiology of the Fowl (VM 311)	----	3	----
Diseases of Poultry (VM 351)	----	----	4
Senior year:			
Marketing Poultry Products (P 421)	3	----	----
Poultry Breeding (P 441)	3	----	----
Poultry Plant Management (P 431)	----	----	3

RELATED COURSES

Poultry Judging (P 341)
Turkey Management (P 351)
Commercial Practices (P 451)
Genetics (Z 341)
Reading and Conference (P 405)
Seminar (P 407)

[1] With consent of the adviser, course may be waived and related course substituted, if student's background in the area is deemed adequate.

Business Administration

Courses in business and industrial administration are offered in the Department of Business Administration. The courses aim in the first two years to orient the student in the field and in the last two years to provide professional preparation. Courses offered in the Department of Economics supplement the work of the Department of Business Administration.

Courses numbered in the 400's are restricted to students with junior or senior standing.

Lower Division Courses

BA 111. **Introduction to Business and Industry.** 4 hours. 4①
Survey of business organization, operation, and management intended to orient the student in the field of business and to help him determine a field of major concentration.

BA 211,212,213. **Principles of Accounting.** 3 hours each term. 3 ①
First Term: Introduction to terminology, content, and form of financial statements for single proprietorships, partnerships, and corporations; recording of data for use in preparing profit and loss statements and balance sheets.
Second Term: Detailed record-keeping procedures; internal control methods to protect cash resources; introduction to analysis and interpretation of financial statements.
Third Term: Methods of recording and reporting incomes and expenses; introduction to functions and procedures of cost accounting for managerial use in controlling business operations; introductions to financial control through use of budgets.

BA 214,215 **Fundamentals of Accounting.** 3 hours each term. 3 ①
Similar to BA 211,212,213, but with increased attention to managerial uses of accounting data and less on detailed record keeping procedures. Primarily for engineering and forestry students.

BA 217. **Basic Accounting and Financial Analysis.** 3 hours. 3 ①
For students who take only one term of accounting. Methods of recording, summarizing, and presenting accounting data. Emphasis on basic principles and terminology; significance, analysis, and interpretation of accounting data; accounting as tool of management.

Upper Division Courses

BA 311. **Production.** 4 hours. 4 ①
Operating techniques used in administration of manufacturing plants together with application to other areas of business management; organization, supervision problems, employee relations, wage payment, output standards, plant location, equipment layout, scientific management.

BA 312. **Finance.** 4 hours. 4 ①
Financial problems encountered in establishment and operation of business firms; forms of ownership organization, acquisition of capital, management of income; related financial institutions; financial adjustment to changing business conditions.

BA 313. **Marketing.** 4 hours. 4 ①
Survey of industrial and consumer markets and of activities and enterprises involved in distributing goods to those markets. Objective is to develop understanding of distribution processes, marketing problems and principles.

BA 321,322,323. **Advanced Accounting.** 3 hours each term. 3 ①
Comprehensive review of basic accounting theory and critical study of conventional accounting procedures. Survey of more difficult problems encountered in accumulation and presentation of financial data; presentation and interpretation of balance sheets and other financial reports measuring costs and revenues, problems in partnership accounting, installments, consignments, agency and branch accounting, consolidations and fiduciary accounting. Prerequisite: BA 211,212,213 or 214,215.

BA 405. **Reading and Conference.** (g) Terms and hours to be arranged.
Supervised individual work in some field of special application and interest. Subjects chosen must be approved by professor in charge. Consent of instructor required. Prerequisite: senior or graduate standing.

BA 407. **Seminar.** Terms and hours to be arranged.

BA 410. **Business Internship.** 1 to 6 hours.
Planned and supervised work experience at selected cooperating business firms. Supplementary training conference, reports, and appraisals. Prerequisite: upper division standing.

BA 411. **Business Law.** 3 hours. 3 ①
Basic rules of law for conduct of business generally. Creates an awareness of proper legal practices, including the desirability of professional supervision. Primary emphasis on requirements of formation, performance, and methods of discharge of contracts. Related treatment of quasi-contracts and torts.

BA 412. **Business Law.** 3 hours. 3 ①
Nature of personal property including sales, bailments, chattel mortgages, and conditional sales; law of negotiable instruments including promissory notes, bills of exchange, and checks. Prerequisite: BA 411.

BA 413. **Business Law.** 3 hours. 3 ①
Law of business ownership and organization including individual proprietorship, agency, partnership, corporations, cooperative associations, and business trusts.

BA 414. **Real Estate Law.** 3 hours. 3 ①
Primary features of legal ownership of land including creation and rights of ownership under various estates, title protection, deeds, wills, and inheritance: property transactions related thereto, including contracts, mortgages, leases, and brokerage. Prerequisite: junior standing.

BA 421,422,423. **Industrial Cost Accounting.** (g) 3 hours each term. 3 ①
First Term: Material, labor, and overhead costs; job order and process cost accounting systems.
Second Term: Estimated and standard costs; standard cost accounting systems; variances and their disposition.
Third Term: Distribution costs; analysis and use of break-even points, differential costs, and other cost data.
Prerequisite: BA 211,212,213 or BA 214,215.

BA 424. **Accounting Theory.** (g) 3 hours. 3 ①
Development of accounting theory under influence of economic factors, law, and administrative ruling: evolution of concepts and procedures for measuring income, cost, value, and results of price level change; accounting ethics. Prerequisite: BA 321,322. 323. If students have not had prerequisites they must have consent of instructor.

BA 425. **Analysis of Financial Statements.** 3 hours. 3 ①
The preparation, analysis, and interpretation of balance sheets and operating reports for effective management and control of industrial and trading concerns. Prerequisite: BA 211,212,213 or BA 214,215.

BA 426. **Accounting Systems.** (g) 3 hours. 3 ①
Systems for accumulating, recording, and summarizing financial data; use of machines in these processes. Demonstrations and field trips. Prerequisite: BA 321,322,323.

BA 427,428. **Industrial Auditing.** (g) 3 hours. 3 ①
Personal standards and verification procedures for auditors of business enterprises; methods of surveying adequacy and effectiveness of accounting system and internal control; practice in application of auditing procedures and in preparation of working papers; certification of financial statement information. Prerequisite: BA 321,322,323.

BA 429. **Controllership.** (g) 3 hours. 3 ①
Functions of the controller and his organization; techniques employed in the coordination and control of accounting, budgeting and planning; controllership's contribution to management and responsibilities for office organization and procedures. Prerequisite: BA 321,322,323.

BA 431,432. **Business and Industrial Statistics.** (g) 3 hours. 3 ①
Statistical techniques for collecting and analyzing business data; statistical source materials; methods for dealing statistically with problems of inspection, quality control, personnel testing, financial analysis, and market research; development of facility in use of business data in reports; sharpening of critical faculties for appraisal of statistical "facts" and "proofs." Prerequisite: Mth 104,105, or Mth 100.

BA 433. **Credits and Collections.** 3 hours. 3 ①
Management functions performed by a credit department; relation to other functions of the business enterprise; nature of consumer credit and mercantile credit, sources of credit information, evaluation of credit risks, and credit controls useful to business firms; credit policy determination.

BA 434. **Income Tax Procedure.** 3 hours. 3 ①
Federal and State income tax regulations, and court decisions applicable to individuals, partnerships, and corporations; differences between managerial and tax accounting and between Federal and State tax requirements; computing taxable income and preparing official returns.

BA 435. **General Insurance.** 3 hours. 3 ①
Aims to familiarize students with the various insurance means at disposal of management for use in shifting, reducing, or eliminating risk; fire, casualty, workmen's compensation, fidelity and surety, marine, life, and other types of insurance.

BA 436. **Investments.** (g) 3 hours. 3 ①
Investment objectives and risks; investment program planning; corporate securities and securities markets; government bonds, real estate, savings institutions; interest income and stock yields; security analysis. Prerequisite: BA 312.

BA 437,438. **Industrial Finance.** (g) 3 hours each term. 3 ①
Financial administration of an industrial enterprise; financial coordination of purchases, inventories, production. and sales; managing cash, receivables. inventories, investments, and working capital position; financial control of plant, equipment, leases, and industrial property. Prerequisite: BA 312. Either BA 437 or BA 438 may be taken separately.

BA 439. **Case Problems in Industrial Finance.** (g) 3 hours. 3 ①
Problems of financial management are studied. using actual situations drawn from the current business scene. Written reports are prepared by the student for each case problem; emphasis on the analysis of the pertinent facts, weighing of alternate solutions. Prerequisite: BA 312.

BA 441,442. **Production Management.** (g) 3 hours each term. 3 ①
Problems of production, factory organization, and factory management, from point of view of production manager. Prerequisite: BA 311. Either BA 441 or BA 442 may be taken separately.

BA 449. **Case Problems in Production Management.** (g) 3 hours. 3 ①
Designed primarily to enable student to formulate an over-all picture of interrelationship of major aspects of production. Intensive case study of actual cases drawn from industry. Prerequisite: BA 441,442, or consent of instructor.

BA 451,452. **Personnel Management.** (g) 3 hours each term. 3 ①
First Term: Survey of objectives, functions, and practices of personnel administration which contribute to effective achievement of aims of organization.
Second Term: Detailed consideration of techniques, uses, and limitations of such personnel activities as job analysis, job evaluation, evaluation of employees, employee services, employee publications, and suggestion system.

BA 459. **Case Problems in Personnel Management.** (g) 3 hours. 3 ①
Case studies to help develop facility in using facts to diagnose causes of personnel problems and in working out plans for improving productivity of personnel. Opportunity is given to use knowledge and experience in situational thinking. Prerequisite: BA 451.

BA 461. **Industrial Purchasing.** 3 hours. 3 ①
Significant managerial problems raised by purchase and control of materials for industrial use as they affect control of quality of products, maintenance of operating efficiency, and quotation of competitive prices.

BA 463. **Retail Merchandising.** (g) 3 hours. 3 ①
Principles of organizing and operating retail institutions; store location, store layout, buying and selling, operating activities, personnel and control.

BA 464. **Advertising.** 3 hours. 3 ①
Advertising as a tool of marketing management; preparation of advertisements; copy, illustration, and layout; use of media: newspapers, magazines, direct mail, radio, and television.

BA 465. **Salesmanship.** 3 hours. 3 ①
Principles and practice of salesmanship; preapproach, gaining the interview, approach, demonstration, meeting objections, and the close; class work correlated with student's major interests in selling.

BA 466. **Sales Management.** 3 hours. 3 ①
Functions of sales manager in marketing process; his administrative and executive duties; analysis of market, policy formulation, recruiting, selecting, contracting, training, equipping, compensating, supervising, and evaluating salesmen.

BA 467,468. **Industrial Marketing.** (g) 3 hours each term. 3 ①
Management of marketing activities among enterprises serving industrial market; planning, organization and control of various elements of marketing program; product planning and policies; market research; use of middlemen and agencies; selling methods; pricing and terms of sale. Prerequisite: BA 313 for *467*; BA 467 for *468*. If students have not had BA 467, they must have consent of instructor to take BA 468.

BA 469. **Case Problems in Marketing.** (g) 3 hours. 3 ①
With the purpose of developing proficiency in solution of marketing problems representative cases are studied involving choice of distribution channels, product and price policies, distribution cost analysis, and sales programs. Consent of instructor required. Prerequisite: BA 313.

BA 471. **Industrial Traffic Management.** (g) 3 hours. 3 ①
Functions and procedures of traffic departments in industrial enterprises; use of tariffs; choice of agencies; control of transportation costs; government rate regulation procedures.

BA 473. **Export and Import Management.** (g) 3 hours. 3 ①
Activities and procedures peculiar to exporting and importing; obtaining transportation services; packing requirements; custom requirements; financing methods; insurance.

BA 497. **Human Relations in Business and Industry.** (g) 3 hours. 3 ①
Relationships among managerial, supervisory, and other workers; actual cases used to help develop attitudes, frames of reference, and approaches which will be useful in solving human relations problems in business. Prerequisite: senior standing.

3 ①
BA 498. **Government Relations in Business and Industry.** (g) 3 hours.
Statutory, administrative, and common law controls affecting modern business and their influence on budgetary considerations, business structure, and administrative policies; importance of constructive attitude and proper recognition of government aids and services to the business community. Prerequisite: senior standing.

BA 499. **Business and Industrial Policy.** (g) 3 hours. 1 ③
Advanced integrative course in analysis of top-management decisions, executive responsibilities, and company objectives. Policymaking is studied through business case histories, current business news, and field investigations of region. Prerequisite: senior standing.

Graduate Service Courses
Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

Business Education

Professional preparation for teachers of business subjects is provided in the Department of Business Education, a joint department in the School of Business and Technology and the School of Education. A student may major in either school, but before registering he must confer with the head of the Department of Business Education.

Baccalaureate Degrees. The undergraduate program for a baccalaureate degree is outlined in the curriculum on a previous page. Courses from business administration, business education, education, and secretarial science form the major background. A liberal number of elective hours permits the selection of a teaching minor. The requirements for a State High School Teacher's Certificate are listed under SCHOOL OF EDUCATION.

Advanced Degrees. Graduate study with a major in business education is available through the School of Education for all those who complete the

undergraduate curriculum or its equivalent. Thirty of the required 45 term hours for the Master of Science or the Master of Arts degree are taken in business education (including the thesis). Other master's degree options are described under GRADUATE SCHOOL. A choice of graduate program can be made following a conference with the head of the Department of Business Education.

Upper Division Courses

BEd 401. **Research.** Terms and hours to be arranged.

BEd 403. **Thesis.** Terms and hours to be arranged.

BEd 405. **Reading and Conference.** Terms and hours to be arranged.

BEd 407. **Seminar.** Terms and hours to be arranged.

Ed 408. **Special Secondary Methods.** 3 hours. (See SCHOOL OF EDUCATION.)

Graduate Courses

BEd 501. **Research.** Terms and hours to be arranged.

BEd 503. **Thesis.** Terms and hours to be arranged.

BEd 505. **Reading and Conference.** Terms and hours to be arranged.

BEd 507. **Seminar.** Terms and hours to be arranged.
PRACTICUM IN BUSINESS EDUCATION—The planning and development of practical and creative projects, group or individual. in the field of business education. Students will be urged to use actual school situations as nucleus for the term's work and to arrive at the best possible solutions.

BEd 536. **Problems and Research Techniques in Business Education.** 3 hours. 1 ①
Trends in high school business curriculum; evaluation of methods and available research studies. Prerequisite: Ed 408 or teaching experience in business subjects.

BEd 537. **Measurements in Business Education.** 3 hours. 3 ①
Objectives and principles of measurement in business education; testing in specific areas; construction of sample tests; evaluation of available testing materials; use of tests in diagnostic and remedial teaching. Prerequisite: Ed 408. BEd 536. Students who have not had Ed 408 must have had teaching experience in business subjects.

BEd 538. **Current Trends in Office Procedure.** 3 hours. 3 ①
Types of clerical and secretarial procedure programs used in secondary and collegiate schools; course content, teaching methods and materials; organization of laboratories; development of objectives, standards, instruction sheets, courses of study, and miscellaneous teaching aids. Prerequisite: Ed 408; BEd 536. Students who have not had Ed 408 must have had teaching experience in business subjects.

BEd 539. **Current Trends in Basic Business Subjects.** 3 hours. 3 ①

BEd 540. **Administration and Supervision of Business Education.** 3 hours. 3 ①

BEd 541. **Current Practices in Typewriting.** 3 hours fall. 3 ①
Principles underlying development of typing skills; motivation, supplementary materials, and special devices. Prerequisite: Ed 408. Students who have not had Ed 408 must have had teaching experience in typing.

BEd 542. **Current Practices in Shorthand.** 3 hours winter. 3 ①
Correct writing habits; correlation of sound and symbol response; word and sentence building and transcription technique. Prerequisite: Ed 408. Students who have not had Ed 408 must have had teaching experience in stenography.

Secretarial Science

The major in secretarial science prepares young men and women for top-level office positions, most common of which is that of secretary. A student may elect a minor in an industrial field in which he plans to work. Service courses in this department are available to all students.

Lower Division Courses

SS 111,112,113. **Stenography.** 3 hours each term. 4 ①
Gregg or Briefhand. Theory of shorthand; practical applications in sentence and paragraph dictation. SS 121,122,123 must be taken concurrently unless the student has had the equivalent. Students with one year of high school shorthand may receive credit for SS 111 only upon recommendation of instructor.

SS 121,122,123. **Typing.** 2 hours each term. 5 ①
Theory and practice of touch typing; drills of all kinds; punctuation and mechanical arrangement of business correspondence, legal forms, tabulating, manuscripts, modern business forms; straight copy timings; training on both manual and electric typewriters. Students who have had one year of typing may receive credit for SS 121 only upon the recommendation of instructor.

SS 124. **Typing.** 2 hours. 5 ①
Intensive skill building in speed, accuracy, figures, and techniques. Use is made of wide variety of special drills, electric typewriters, and tachistoscope. Prerequisite: consent of instructor.

SS 211,212,213. **Applied Stenography.** 3 hours each term. 3 ②
Advanced principles and phrases; dictation and transcripts covering vocabularies of representative businesses; legal forms; newspapers and magazine articles. Prerequisite: SS 113,123 or equivalent.

SS 215. **Business Machines.** 2 hours. 5 ①
Operation of rotary and key-driven calculators, bookkeeping machines, adding machines, addressing machines, voice-writing machines, stencil and fluid-process duplicators, and electric typewriters.

SS 216. **Business Machines.** 1 hour. 3 ①
Same as SS 215 except that fewer equipment types are covered.

Upper Division Courses

SS 311,312,313. **Office Procedure.** 4 hours each term. 2 ① 2 ② 3 ②
The most efficient stenographic methods and office practice; filing; advanced dictation; transcripts; reports; modern office appliances. Prerequisite: SS 213 or equivalent.

SS 321,322. **Technical Reporting.** 3 hours each term winter and spring.
Advanced stenographic training in specialized business fields. Prerequisite: SS 123,213.

SS 407. **Seminar.** 1 hour fall and winter. 1 ①

SS 411. **Secretarial Problems.** 3 hours winter or spring. 3 ①
Duties and problems of the secretary in business and professions; relation to employer and fellow employees; office supervision. Prerequisite: SS 421 or equivalent.

SS 412. **Secretarial Practice.** 3 hours any term. 3 ①
Practical office experience. Ninety hours laboratory work in campus offices. Prerequisite: senior standing. 3 ①

SS 421,422. **Office Organization and Management.** 3 hours each term.
SS 421, fall and winter, *SS 422,* spring. Scientific office management; organization; arrangement; operation; employment and training of office workers; efficiency problems; business ethics. Prerequisite: SS 313 or consent of instructor.

School of Education

Faculty

As of January 1961

FRANKLIN ROYALTON ZERAN, Ph.D., Dean of the School of Education.

KATHRYN SMITH, Teacher Placement Secretary.

Education: Professors ZERAN (department head), BERGSTROM, CLINTON, DIXON, GOODE, JEWELL (emeritus), LANGTON, MUNFORD, REICHART, SALSER (emeritus), SEEN, W. VAN LOAN, WILLIAMSON; Associate Professors AINSWORTH, BARON, GILL, HALL, LEELAND, MARKSHEFFEL, MILLIKEN, PARKS; Assistant Professors ADOLF, CANNON, FOX, KING, LEMON, LUMPKIN, REDKEY, REES, SABAROFF, SEVEREIDE, SEYMOUR, E. SMITH, K. SMITH.

Agricultural Education: Professor TEN PAS (department head); State Supervisor and Teacher Trainer LEE; Assistant Professor DAVIS.

Business Education: Professors YERIAN (department head), LARSE, WINGER; Assistant Professor BARBER; Instructor WIPER.

Home Economics Education: Professor DUBOIS (department head); State Supervisor and Teacher Trainer KOHLHAGEN; Associate Professor MCQUESTEN; Instructor WOHLGENANT.

Industrial Education: Professor COX (department head); State Director for Vocational Education PAULSON; State Supervisor and Teacher Trainer LOOMIS; Associate Professor AINSWORTH; Assistant Professors CANNON, SMITH.

Science Education: Professors WILLIAMSON (department head), ANDERSON; Associate Professors FOSTER, KOSKI, MAYSHARK; Assistant Professor FOX; Instructors CRAVEN, HALE.

General Statement

THE SCHOOL OF EDUCATION at Oregon State University offers undergraduate work in elementary education, undergraduate and graduate work in secondary education, graduate work in higher education, and instruction, principally at the graduate level, in guidance and personnel work.

Distinctive elements in the School of Education are its Department of Trade and Industrial Education and the Departments of Agricultural, Business, Home Economics, and Science Education, which also are departments in their respective schools of subject specialization. Degrees in physical education are granted through the School of Education (see DIVISION OF PHYSICAL EDUCATION). The School does not offer a major in school administration but does offer the courses required for an elementary or secondary school principalship in Oregon.

Accreditation. The School of Education is accredited by the National Council for Accreditation of Teacher Education for the preparation of elementary and secondary teachers and school service personnel (guidance counselors) with the doctor's degree as the highest degree approved.

Elementary Education. To qualify for an Elementary Teacher's Certificate in Oregon a person must have graduated from a 4-year program of elementary teacher education in a college or university approved by the State Board of Education for the preparation of elementary teachers. The curriculum must include at least 6 term hours of supervised teaching at elementary level. The curriculum includes both the courses required for graduation and those required for an Elementary Teacher's Certificate.

Secondary Education. The State Board of Education issues the following types of Secondary Teachers' Certificates:

Provisional Certificates. Until such time as secondary teachers have completed the 5-year secondary teacher education program, they are issued a pro-

visional certificate *A*, *B*, *C*, *D*, or *E*; each is issued for one year only and *is not renewable*. Applicants should apply for the provisional certificates in turn as they go through the schedule outlined below. When they are eligible for the regular 5-year secondary certificate, they should make application for this credential. It is not mandatory that a teacher hold all five provisional certificates to qualify for the 5-year certificate. Persons who have held the 5-year secondary certificate are not eligible for further provisional certification.

Provisional Certificate A may be issued to those otherwise qualified applicants who present official evidence of the following:

1. A baccalaureate degree from a standard college, university, or teachers college.
2. 21 quarter hours in secondary school education, at least 9 quarter hours of which shall be high school supervised teaching—grades 9 through 12 in high school, or grades 7, 8, or 9 in a regularly organized junior high school.

Provisional Certificates B, C, D, and E may be issued to those persons who have met all requirements for and held the preceding provisional certificate and who have completed 9 quarter hours of upper division or graduate work in secondary teacher preparation applicable to the fifth-year program and over and beyond requirements for preceding provisional certificate.

The regular 5-year State Secondary Certificate may be issued to those persons who have completed a 5-year secondary teacher education program in a standard college, university, or teachers' college approved by the State Board of Education for preparation of secondary teachers provided the 5-year program includes:

1. A baccalaureate degree from a standard college, university, or teachers college.

2. A master's degree in secondary teacher preparation, or 45 quarter hours of secondary teacher preparation completed subsequent to baccalaureate degree. (Upper division or graduate credit in secondary teacher preparation in excess of that required for completion of requirements for the baccalaureate degree may be applied on the fifth year when marked on the official transcript or indicated by course number and title on an official report from the degree-granting institution as reserved for Oregon certification. The number of hours so applied may in no case exceed 12 quarter hours.)

3. Preparation subsequent to the baccalaureate degree distributed as follows: (a) 21 quarter hours in subjects taught in high school, at least 15 quarter hours of which shall be upper division or graduate. (b) 9 quarter hours in secondary education earned subsequent to baccalaureate degree and of upper division level or graduate level, (c) 15 quarter hours of upper division or graduate study as electives.

4. 36 quarter hours of secondary education of upper division or graduate level, at least 9 quarter hours of which shall be completed subsequent to baccalaureate degree as indicated in 3-b, and which shall include: (a) Educational Psychology. (b) Human Growth and Development. (c) School in American Life. (d) Special methods in a subject taught in high school. (e) General high school methods or special methods in a second subject taught in high school. (f) High school supervised teaching, 9 quarter hours. (To be done in grades 9 through 12 in the high school, or in grades 7, 8, or 9 of a regularly organized junior high school.) (g) Preparation in any two of the following areas: curriculum and instruction, guidance and counseling, measurement and evaluation, social foundations of education, improvement of reading in high school.

The State Department of Public Instruction charges a fee of $5 for each of the types of certificates or for renewal of a 5-year certificate.

More detailed information concerning regulations governing certification and progression from provisional to regular certification may be obtained from the School of Education. Completion of either of the curricula listed on pages 192, 193 will fulfill requirements for a provisional certificate.

Higher Education. The School of Education cooperates with the major departments on the campus through the Graduate School in a graduate minor in college teaching which may be elected by candidates for advanced degrees, especially the doctorate. In addition, graduate students may elect courses in higher education and utilize special courses in preparation for positions in junior colleges, colleges, and universities.

Guidance and Personnel Work. Oregon State University offers a comprehensive program at the graduate level in Guidance and Personnel Work. This program prepares students for work as counselors in schools and colleges, as deans of boys or girls or of men or women, and as directors of student personnel, counselor trainers, and state supervisors of guidance.

An individual desiring to major at the master's level in Guidance must elect Option B. The minor (15 hours) must be in psychology, at least 6 hours of which must be in psychological tests and testing. The candidate completes 45 term hours of graduate work but does not present a thesis or field studies. He takes written comprehensive examinations upon completion of the 45 hours.

The required courses in Option B (Guidance) are as follows:

Principles and Practices of Guidance Services (Ed 485)
Occupational and Educational Information (Ed 486)
Counseling Techniques (Ed 487)
Diagnostic and Remedial Techniques in Reading (Ed 468)
Supervised Counseling Techniques (Ed 588)
Research Procedures in Education (Ed 512); or Measurements in Education (Ed 424); or Statistical Inference (St 421).

Four of the following courses selected with assistance of adviser: Group Procedures (Ed 577); or Organization and Administration of Guidance Services (Ed 589); or The Maladjusted Child (Ed 463); or Psychology of the Exceptional Child (Ed 462)— not offered at OSU; or Principles and Techniques of Speech Correction (Sp 493); or Psychology of Adolescence (Ed 461); or Psychology of Childhood (Ed 460); or The College Student (Ed 556); or Family Relationships (FL 422); or Parent Education (FL 423); or Social Psychology (Soc 474); or Community Organizations (Soc 475); or Social Problems (Soc 411).

MINOR (PSYCHOLOGY)—15 hours. At least 6 of the 15 hours must be in Psychological Tests and Testing.

Before a person may be admitted to candidacy for the Doctor of Education degree in Guidance and Personnel Work he must have had at least two years' paid teaching experience at the elementary or secondary level and, in addition, two years of paid counseling experience in a school or college.

Enrollment as Freshman. High school graduates who plan to teach should enroll in the School of Education as freshmen. In this way requirements will be most easily and certainly met, an adviser will be available at all times, appropriate teaching fields will be chosen, and the most valuable supporting courses will be selected and worked into the student's program.

Psychology Requirement. General Psychology (Psy 201, 202), is prerequisite to all upper division education courses. Psychology courses Psy 201, 202, 311 are the only psychology courses which may be counted as a part of the education major of 36 term hours.

Supervised Teaching. In their senior year, student teachers observe teaching by experienced instructors, work out lesson plans under the direction of the supervisors, and teach kindergarten, elementary, or high school classes under supervision. *In addition to other requirements, a student must be in full-time residence at Oregon State and taking courses in his teaching field, normally in the term immediately preceding the one in which he plans to do supervised teaching.*

Placement Bureau. The School of Education maintains a Teacher Placement Bureau to assist Oregon State University graduates and other teachers in obtaining teaching positions suited to their preparation and qualifications. Cre-

dentials are handled for kindergarten, elementary, junior high school, senior high school, and college placement. Qualified undergraduate students who are completing degree requirements are given initial placement service for 12 months without charge. All others who are qualified pay a $5 initial registration fee which entitles them to service for a 12-month period. Fee for reregistration or activation of papers after lapse of 12 months subsequent to initial registration will be $5. Service for reregistration will be granted during a 12-month period.

Graduate Study. Graduate work in education is offered through the Graduate School. Students may pursue graduate study for a master's or doctor's degree as preparation for junior or senior high school, junior college, or college teaching in fields allocated as majors at Oregon State, or for counseling, guidance, and personnel work in secondary schools or in colleges. Programs of graduate students are worked out for individuals according to their needs and objectives and regulations of the Graduate School. Specialized graduate work is offered in school administration and supervision.

For an M.A. or M.S. degree, the student must complete a graduate major in education and a graduate minor in a subject-matter field; for the M.A. degree a reading knowledge of a relevant foreign language is required.

For the Ed.M. the candidate must complete a graduate major and one graduate minor. For the Ed.D. degree the student must complete a graduate major and two graduate minors one of which must be in a field outside education. For the Ed.D. degree the candidate must submit a record of successful paid teaching experience of at least two years at the elementary or secondary level. Reading knowledge of French, German, or other language may be required if regarded as essential to the student's program. Since the doctoral candidate works closely with his adviser and committee and since the staff approved to advise doctoral candidates is small, the School of Education limits the number of students admitted to the Graduate School with a view to working on the doctorate. Transcript, four letters of recommendation, Graduate Record Examination results, completed doctoral applicant questionnaire, and application for admission to the Graduate School must be on file by March 14 of the year preceding the September in which the student desires to begin his doctoral program. Candidates are notified immediately after March 14 as to whether they are accepted.

Curricula for Undergraduates

CURRICULUM IN ELEMENTARY EDUCATION

B.A., B.S. Degree

Freshman Year

	Hours
English Composition (Wr 111,112,113)	9
Hist of Am Civ (Hst 224,225,226)	9
Mathematics for Elementary Teachers (Mth 111,112)	6
Introductory Geography (Geog 105,106)	6
Speech	3
Physical Education	3
Air, Military, or Naval Science (men) or electives	3–9
Electives	9–12

Sophomore Year

	Hours
Literature	6
Field Experience (Ed 200)	2
General Psychology (Psy 201,202)	6
Human Development (Psy 311)	3
General Biology (GS 101,102)	8
Music for Elem Tchrs (Mus 371,372,373)	9
Physical Education	3
Air, Military, or Naval Science (men) or electives	3
Electives	8–11

Junior Year

	Hours
School in American Life (Ed 310)	3
Educ Psych: Learning (Ed 312)	3
Methods & Materials: Soc Sci (Ed 369)	3
Methods & Materials: Science & Math (Ed 368)	5
Games & Relays for Elementary School (PE 321)	1
Arts & Crafts for Classroom Tchrs (AA 311,312,313)	9
Physical Science (GS 104,105)	8
School Health Education (SEd 321)	3
Methods and Materials: Language Arts (Ed 367)	3
Electives	10

Senior Year

	Hours
Student Teaching: Elementary (Ed 415)	12
Methods in Reading (Ed 350)	3
Physical Education in the Elementary School (PE 420)	3
Children's Literature (Lib 388)	3
Principles and Techniques of Speech Correction (Sp 493)	3
Electives	24

CURRICULUM IN SECONDARY EDUCATION

B.A., B.S., M.A., M.S., Ed.M., Ed.D. Degrees

General Notes

a. The recommended electives for freshmen and sophomores are designed to broaden the experience and preparation of students. Early attention should be given to the fullest preparation in a teaching major and to one or two teaching minors. Some preparation in an additional field should be included, if possible, and also one or more extracurricular activities. The School of Education provides a large number of electives in each term of the 4-year program for the bachelor's degree.

b. In the freshman year General Hygiene (PE 150, 1 term hour for men; PE 160, 2 term hours for women) is taken one term in place of physical education.

Freshman Year

	Hours
English Composition (Wr 111,112,113)	9
[1]Laboratory Science or Mathematics	9–15
Air, Military, or Naval Science (men)	3–9
Physical Education	3
Electives in Teaching Fields	9–15
Other Electives	9–15

Sophomore Year

	Hours
Field Experience (Ed 200)	2
General Psychology (Psy 201,202)	6
Literature	9
Speech	3
Hist of Am Civ (Hst 224,225,226)	9
Air, Military, or Naval Science (men)	3–9
Physical Education	3
Electives in Teaching Fields	6–12

Junior Year

	Hours
School in American Life (Ed (310)	3
Educ Psych: Learning (Ed 312)	3
Human Development (Psy 311)	3
Outlines of Econ (Ec 212) or Econ Dev of U.S. (Ec 215)	3
American Governments (PS 201)	3
General Sociology (Soc 212)	3
Electives in Teaching Fields	18
Other Electives	12

Senior Year

	Hours
Methods in Reading (Ed 350)	3
Special Secondary Methods (Ed 408)	3
Student Teaching: Secondary (Ed 416)	3–12
Electives	30

Fifth Year

Fifth-year students desiring to meet certification requirements are not required to work for a master's degree. For most high school positions, ho vever, a master's degree is desirable. Students preparing to enter counseling, guidance, and personnel work must qualify for a master's degree.

TEACHING MAJORS AND MINORS IN HIGH SCHOOL FIELDS

Under current regulations, both new teachers and those reassigned in a standard secondary school must be assigned to teach only those subjects in which they have completed adequate preparation in a standard college or university.

The courses which Oregon State University requires for minimum subject preparation in the several teaching fields satisfy the subject-preparation standards of the State Board of Education. In planning his program of study, how-

[1] Psychology plus laboratory is not acceptable as a substitute for a laboratory science.

ever, a student should note that they satisfy *minimum* requirements only. Students must consult members of the faculty of the schools or departments in which they are taking subject-preparation courses concerning additional courses they should elect to strengthen their preparation. Certain courses not listed in either the major or minor requirements can be of great help to teachers.

A student preparing to teach in secondary schools must have a teaching major and at least one teaching minor. If he can supervise at least one cocurricular activity and has more than one teaching minor, he will find job opportunities beter when he graduates. His teaching major must be in one of the fields in which Oregon State University offers student teaching: biology, health education, general science, humanities, mathematics, physical science, agriculture, business, home economics, industrial arts, social science, trade and industrial education, or physical education. The teaching minor may be in one of these same fields, if it is listed as a minor, or may be in one of the following: architecture, art, business administration, French, German, journalism, music, recreation, Spanish, or speech. Cocurricular activities which provide excellent training and experience for prospective teachers include intercollegiate and intramural sports, journalism, art, dramatics, debating, oratory, orchestra, band, glee club, writing and producing radio programs, and participating in student self-government.

Science Education

Biological Science: General Biology

	Term Hours
Requirements for **MAJOR**:	
General Zoology (Z 201,202,203), General Botany (Bot 201,202), Field Botany (Bot 203), Natural History of Oregon I, II, III (Z 374,375,376) Principles of Bacteriology (Bac 230). Economic Entomology (Ent 314).	
ABOVE COURSES CONSTITUTE THE MINOR	35
Additional requirements for MAJOR: upper division electives in biology	9
Recommended electives: courses in ecology, physiology, evolution; genetics; and systematic botany.	
Total requirements for teaching MAJOR	44
Required to accompany MAJOR: General Chemistry.	
Requirements for **MINOR**: Courses constituting minor listed above	35

Biological Science: Health Education

Must be accompanied by adequate science preparation.

Requirements for **MAJOR**:	
Introduction to Health Education (SEd 123), General Hygiene (PE 170), Nutrition (FN 225), School Health Education (SEd 321), School Health Services (SEd 322), First Aid (PE 358), Safety Education (Ed 360), Community Health Problems (Bac 424), Special Secondary Methods in Health Education (Ed 408i).	
ABOVE COURSES CONSTITUTE THE MINOR	27
Additional requirements for MAJOR: Seminar (SEd 407), and 9 hours from following approved electives: Community Health Problems (Bac 424,425,426), School Health Problems (SEd 431,432,433), Health Education (SEd 441,442 443)	12
Total requirements for teaching MAJOR	39
Requirements for **MINOR**: Courses constituting minor listed above	27

General Science

Preparation for teaching grades 7, 8, and 9

Requirements for **MAJOR**:	
General Biology (GS 101,102,103), Chemistry (Ch 101,102,103), Physics (Ph 211, 212), 6 hours of electives in biological or physical science.	
ABOVE COURSES CONSTITUTE THE MINOR	33
Additional requirements for MAJOR: Natural History of Oregon I, II, III (Z 374, 375,376), GS 321,322,323	19
Total requirements for teaching MAJOR	52
Recommended electives: general entomology principles of bacteriology, photography, astronomy, geology of Oregon, advanced field geology, ornithology, evolution, physical geography.	
Requirements for **MINOR**: Courses constituting minor listed above	33

Mathematics

	Term Hours
Requirements for MAJOR: College Algebra (Mth 101); Trigonometry (Mth 102); Calculus with Analytic Geometry (Mth 200,201, and 202). Electives to complete MINOR (15 hours).	
ABOVE COURSES CONSTITUTE THE MINOR	35
Additional requirements for MAJOR: Mathematics for Secondary Teachers (Mth 417,418, and 419). Electives (3 hours)	12
Total requirements for teaching MAJOR:	47
Recommended electives: History of Elementary Mathematics (Mth 415); Probability (Mth 337); Finite Differences (Mth 338); Linear Algebra (Mth 341); Theory of Equations (Mth 342); Theory of Numbers (Mth 343); Projective Geometry Mth 351); and/or Foundations of Elementary Mathematics (Mth 414).	
Requirements for MINOR: Courses constituting minor listed above	35

Physical Science

Requirements for MAJOR: General Chemistry (Ch 101,102,103 or Ch 204,205), Qualitative Analysis (Ch 206), General Physics (Ph 201,202.203), electives 6-10 hours.	
ABOVE COURSES CONSTITUTE THE MINOR	33–37
Additional requirements for MAJOR: Organic Chemistry (Ch 226,227), Elementary Physical Chemistry (Ch 340) Introduction to Modern Physics (Ph 311,312, 313), electives to total 12 to 16 hours.	12–16
Total requirements for teaching MAJOR	49–53
Required to accompany major: Biological science sequence.	
Requirements for MINOR: Courses constituting minor listed above	33–37

Agriculture

Requirements for MAJOR:
Introduction to Agricultural Economics (AEc 111), Principles of Farm Management (AEc 211), Farm Organization (AEc 414); Agricultural Engineering Survey (AE 211). Farm Mechanics (AE 221); Introduction to Dairy and Animal Science DAH 121); Poultry Production (P 121), Animal Nutrition I (DAH 311) or Animal Nutrition II (DAH 411), Range Management (DAH 341) or Plant Genetics (FC 517); Elements of Agronomy I (FC 111), Crop Production (FC 211), Elements of Horticulture (Hrt 111), Soils (Sls 111 and 212).
A B.S. degree in agriculture is required of all majors in agricultural education.

Business Education

Requirements for MAJOR:
Stenography (SS 111,112,113), Typing (SS 121) or equivalent and the following: Typing (SS 122,123), Applied Stenography (SS 211,212,213), Office Procedure (SS 311,312), Office Organization and Management (SS 421). Introduction to Business and Industry (BA 111), Principles of Accounting (BA 211,212,213), Business Law (BA 411,412).

ABOVE COURSES CONSTITUTE THE MINOR	43
Additional requirements for MAJOR: Office Procedure (SS 313), Secretarial Problems (SS 411), Retail Merchandising (BA 463)	10
Total requirements for teaching MAJOR	53

Special Secondary Methods courses in Bookkeeping and Non-Skill, Shorthand, and Typing are to be taken by the student majoring in Business Education. Students who minor will take two of the three methods courses.

Requirements for MINOR: Courses constituting Minor listed above	43

Home Economics

Requirements for MAJOR:
Child Development (FL 225,311), The Nursery School Child (FL 425), Clothing, Textiles, and Related Arts (CT 210,211,212,250), Family Living (FL 223) or Marriage (FL 222) or Family Relationships (FL 422), Foods (211,212,213), or for students having chemistry, (FN 220,221,313), Nutrition (FN 225), Management in Family Living (HAd 240)

ABOVE COURSES CONSTITUTE THE MINOR	37
Additional requirements for MAJOR: Courses selected from the following groups to make at least 8 term hours in each of the following areas: (A) Child Development, (B) Clothing, Textiles, and Related Arts, (C) Housing, Home Furnishings and Equipment, and (F) Home Management and Family Economics	14
Total requirements for teaching MAJOR	51

Humanities

Term Hours

Requirements for MAJOR:
Survey of English Lit (Eng 101,102,103); Speech (including Sp 247); Shakespeare (Eng 201,202,203); Survey of American Lit (Eng 253,254,255); Dev of English Language (g) (Eng 490); English Comp for Teachers (Wr 411).
ABOVE COURSES CONSTITUTE THE MINOR 39
Additional requirements for MAJOR: Journalism (J 111); Literature for Teachers (g) (Eng 488); Advanced Exposition (Wr 316) 9
Total requirements for teaching MAJOR 48

Requirements for MINOR: Courses constituting minor listed above 39

Social Science

Requirements for MAJOR:
Hist of Western Civ (Hst 101 102.103); Introductory Geography (Geog 105,106, 107); Hist of Am Gov (Hst 224,225,226); Principles of Economics (Ec 201,202, 203); American Governments (PS 201,202,203); General Sociology (Soc 204,205, 206).
ABOVE COURSES CONSTITUTE THE MINOR 54
Additional requirements for MAJOR: Upper Division History; Social Science Seminar (SSc 407) 21
Total requirements for teaching MAJOR 75

Requirements for MINOR: Courses constituting minor listed above 54

Industrial Arts

For a major in Industrial Arts *see* PROFESSIONAL CURRICULUM IN INDUSTRIAL ARTS, page 194.

Physical Education

Requirements for MAJOR:
Professional Activities (PE 194, 3 terms; PE 294, 3 terms), Physical Education Technique (PE 333), School Programs and Organization (PE 442), Evaluation of Physical Education (PE 443), and Professional Activities (PE 394, 3 terms; for women) or athletic coaching (PE 365,366, and 367 or 368; for men).
ABOVE COURSES CONSTITUTE THE MINOR 28
All teachers of physical education in Oregon are also required to have at least 18 hours in health education. Courses in health education include: PE 170; PE 358; SEd 321,322; Ed 360; Bac 261; Bac 321; Bac 425,426; Bac 453; FN 225; FL 225. Students interested in teaching physical education or biological science, or both, may include a minor in health education.
Additional requirements for MAJOR: See DIVISION OF PHYSICAL EDUCATION.

Requirements for MINOR: Courses constituting minor listed above 28

Health Education

See BIOLOGICAL SCIENCE: HEALTH EDUCATION, page 194.

Recreation

Requirements for MINOR: Introduction to Recreation (Ed 121), Recreation Leadership (PE 240), Recreational Use of Arts and Crafts (AA 250), Recreational Use of Music (Mus 241), Recreational Use of Drama (Sp 242), Field Work (Ed 347, 348, or 349), Camping (Ed 263,364,365 or 366), Recreational Programs (Ed 422), and Youth Agencies (Ed 425), or Community Recreation (Ed 426) 29

Camp Education

Requirements for Minor: Camp Counseling (Ed 263), Laboratory Practice in Camping Skills (Ed 364), Camp Management (Ed 365), Group Dynamics (Psy 361), Public School Camping (Ed 366), electives approved by Camp Education Minor adviser, representing areas of arts, natural sciences, and physical education.... 27

Dance

Requirements for MINOR: Introduction to Dance Education (PE 253), Physical Education Techniques (PE 333,334,335), Professional Activities (PE 194, 3 terms), electives approved by Dance Minor adviser selected from music, speech or dramatics, arts and crafts, and recreation 27

ADDITIONAL TEACHING MINORS

Student teaching is not offered in these fields.

Agricultural Engineering

For agricultural education majors only.

Term Hours

Requirements for MINOR: Intermediate Algebra (Mth 100), Farm Mechanics (AE 221,222), Farm Implements (AE 391), Agricultural Engineering Survey (AE 211), Workshop; Welding (AE 408, 1 hour each term, 3 terms), Farm Motors and Tractors (AE 331), Special Secondary Methods in Shop Skills (Ed 408a, section 2) 28

Architecture

For industrial arts majors only.

Architecture and Construction

Requirements for MINOR: Graphics I (AA 111,112), Graphics (AA 211,212,213), House Planning and Architectural Drawing (AA 178), Construction (AA 218, 219,220), Basic Design (AA 295), Lower Division Architectural Design (AA 297) 27–33

Architecture and Allied Arts

Requirements for MINOR: House Planning and Architectural Drawing (AA 178, 179, 180), Elements of Interiors (AA 223), Survey of Visual Arts (AA 203), Lower Division Architectural Design (AA 297), Rural House Planning (AE 451), 6 hours of electives in architecture and allied arts 30

Art

Drawing and Painting

Requirements for MINOR: Basic Design (AA 295), Survey of Visual Arts (AA 201,202,203), Painting (AA 290), Drawing (AA 291) 30

Art Crafts

Requirements for MINOR: Basic Design (AA 295), Survey of Visual Arts (AA 201,202,203); 9 hours selected from this group: Leathercraft (AA 254), Ceramics (AA 255), Jewelry (AA 257), Art Metalcraft (AA 258), Art Craft (AA 259); 6 hours of electives in art 30

Art

For industrial arts majors only.

Requirements for MINOR: Industrial Arts Drawing and Design (AA 281,282, 283), Leathercraft (AA 254), Ceramics (AA 255), Jewelry (AA 257), Art Craft (AA 259), Graphic Arts (AA 275 or 276 or 277), Sculpture (AA 293); 3 hours of electives to reflect extended interest in one of the above 30

Business Administration

(May not be offered as a teaching minor by business education teaching majors.)

Requirements for MINOR: Principles of Accounting (BA 211,212,213), Production (BA 311), Finance (BA 312), Marketing (BA 313), Business Law (BA 411, 412,413) 30

French

Requirements for MINOR: RL 50,51,52 (first year), or equivalent, and the following courses: Second-Year French (RL 101a,102a,103a), Second-Year French (RL 101b,102b,103b) (conversational drill), Directed Reading in French (RL 211, 212,213), Survey of French Literature (RL 311,312,313) 30

German

Requirements for MINOR: GL 50,51,52 (first year) or equivalent, and the following courses: Second-Year German (GL 101a,102a,103a), Second-Year German (GL 101b,102b,103b) (conversational drill), Scientific German (GL 320,321,322), Survey of German Literature (GL 343,344,345) 30

Journalism

Must be accompanied by another teaching minor.

Term Hours

Requirements for **MINOR**: Journalism (J 111,112), Copyediting (J 214), Editorial Writing (J 223), Special Feature Articles (J 317), Public Information Methods (J 318), 9 hours of approved electives 27
Suggested electives: Technical Writings (J 319), Journalism Projects (J 351,352, 353), Creative Writing (Wr 218), English Composition for Teachers (Wr 411), Advertising (BA 464), Photography (Ph 361).

Music

Vocal

Requirements for **MINOR**: Music Theory I (Mus 111,112,113), *History of Music (Mus 360,361), †Applied Music (Mus 190,390) or Class Lessons in Voice (Music 181)—5 hours as directed, Choral Conducting (Mus 324,325), Music for the High School Teacher (Mus 350)..... 30

Instrumental

Requirements for **MINOR**: Music Theory I (Mus 111,112,113), *History of Music (Mus 360,361), †Applied Music (Mus 190,390)—4 hours as directed. Instrumental Conducting (Mus 321,322), Band and Orchestra Techniques (Mus 335,336) 30
Suggested electives: Band (Mus 195,395), Orchestra (Mus 196,396), Chorus (Mus 197,397), Music Theory II (Mus 211,212,213), Choral Conducting (Mus 326), Band Arranging (Mus 354,355).

Russian

Requirements for **MINOR**: SL 50,51,52 (First-Year Russian) or equivalent, and the following courses: Second-Year Russian (reading and grammar review) (SL 101a,102a,103a), Second-Year Russian (conversational drill) (SL 101b,102b,103b), Scientific Russian (SL 320,321,322), Survey of Russian Culture (Hum 327,328,329) 30

Spanish

Requirements for **MINOR**: RL 60,61,62 (first year), or equivalent, and the following courses: Second-Year Spanish (RL 107,108,109), Survey of Spanish Literature (third year) (RL 341,342,343), 9 hours of electives approved by department 27

Speech

General Speech

Requirements for **MINOR**: Speech Science (Sp 480). Voice and Diction (Sp 120), Extempore Speaking (Sp 111,112), Interpretation (Sp 121,122), and 12 hours from the following courses: Extempore Speaking (Sp 113), Interpretation (Sp 123), Parliamentary Procedure (Sp 231), Group Discussion (Sp 232), Argumentation (Sp 237), Persuasion (Sp 238), Stagecraft and Lighting (Sp 244), Community Drama (Sp 247), Radio Speaking (Sp 361), Basic Television (Sp 367), or Principles and Techniques of Speech Correction (Sp 493) (G)..... 3

Dramatics

Requirements for **MINOR**: Interpretation (Sp 121,122), Voice and Diction (Sp 120). Extempore Speaking (Sp 111), Stagecraft and Lighting (Sp 244), Community Drama (Sp 247,248,249), Speech Science (Sp 480) 27

Forensics

Requirements for **MINOR**: Extempore Speaking (Sp 111.112), Voice and Diction (Sp 120), Interpretation (Sp 121), Argumentation (Sp 237), Persuasion (Sp 238), Parliamentary Procedure (Sp 231), Group Discussion (Sp 232), Speech Science (Sp 480) 27

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* Introduction to Music Literature (Mus 221) prerequisite.

† The subject for applied music (voice, piano, violin, or other) will be determined by the student with the guidance of his adviser in the department.

Radio and Television

	Term Hours
Requirements for MINOR: Extempore Speaking (Sp 111), Interpretation (Sp 121), Voice and Diction (Sp 120), Speech Science (Sp 480), Radio Speaking (Sp 361, 362,363), Basic Television (Sp 367), Television Programing (Sp 368)	27

Speech Correction

Requirements for MINOR: Voice and Diction (Sp 120), Extempore Speaking (Sp 111,112), Interpretation (Sp 121), Speech Science (Sp 480), Principles and Techniques of Speech Correction (Sp 493) (G), Clinic Procedures (Sp 494) (G), Electives in Speech	27

CURRICULUM IN INDUSTRIAL ARTS

B.S. Degree

General Notes

a. All students following the professional curriculum for Industrial Arts will report directly to the head of the department for counseling on objectives, program planning, and occupational opportunities.

b. General Hygiene (PE 150, 1 term hour for men; PE 160, 2 term hours for women) is taken one term in place of physical education.

c. Technical electives must be related directly to the major option of the student and are selected with approval of the major adviser.

d. Students who are not candidates for the Oregon Credential, but who wish recommendations for teaching certificates based on a 4-year curriculum (instead of the 5-year certification requirement) will omit IEd 420. To complete graduation requirements and be eligible for certification and teaching recommendations it will be necessary to complete either IEd 472, IEd 473, or IE 511 as a substitute for the course omitted.

Freshman Year

	Hours
Pattern Making (IE 111)	3
Methods in Woodworking (IE 112,113)	6
Foundry Practices (IE 140)	3
Forging and Welding (IE 150)	3
Machine Tool Practices (IE 160)	3
Engineering Graphics (GE 111,112)	4
Physical Science (GS 104,105,106)	12
English Composition (Wr 111,112,113)	9
Physical Education and General Hygiene (See note b above)	3
Air, Military, or Naval Science. or Electives	3–9
Technical Elective	2
	51–57

Sophomore Year

NORM

	Hours
Ind Arts Draw & Design (AA 281,282)	6
House Plan & Arch Draw (AA 178,179)	6
Field Experience (Ed 200)	2
General Psychology (Psy 201,202)	6
Intermediate Algebra (Mth 100)	4
Math or Science Electives	8
Physical Education	3
Air, Military, or Naval Science	3–9
	38–44

Sophomore Year Options

WOOD INDUSTRIES OPTION

	Hours
Sophomore Year Norm	38–44
Wood Turning (IE 220)	2
Mach & Tool Maint (Wd Shp) (IE 225)	2
Mill Work: Mach Wdwrk (IE 311)	3
Ind Arts Draw & Design (AA 283)	3
Technical Elective (See note c above)	2
	50–56

METAL INDUSTRIES OPTION

	Hours
Sophomore Year Norm	38–44
Mach & Tool Maint (Wd Shp) (IE 225)	2
Mach Tool Maint: Metals (IE 265)	3
Carpentry & Build Construct (IE 333)	3
Stagecraft and Lighting (Sp 244)	3
	49–55

Junior Year

NORM

	Hours
School in American Life (Ed 310)	3
Educational Psych: Learning (Ed 312)	3
Methods in Reading (Ed 350)	3
History of American Civilization (Hst 224,225,226)	9
Extempore Speaking (Sp 111)	3
Social Science Electives	6
General Electives	6
	33

Senior Year

NORM

	Hours
Special Secondary Methods (Ed 408c)	3
Industrial Arts Organization (IED 420) (See note d above)	3
Student Teaching: Secondary (Ed 416)	12
Human Development (Psy 311)	3
Seminar	6
General Electives	6
	29

WOOD INDUSTRIES OPTION

	Hours
Junior Year Norm	33
Furn Des & Constr (IE 312,313,314)	6
Wood and Metal Finishing (IE 316)	3
Carpentry & Build Construct (IE 333)	3
Applied Electricity (IE 370)	3
	48

WOOD INDUSTRIES OPTION

	Hours
Senior Year Norm	32
Stagecraft and Lighting (Sp 244)	3
Sheet Metalwork (IE 380)	3
Metal Crafts (IE 387)	3
Approved Technical Electives	2
	43

METAL INDUSTRIES OPTION

	Hours
Junior Year Norm	33
Foundry Practice (IE 340)	3
Forging and Welding (IE 350)	3
Machine Shop Practice (IE 360)	3
Applied Electricity (IE 370)	3
Sheet Metalwork (IE 380)	3
Metal Crafts (IE 387)	3
	51

METAL INDUSTRIES OPTION

	Hours
Senior Year Norm	32
Millwork: Machine Woodwork (IE 311)	3
Wood and Metal Finishing (IE 316)	3
Approved Technical Electives	4
	42

Education

The Department of Education offers courses in principles and techniques of teaching at the elementary, secondary, and college levels, special methods in teaching the various major subjects in which Oregon State University gives teacher training, the history and philosophy of education, guidance, counseling, and personnel work.

Lower Division Courses

Ed 101. **Methods of Study.** 3 hours. 2 ① 1 ②
Specific methods of study as applied to various subject-matter fields; the general principles of note taking; study schedule; fixing study habits; evaluation of the various broad fields of human learning. Laboratory work also scheduled.

Ed 121. **Introduction to Recreation.** 3 hours. 3 ①
Concept of community recreation; growth and development of public recreation movement; types of recreation; role of organized recreation in the present social order.

Ed 200. **Field Experience.** 2 hours. 2 ①
To help prospective teachers bridge gap between classroom theory and student teaching. Observation of and participation in school and community organizations and programs.

Ed 263. **Camp Counseling.** 3 hours. 3 ①
Counselor training; responsibility in camp; camper problems; camp relationships. Three-day practical camping field trip.

Ed 296. **Leadership Training.** 2 hours. 2 ①
Interpretation of leadership, understanding functions of group, examination of possible methods involved; leadership in campus life used as laboratory experience. Prerequisite: an actual leadership position. If students have not held such position, consent of instructor is required.

Upper Division Courses

Ed 310. **School in American Life.** 3 hours. 3 ①
Problems of elementary and high schools from standpoint of teacher; aims, functions, and characteristics. Prerequisite: Psy 201,202.

Ed 312. **Educational Psychology: Learning.** 3 hours. 3 ①
Laws of learning and application to classroom; motivation; transfer of training; memory; forgetting; psychology of school subjects. Prerequisite: Psy 201,202.

Ed 347,348,349. **Field Work.** 2 hours each term. 2 ①
Observation and participation in planning, operation, and administration of wide variety of functioning recreation or youth organization programs under direction and supervision of trained leaders. Prerequisite: junior standing.

Ed 350. **Methods in Reading.** 3 hours. 3 ①
Prerequisite: Ed 310.

Ed 360. **Safety Education.** 3 hours. 3 ①
All phases of safety: home, fire, industrial, water, rural, school, and traffic safety: elementary, secondary, and adult. Prerequisite: Ed 310.312.408.

Ed 364. **Laboratory Practice in Camping Skills.** 3 hours. 3 ①
Practical experience and development of skills in a variety of camping activities.

Ed 365. **Camp Management.** 3 hours. 3 ①
Directed toward preparation for camp administration. Prerequisite: Ed 263 or camp counseling experience.

Ed 366. **Public School Camping.** 3 hours. 3 ①
Role of camping in education; study of school camp, its organization, administration, and leadership. Prerequisite: Ed 365.

Ed 367. **Methods and Materials: Language Arts.** 3 hours. 3 ①
Method course designed to help prepare elementary school teachers to present language skill as a tool of communication, especially to set up developmental program stressing skills of listening, observing speaking, reading, and writing. Prerequisite: Ed 310.

5 ①

Ed 368. **Methods and Materials: Science and Mathematics.** 5 hours.
Problems, methods, and techniques in selecting and organizing content and experiences in elementary school science and mathematics; goals in teaching; multisensory and resource aids available for classroom use. Prerequisite: Ed 310.

Ed 369. **Methods and Materials: Social Science.** 3 hours. 3 ①
Aims, evaluation, and procedures in presenting social studies at various levels in elementary schools. Prerequisite: Ed 310.

Ed 401. **Research.** Terms and hours to be arranged.

Ed 405. **Reading and Conference.** Terms and hours to be arranged.

Ed 407. **Seminar.** 1, 2, or 3 hours any term. 1, 2, 3 ①
Prerequisite: Ed 310.312.350.408. If students have not had prerequisite, they must have consent of instructor.

Ed 408. **Special Secondary Methods.** 3 hours.
Problems and methods in selecting and organizing materials for instruction: comparison and evaluation of methods, laboratory techniques, supplies, equipment; economy of time and materials. Sections include: (a) agriculture, (b) biological science, (c) business, (d) home economics, (e) industrial arts, (f) mathematics, (g) physical science, (h) physical education, (i) health education, (j) humanities, (k) social science, (t) trade and industrial education. Prerequisite: Ed 310.312,350. (6 hours maximum allowed toward certification.)

Ed 414. **Student Teaching: Kindergarten.** 3 hours.
Open only to students in Elementary Education. Prerequisite: Ed 415 (Elementary) minimum of 6 quarter hours; Ed 451 Preprimary Education (Kindergarten) and consent of adviser. Arrangements to do student teaching must be made during registration for winter term of junior year.

Ed 415. **Student Teaching: Elementary.** 9 to 15 hours.
Open only to students in Elementary Education. Senior standing in Elementary Education or consent of instructor required. Student must not be on probation.

Ed 416. **Student Teaching: Secondary.** 9 to 15 hours.
Experience in classroom procedures in fields of student's preparation and interests: (a) agriculture, (b) biological science, (c) business, (d) home economics, (e) industrial arts, (f) mathematics, (g) physical science, (h) physical education, (i) health education, (j) humanities, (k) social science, (t) trade and industrial education. Arrangements to do student teaching must be made during registration for winter term of junior year. Prerequisite: Ed 310.312 350.408 and consent of director of teacher training. *Student must have grade-point average of 2.50 in his teaching major at the beginning of the term in which he does student teaching and must not be on probation. He must also have a teaching minor.*

Ed 421. Principles and Philosophy of Recreation. (g) 3 hours. 3 ①
Foundations and understandings of leisure and recreation in American culture; present status and principles basic to field. Prerequisite: Ed 349.

Ed 422. Recreation Programs. (g) 3 hours. 3 ①
Principles of program planning, content, trends, and problems in field of recreation programing. Prerequisite: Ed 421.

3 ①

Ed 423. Organization and Administration of Recreation. (g) 3 hours.
Organizing, administering, and conducting recreation programs; study of problems in recreation. Prerequisite: Ed 349.

Ed 424. Measurements in Education. (G) 3 hours. 3 ①
Use of standard tests and scales to measure achievement in school subjects; elements of statistical method. Prerequisite: senior standing.

Ed 425. Youth Agencies. (G) 3 hours. 3 ①
Survey of youth-serving organizations; organization and leadership of school and community clubs. Prerequisite: senior or graduate standing. Students who do not have senior or graduate standing must have consent of instructor.

Ed 426. Community Recreation. (G) 3 hours. 3 ①
The developing philosophy of recreation; current trends and problems in inter-relationships of community agencies offering recreation programs. Prerequisite: Ed 423.

Ed 431. Junior High School Curriculum. (G) 3 hours. 3 ①
Curriculum needs of junior high school pupil; scheduling core program, instructional materials in relation to ability and maturity of pupil. Prerequisite: Ed 310,312.

Ed 432. Junior High School Guidance. (G) 3 hours. 3 ①
Diagnosis and evaluation of individual pupil; his abilities, interests, and aptitudes. Organization and administration of program, role of teachers and auxiliary-service staff. Prerequisite: Ed 310,312.

Ed 434. Preparation of Audio-Visual Aids. (G) 3 hours. 1 ① 2 ②
Aids for more efficient teaching in large and diversified classes; design and construction of charts, graphs, illustrated materials, flat and three-dimensional materials for display or projection, and the devolpment of audio-teaching aids. Prerequisite: senior standing. Students who do not have senior standing must have consent of instructor.

Ed 435. Audio-Visual Aids. (G) 3 hours. 1 ① 2 ②
Film, slide, chart, and other visual materials; selection and use to best advantage; operation of projectors and other equipment. Prerequisite: senior standing. Students who do not have senior standing must have consent of instructor.

Ed 440. History of Education. (G) 3 hours. 2 ① 1 ②
Growth and development of education; Plato, Aristotle, Renaissance educators. Comenius, Locke, Rousseau, Pestalozzi, Froebel, Herbart, Herbert Spencer, and Dewey. Prerequisite: senior standing.

Ed 450. Kindergarten Education. (G) 3 hours. 3 ①
Building good attitudes toward school, group adjustment, work habits, readiness for first-grade subjects. Prerequisite: Ed 310,312,367,368. Limited to students enrolled in or having a degree in elementary education.

Ed 460. Psychology of Childhood. (G) 3 hours. 3 ①
Growth of behavior during the prenatal period, infancy, and childhood; development of muscular activities, perception, emotional adjustment, intelligence, language, and social behavior in childhood. Prerequisite: senior standing.

Ed 461. Psychology of Adolescence. (G) 3 hours. 3 ①
Behavior changes during preadolescence and adolescence as related to physiological development and social and cultural factors. Emphasis on personal and social adjustment. Prerequisite: senior standing.

Ed 463. The Maladjusted Child. (G) 3 hours. 3 ①
Discovery and treatment of emotionally and socially maladjusted child; home, school, and community in relation to child's mental health. Prerequisite: Ed 310,312.

Ed 465. Diagnostic and Corrective Techniques in the Basic Skills. (G) 3 hours. 3 ①
Diagnostic, remedial, and corrective techniques in basic school subjects; application of techniques to actual cases. Prerequisite: Ed 310,312.

3 ①

Ed 468. Diagnostic and Remedial Techniques in Reading. (G) 3 hours.
Nature of the reading process, reading readiness, reading skills; causes of retardation; methods of diagosing difficulties and evaluating progress; and procedures and materials for the development of reading abilities. Prerequisite: Ed 310,312,350.

Ed 476. School Law and Organization. (G) 2 hours. 2 ①
Oregon school system and laws; problems of Oregon schools; plans for solution; course of study; trends in educational development. Prerequisite: junior standing.

3 ①

Ed 479. Corrective Reading Laboratory. (G) 3 hours each term, 2 terms.
Administration and evaluation of diagnostic tests; remedial techniques in reading; diagnosis; planning and executing corrective procedures. Consent of instructor required. Prerequisite: Ed 468.

Ed 484. The Junior High School. (G) 3 hours. 3 ①
Development of junior high school; purpose and objectives; general organization; courses of study; present practices in leading representative junior high schools; direction of classroom activities; provision for individual differences; pupil personnel. Prerequisite: Ed 310,312.

Ed 485. Principles and Practices of Guidance Services. (G) 3 hours. 3 ①
Beginning course in guidance. Overview of guidance and personnel work; vocational, educational, health, social, personality, recreational, and individual development; participation of teachers, counselors, administrators, parents, and community organizations in guidance program. For teachers and administrators. Prerequisite: senior standing.

Ed 486. Occupational and Educational information. (G) 3 hours. 3 ①
Materials available regarding occupations; interpretations of present trends; value and usefulness for high school and college students. Prerequisite: senior standing.

Ed 487. Counseling Techniques. (G) 3 hours. 3 ①
Mental, achievement, trade, and other tests; administration of such tests; classification, methods in educational and vocational counseling. Prerequisite: Ed 485.

Ed 494. Principles and Objectives of Vocational Education, (G) 3 hours. 3 ①
Basic principles and development of vocational education; review of history and legislation; analysis of objectives of vocational schools and vocational programs in relationship to the total program of education. Consent of instructor required.

Ed 495. Organization and Administration of Vocational Education. (G) 3 hours. 3 ①
Federal vocational education acts; state boards for vocational education; local boards of education; analysis of laws, regulations, policies; problems and principles of vocational education as related to organization, administration, cooperating personnel, agencies, finances, budgets, and committees. Consent of instructor required.

Ed 498. Organization and Supervision for High School Teachers. (G) 3 hours. 3 ①
Administrative organization, methods, and purposes of supervision as they involve the classroom teacher. Prerequisite: Ed 310,312.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

Ed 501. Research. Terms and hours to be arranged.
In addition to regular courses listed, members of the staff supervise research and investigation by qualified graduate students. Registration by permission of staff members. Prerequisite: graduate standing in education. See also AEd 501, BEd 501, HEd 501, IEd 501, SEd 501.

Problems in Curriculum and Instruction—WILLIAMSON.
Problems in Educational Psychology—REICHART.
Problems in Guidance—ZERAN.
Problems in History or Philosophy of Education—REICHART.
Problems in Measurements—BARON.

Ed 503. Thesis. Terms and hours to be arranged.

Ed 505. **Reading and Conference.** Terms and hours to be arranged.

Ed 507. **Seminar.** Terms and hours to be arranged.

Ed 508. **Workshop.** Terms and hours to be arranged.

COUNSELOR TRAINING—Each student concentrates on special problem in guidance; training and assistance to teachers, counselors, deans, and administrative officers. Prerequisite: 9 hours in education and teaching experience.

CURRICULUM—Experience in planning curricula for specific situations. Conducted on an individual basis or (preferably) by a staff group working cooperatively in developing or revising plans and programs.

Ed 511. **Recent Educational Trends and Problems.** 3 hours. 3 ①
Trends, problems, and developments in all fields of education. Prerequisite: 24 hours of upper division education including student teaching.

Ed 512. **Research Procedures in Education.** 3 hours. 3 ①
Methods, techniques, and tools for doing research work; meaning of scientific method; ways of locating and formulating problems; techniques for solving problems; necessary statistical tools; collection and interpretation of data; preparation of research reports.

Ed 522. **Secondary School Curriculum.** 3 hours. 3 ①
Advanced course for experienced teachers. Schools in the community; guidance activities in school; extra class activities; role of school in contemporary society; teacher in local community. Prerequisite: graduate standing in education.

Ed 523. **School Activities.** 3 hours. 3 ①
Principles and purposes of school activities; pupil participation in school government; assemblies, clubs, social activities, drama, speech activities, music, and publication; evaluation of activity program. Prerequisite: Ed 310,312.

Ed 524. **Construction and Use of Objective Examinations.** 3 hours. 3 ①
Principles and statistics in selection of test items; types of examinations; validity; reliability; administering, scoring, grouping results. Prerequisite: graduate standing.

Ed 527. **Secondary School Administration and Supervision.** 3 hours. 3 ①
Principalship; principles of administration, staff relationships, public relations, professional growth; business administration; administration of guidance services, curriculum, activities; evaluation of secondary schools. Prerequisite: secondary certificate, one year secondary teaching experience.

Ed 532. **Tests and Measurements.** 3 hours. 3 ①
Selected tests and measurements applicable in a particular subject or department. Prerequisite: Ed 424 and other courses specified by department.

Ed 533. **Psychological Aspects of Vocations.** 3 hours. 3 ①
Psychological principles applied to: (1) choice of occupations, (2) adjusting, or aiding others in adjusting, and (3) alteration of occupational conditions and demand to meet needs. Prerequisite: graduate standing in education.

Ed 543. **History of American Education.** 3 hours. 3 ①
Intellectual development of America with special reference to education. Prerequisite: graduate standing in education.

Ed 546. **Philosophy of Education.** 3 hours. 3 ①
Fundamental problems of education, with some attempt at their solution; meaning of philosophy; philosophy of education; value for teacher and administrator. Prerequisite: graduate standing in education.

Ed 550. **The Junior College.** 3 hours. 3 ①
Early junior colleges; junior college movement; aims and functions; curriculum; organization and operation; relation to secondary and higher education. Consent of instructor required.

Ed 553. **Elementary School Curriculum.** 4 hours. 4 ①
Pupil needs in life situations, objectives, essentials of a goal program, varying curriculum designs, organization of learning experiences, evaluation of learning, appraisal of new curriculum practices. Prerequisite: elementary certification, one year of elementary teaching experience.

4 ①

Ed 554. **Elementary School Supervision and Administration.** 4 hours.
Role duties, needs, problems of supervision; evaluation and improvement of teaching-learning. Prerequisite: elementary certification, one year elementary teaching experience.

Ed 555. **Student Personnel Work in Higher Education.** 3 hours. 3 ①
Student personnel services in colleges and universities; philosophy, organization, administration of personnel program at this level; specific services provided. Opportunity to visit and study college personnel programs. Prerequisite: graduate standing.

Ed 556. **The College Student.** 3 hours. 3 ①
Student as central factor in college and university teaching; hereditary background, physical environment, cultural environment, and group relationships as contributors to his maturation; learning as nurture; motivation and direction of college student's learning. Prerequisite: graduate standing.

Ed 557. **College and University Teaching.** 3 hours. 3 ①
Evaluation, aims, procedures. and outcomes in college and university teaching; professional relationships and interests; individual studies according to student's field. Prerequisite: graduate standing.

Ed 558. **American Higher Education.** 3 hours. 3 ①
Development of the American college and university; the old liberal arts college; influence of German university; rise of American university; current problems in structure and curriculum; international higher education.

Ed 561. **Advanced Educational Psychology.** 3 hours. 3 ①
Experimental material that seems most useful and relevant to educational psychology. Prerequisite: graduate standing in education.

Ed 566. **Curriculum Construction.** 3 hours. 3 ①
Building elementary and secondary school curricula; theories and policies since 1900; selecting and organizing subject matter; courses of study; curriculum organization. Prerequisite: 24 hours of upper division credit in education including student teaching.

Ed 574. **School Supervision.** 3 hours. 3 ①
Purpose of and plans for supervision; use of tests, diagnosis of pupil difficulty. Prerequisite: elementary or secondary certification, one year teaching experience.

Ed 575. **School Finance.** 3 hours. 3 ①
School finance and business administration; sources of school income; State financial structure; budgeting and accounting. Prerequisite: elementary or secondary certification, one year teaching experience.

Ed 577. **Counselor Training: Group Procedures.** 3 hours. 3 ①
Principles underlying behavior and methods for modifying individual's attitudes and actions by group procedures; group dynamics; evaluation of leader's role in group; process of attitudinal change and its results; approaches to group and play therapy; relation between individual and group counseling methods. Prerequisite: Ed 485,487.

Ed 581,582. **Counselor Training.** 3 hours each term. 3 ①
Through cooperation of department stores and industries in Portland, students gain experience in both customer-contact and nonselling departments, or move from job to job in industry to obtain both production-line experience and contact with top management; conferences, lectures, and discussions by executives, faculty members, leaders in labor relations, and others. Extramural or Summer Session. Prerequisite: Ed 485,487.

Ed 587. **Adult Education.** 3 hours. 3 ①
Development, methods, and results; public schools, extension instruction, industrial and commercial organizations, radio, and other agencies of adult learning. At least senior standing required.

3 ①

Ed 588. **Supervised Counseling Techniques.** 3 hours each term, two terms.
Provides actual counseling experience in counseling laboratory. Interviewing; administering, scoring, and interpreting psychological tests; writing case studies. Consent of instructor required. Prerequisite: Ed 485,487; Psy 478,479,480.

Ed 589. **Organization and Administration of Guidance Services.** 3 hours. 3 ①
Criteria for evaluating present personnel services, setting up guidance committees, selection of personnel, responsibilities and duties of staff, development of program of services, and in-service training program. Prerequisite: Ed 485,487.

Agricultural Education

The Department of Agricultural Education, a joint department within the Schools of Agriculture and Education, trains teachers and supervisors of agriculture for secondary schools and for schools and classes of adult farmers and young men not enrolled in regular dayschools. The strong demand for teachers of vocational agriculture in Oregon, in the Pacific Region, including Hawaii, and throughout the United States, is expected to continue indefinitely. Special consideration is given to George-Barden Act and to Smith-Hughes Act. Field activities, followup for new teachers, and preparation of instructional material for agricultural instructors are handled by this department in cooperation with staff of the School of Agriculture.

Requirements for Teaching Agriculture. The prospective vocational agriculture teacher should confer early with the department head. Discussion will center on attainment of certain fundamental qualifications and knowledge as well as the high level of practical ability necessary for admission to this field.

Requirements in Agriculture:

- Graduation from a college of agriculture of standard rank.
- 80 term hours or equivalent, or special work in agriculture. Courses depend somewhat on previous training and experience and recommendations of department head.

Requirements in Education and for Certification:

- Course requirements in Education: A minimum of 25 term hours in the 4-year curriculum, including courses in special secondary methods and supervised teaching.
- Vocational Teaching Certificate: The curriculum in Agricultural Education is designed to fulfill requirements for a vocational teaching certificate. The State Director of Vocational Education will issue this certificate after determining applicant's qualifications for teaching vocational agriculture and after applicant has been placed in a teaching position.
- It is expected that persons who have been employed to teach vocational agriculture, after receiving the vocational certificate and completing the 4-year curriculum, will continue systematic work in education and agriculture, as needed, through summer courses and otherwise during their period of employment in full-time teaching. Such work may carry college credit leading to a master's degree.

Graduate Study. For those wishing to continue studies beyond a bachelor's degree, a program of experience and graduate study leading to a master's degree will be developed to meet individual needs.

Upper Division Courses

AEd 401. **Research.** Terms and hours to be arranged.

AEd 405. **Reading and Conference.** Terms and hours to be arranged.

AEd 407. **Seminar.** Terms and hours to be arranged.

Ed 408. **Special Secondary Methods.** 3 hours. (See page 201)
Section 1: Supervised Farming, FFA. *Section 2:* Shop and Manipulative Skills.

AEd 411. **Program Report Analysis.** 2 hours fall or spring. 2 ①
Analysis of Federal, State, and local reports and records prepared by the Vocational Agriculture Teacher.

AEd 417. **The Agricultural Curriculum.** (G) 3 hours. 3 ①
Determining course content and evaluating types of course organization with reference to objectives to be attained in the field. Prerequisite: Ed 312,416. TEN PAS.

AEd 418. **Adult Education in Agriculture.** (G) 3 hours. 3 ①
Developing programs for young and adult farmer groups; supervision of classes for young farmers, for older farmers, and for farm veterans and special classes of veterans. Prerequisite: AEd 417. TEN PAS.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

AEd 501. **Research.** Terms and hours to be arranged.

AEd 503. **Thesis.** Terms and hours to be arranged.

AEd 505. **Reading and Conference.** Terms and hours to be arranged.

AEd 507. **Seminar.** Terms and hours to be arranged.

AEd 516. **Extension Course in Teacher Training.** Hours to be arranged. Enables present and prospective teachers of agriculture to continue professional improvement; conference, followup instruction, supervision, correspondence, reports. Prerequisite: Ed 310,312.

AEd 533. **Rural Survey Methods.** 3 hours. 1 ③ Technique of surveys; analyzing, interpreting, and using results in evaluating and formulating programs; field studies. Prerequisite: Ed 310,312, teaching experience.

AEd 541. **Community Programs of Agricultural Education.** 3 hours. 3 ① Developing the natural and human resources of a community through agricultural education. Prerequisite: Ed 408a, teaching experience.

Business Education

Professional preparation for teachers of business subjects is provided in the Department of Business Education, a joint department in the School of Business and Technology and the School of Education. A student may major in either school, but before registering he must confer with the head of the Department of Business Education.

Baccalaureate Degrees. The program for undergraduates for a baccalaureate degree is outlined in the curriculum on a previous page. Courses from business administration, business education, education, and secretarial science form the major background. A liberal number of elective hours permits the selection of a teaching minor. The requirements for a State High School Teacher's Certificate are listed on pages 189, 190.

Advanced Degrees. Graduate study with a major in business education is available through the School of Education for all those who complete the undergraduate curriculum or its equivalent. Of the required 45 term hours for the Master of Science or the Master of Arts degree, 30 are taken in business education (including the thesis). Other master's degree options are described under GRADUATE SCHOOL. A choice of graduate program can be made following a conference with the head of the Department of Business Education.

For description of courses see SCHOOL OF BUSINESS AND TECHNOLOGY, page 187.

Home Economics Education

Professional preparation for teachers of home economics is provided by the Department of Home Economics Education. A student in either the School of Education or School of Home Economics may meet certification requirements. Before registering for teacher preparation courses, every student should receive permission for registering and guidance for selection of courses from the Home Economics Education staff. Home Economics students who have taken FL 225,311 may substitute FL 413 for Psy 311.

Lower Division Course

Ed 200. **Field Experience.** 2 hours. (See SCHOOL OF EDUCATION.)

Upper Division Courses

HEd 401. **Research.** Terms and hours to be arranged.

HEd 403. **Thesis.** Terms and hours to be arranged.

HEd 405. **Reading and Conference.** Terms and hours to be arranged.

HEd 407. **Seminar.** Terms and hours to be arranged.
PLANNED HOME EXPERIENCES.
PROBLEMS OF BEGINNING TEACHERS.

Ed 408. **Special Secondary Methods.** 3 hours. (See page 201.)

HEd 422. **Organization and Administration of Homemaking Education.** (G) 3 hours. 3 ①
Organizations of homemaking departments with special emphasis on the unique aspects of secondary homemaking. Prerequisite: Ed 408d.

HEd 440. **Homemaking Education in the Community High School.** (G) Hours to be arranged.
Stimulation of interest in assuming leadership in programs of home and family living by extension of secondary homemaking departments into school and community through development of home and family life education at all levels of day-school and adult-education programs under vocational education.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

HEd 501. **Research.** Terms and hours to be arranged.

HEd 503. **Thesis.** Terms and hours to be arranged.

HEd 505. **Reading and Conference.** Terms and hours to be arranged.

HEd 507. **Seminar.** Terms and hours to be arranged.
HOME AND COMMUNITY EXPERIENCES
AUDIO-VISUAL AIDS FOR TEACHING HOMEMAKING
EVALUATION OF HOMEMAKING INSTRUCTION
STUDIES IN HOME ECONOMICS EDUCATION

HEd 511. **Current Methods in Teaching Homemaking.** 3 hours. 3 ①
Current trends in education applied to homemaking education. Prerequisite: Ed 408d.

HEd 512. **Supervision of Home Economics Education.** 3 hours. 3 ①
Philosophy and practices of inservice and preservice home economics supervision. Prerequisite: Ed 408d and teaching experience.

HEd 554. **Community Programs in Homemaking.** 3 hours. 3 ①
Planning, organizing, cooperating, directing, and appraising total community programs in family life education; emphasis on adult education. Prerequisite: HEd 440.

Industrial Education

Jointly with the Department of Industrial Engineering and Industrial Arts (School of Engineering), the Department of Industrial Education prepares teachers and supervisors in industrial-arts education and in trade and industrial (Smith-Hughes vocational) education. While the department is organized as part of the School of Education, and offers no technical courses or curricula of its own, it makes use of such courses in other schools and departments as

serve its needs. Special attention is called to the joint administration of curricula for teacher training in industrial-arts education and in vocational trade and industrial education. The Department of Industrial Engineering and Industrial Arts is responsible for the technical training, while the Department of Industrial Education (School of Education) is responsible for the professional curriculum and for teacher-education courses and applied teaching methods. Preparation for vocational teachers in trade and industrial education is carried on cooperatively with the State Department of Vocational Education in Salem.

Undergraduate Curriculum for Industrial Arts Education. The 4-year professional program, leading to the degree of Bachelor of Science, meets certification requirements of any state except those requiring graduate study as a prerequisite to certification. In such cases it furnishes an excellent foundation for the required graduate study, which may be completed at Oregon State University or elsewhere.

Undergraduate Curriculum for Trade and Industrial Education. The 4-year professional program leading to the bachelor's degree in trade and industrial education provides opportunity for candidates to receive some credit based on trade or industrial experience, but they must fulfill the regular institutional requirements listed under DEGREES AND CERTIFICATES. In order to be admitted to this program a candidate must present evidence of three years above the standard learning experience or acceptable trade or industrial experience, or he must present credentials indicating that he is qualified to teach or supervise reimbursed Smith-Hughes classes in his state. He must also be engaged in teaching (or about to be so engaged), or be employed as a vocational supervisor.

Graduate Study in Industrial Education. Many school systems, and some state departments of education, now require all teachers to present graduate study or a master's degree as a principal prerequisite to a teaching credential for secondary schools. Since demands upon teachers the country over are becoming increasingly exacting each year, graduate work in industrial education brings its proportional rewards and is usually necessary for those who desire to enter the field of supervision, administration, or teacher education. Programs of study leading to the degree of Master of Science or Master of Education are outlined by this department for both *industrial-arts* and *trade-industrial* students and teachers with approved graduate standing.

Courses for Industrial Arts Students

See also courses in the Department of Education, especially Ed 408, and courses in technical subject matter appropriate to industrial arts teachers in the Department of Industrial Engineering and Industrial Arts (SCHOOL OF ENGINEERING).

Upper Division Courses

IEd 311,312. **Elementary School Industrial Arts.** 3 hours each term. 3 ①
Objectives, methods, techniques of *expressional* industrial arts in elementary schools. *First term:* Objectives and techniques; group projects in home room; creative expression. *Second term:* Individual projects for special displays; tools and material for special-subjects room. Prerequisite: Ed 310 or junior standing.

IEd 401. **Research.** Terms and hours to be arranged.

IEd 403. **Thesis.** Terms and hours to be arranged.

IEd 405. **Reading and Conference.** Terms and hours to be arranged.

IEd 407. **Seminar.** Terms and hours to be arranged.

IEd 420. **Industrial Arts Organization.** (g) 3 hours. 3 ①
Diversified programs for smaller high schools; evaluation of jobs, projects, and class problems; survey of appropriate teaching aids; development of professional relationships. Prerequisite: Ed 408e and senior standing.

IEd 470. **History of Manual and Industrial Education.** (G) 3 hours. 3 ①
Historical development and present-day aims of industrial-arts and vocational-industrial education. Prerequisite: senior standing.

IEd 472. **Occupational Analysis.** (G) 3 hours. 3 ①
Analysis of an occupation, trade, or job into its component subdivisions, blocks, operations, and teaching units; occupational analysis in teaching procedure. Prerequisite: Ed 408, and technical background.

IEd 473. **The General Shop and Its Problems.** (G) 2 hours. 2 ①
The "general shop" type of organization; advantages and limitations; probable future; content, organization, and methods of presenting subject matter; class control. Prerequisite: Ed 408e.

IEd 475. **Project Analysis and the Contract Plan.** (G) 2 hours. 2 ①
Projects for various types of shop teaching; history and development of the contract plan; technique of preparing contracts; suggestions for use in industrial-arts classes. Prerequisite: IEd 472 or equivalent.

IEd 476. **Supervision of Industrial Arts.** (G) 2 hours. 2 ①
Functions, techniques of supervisor; supervision principles from teacher's viewpoint; teacher-supervisor relationships. Problems of supervisor in large and small school systems. Prerequisite: gradua'e standing and teaching experience in industrial arts.

Graduate Courses
(For both Industrial Arts and Trade Education students)
Courses numbered 400-499 and designated (*g*) or (*G*)
may be taken for graduate credit.

IEd 501. **Research.** Terms and hours to be arranged.

IEd 503. **Thesis.** Terms and hours to be arranged.

IEd 505. **Reading and Conference.** Terms and hours to be arranged.

IEd 507. **Seminar.** Terms and hours to be arranged.

Undergraduate Curriculum for Trade and Industrial Education

The 4-year professional program leading to the bachelor's degree in trade and industrial education allows candidates some credit based on trade or industrial experience; but they must fulfill the regular institutional requirements listed under DEGREES AND CERTIFICATES. In order to be admitted to this program, a candidate must present evidence of three years above the standard learning experience, or acceptable trade or industrial experience, or he must present credentials indicating that he is qualified to teach or supervise reimbursed Smith-Hughes classes in his state. He must also be engaged in teaching (or about to be so engaged), or be employed as a vocational supervisor.

Required Professional Courses. General Psychology (Psy 201,202), School in American Life (Ed 310), Educational Psychology: Learning (Ed 312), Special Secondary Methods (Trade and Industrial Education) (Ed 408t), and the following Trade and Industrial Education courses: IEd 381,382,480,481,482, and 491. The student's program must also include 16 hours of approved electives in Trade and Industrial Education to make a total of 48 hours of required professional courses.

Recommended Professional Electives. Principles and Objectives of Vocational Education (Ed 494), Conference Leader Training (Ed 496), Organization and Administration of Vocational Education (Ed 495), and the following Trade and Industrial Education courses: IEd 383,483,484,485,486,487,488,490,407.

Credit through Examination. Students with three or more years above the standard learning period of trade or industrial experience may be granted a maximum of 48 term hours of credit for such experience. This credit is granted upon the candidate's successful performance on a special examination.

A year's trade or industrial experience is defined as 48 weeks as a wage earner. Experience in the employment of school boards or in the armed services will not be accepted. The minimum period of experience acceptable under one employer is 3 months. In those trades or occupations where assignment to short time jobs is made through a union hiring hall, the assigning union may be considered as the employer. Experience in scattered fields is not acceptable.

Summary:

Required courses (general)	54 term hours
Required courses (professional)	48 term hours
Credit through examination (maximum)	48 term hours
General electives	42 term hours
Total required for bachelor's degree	192 term hours

Additional information in regard to provision for obtaining credit for experience through examination may be obtained from the School of Education. Courses listed below are offered only infrequently, extramurally, or in summer session in cooperation with the Department of Vocational Education.

Courses for Trade and Industrial Education Students

Upper Division Courses

IEd 381. **Introduction to Industrial Education.** 2 hours. 2 ①
Orientation in and purposes and operation of vocational education emphasizing trade and industrial aspects; practice in organizing materials, planning lessons, and developing teaching techniques. Prerequisite: three years' practical trade experience.

IEd 382. **Analysis and Course Construction.** 3 hours. 3 ①
Course construction based on trade analysis: selection of type of jobs that require skills and knowledge discovered through analysis, arranged in sequence of difficulty within each division of the trade. Prerequisite: Ed 408; IEd 381 or equivalent.

IEd 383. **Educational Psychology for Trade and Industrial Teachers.** 3 hours. 3 ①
Psychology applied to acquisition of manipulative skills and related technical information; the learning process, factors in emotional control, development of attitudes, abilities, and evaluations. Prerequisite: IEd 381 or experience as a vocational instructor.

IEd 480. **Shop Organization and Management.** (g) 3 hours. 3 ①
Organizing and controlling shop instruction, handling supplies, maintaining equipment and tools, purchasing materials, keeping records, making inventories, and meeting other problems of setting up and operating vocational shop courses; shop plans and layout. Prerequisite: IEd 381; Ed 408; IEd 382 or equivalent.

IEd 481. **Development and Use of Audio-Visual Aids.** (g) 3 hours. 3 ①
Instructional aids and methods of evaluating them; practice in techniques of development, preparation, and construction; using instructional aids; operation of audio-visual equipment in vocational classes. Prerequisite: IEd 382 or teaching experience.

IEd 482. **Development, Organization, and Use of Instructional Materials.** (g) 2 hours. 2 ①
Sources, values, limitations, and classification of instruction sheets and reference materials. Techniques of developing and using instructional materials in shop and related classes. Prerequisite: IEd 382 or equivalent.

IEd 483. **Coordination of Diversified Occupations Programs.** (G) 2 hours. 2 ①
Principles and practices of effective coordination applied to diversified occupations programs; problems involved in organizing, conducting, and reporting a diversified occupations program. Prerequisite: IEd 381 or coordination experience.

IEd 484. **Coordination of Trade and Industrial Classes.** (G) 2 hours. 2 ①
Principles, practices of coordination between trade and industrial education and industry; problems of coordinator in unit trade, trade extension, and cooperative programs; relationships between coordinator, supervisor, and administrator; placement and followup problems. Prerequisite: IEd 483 or coordination experience.

IEd 485. **Supervision of Trade and Industrial Education.** (G) 2 hours. 2 ①
Supervisory techniques applied to local and State-level programs. Analysis of supervisory needs for individual situations; planning supervisory programs to meet the needs. Prerequisite: IEd 382, IEd 484, or equivalent.

IEd 486. **Vocational Guidance for Trade and Industrial Teachers.** (G) 2 hours. 2 ①
Principles and problems of guidance that will enable a vocational teacher to serve as an outpost of guidance counselor's office; number of workers in trade, working conditions, rates of compensation, special laws pertaining to occupation, opportunities for advancement, and necessary preparation for promotion and success in different phases of the occupation. Prerequisite: IEd 382 or equivalent.

IEd 487. **Industrial and Public Relations for Trade and Industrial Teachers.** (G) 3 hours. 3 ①
History and development of industrial, civic, and labor organizations; techniques necessary to promote wholesome relationships with the community and outside groups. Prerequisite: Ed 408 or teaching experience.

IEd 488. **Educational Personnel Relations: Supervisory Development.** (G) 2 hours. 2 ①
Designed to aid school administrators, supervisors, coordinators, and teachers in building and maintaining good personnel relations; methods of handling individual and group relations and problems. Prerequisite: IEd 484 or IEd 485 or equivalent.

IEd 490. **Shop Design and Layout for Trade and Industrial Teachers.** (G) 2 hours. 2 ①
Shop planning and layout principles applied to vocational or trade school; planning, designing, and layout of vocational-type shops. Prerequisite: IEd 480 or equivalent.

IEd 491. **Testing for Trade and Industrial Teachers.** (g) 3 hours. 3 ①
Selection and construction of tests to measure effectiveness of trade teacher and advancement of pupils; types of tests; techniques of construction and administration; possibilities and limitations; reliability and validity. Prerequisite: IEd 382,482,or equivalent.

Graduate Courses
Courses numbered 400-499 and designated (*g*) or (*G*)
may be taken for graduate credit. See also IEd 501-507, page 210.

Physical Education

The Division of Physical Education offers professional courses in physical education leading to baccalaureate degrees through the School of Education. The major provides professional preparation for physical education and coaching. It may be combined with health education, camp education, or recreation to meet needs in many public schools or communities. Graduates are prepared for positions in YMCA or YWCA, city recreation, industrial recreation, camping, and various youth-serving organizations. The major provides a foundation for students preparing to enter the field of physiotherapy and other closely related fields. The program is flexible so that varied needs may be met.

Many opportunities exist for combining a physical education major with courses in the Schools of Science, Agriculture, Engineering, and Home Economics. These schools offer work closely related to the offerings in health and physical education.

See the DIVISION OF PHYSICAL EDUCATION for outline of a suggested Student's Basic Program for a major in physical education.

Science Education

Professional preparation for prospective teachers of biological and physical science and mathematics is offered by the Department of Science Education, a joint department within the School of Science and the School of Education. Students preparing to teach science in secondary schools may major in one of the sciences, or in general science, according to the degree or emphasis on sub-

ject matter or professional preparation. Combination of subjects to be taught and scope of preparation desired influence the choice of major school.

The requirements for the State High School Teacher's Certificate and list of approved teaching majors and minors in science on page 194 may be supplemented by additional courses in the several fields. Teaching majors in general biology, general science, mathematics, and physical science provide electives that permit flexibility in selection of courses. The major in health education is made up of required courses and may well be augmented by additional courses in biology and related fields. A wide range of health education courses is available in the Schools of Science, Education, Agriculture, Engineering, and Home Economics, and the Division of Physical Education. Both undergraduate and graduate majors in hygiene and sanitation are offered in the Department of Microbiology and Hygiene.

Lower Division Course

SEd 123. **Introduction to Health Education.** 3 hours spring. 3 ①
Background and philosophy of health education; statistical facts that indicate need for health education; modern practices in, and organizations for, health education; opportunities for professional work in field.

Upper Division Courses

SEd 321. **School Health Education.** 3 hours. 3 ①
Methods, procedures, processes, and techniques in developing ability of public school student to understand and guide his own health and to contribute to health of community. Prerequisite: SEd 123 or junior standing.

SEd 322. **School Health Services.** 3 hours. 3 ①
School procedures in development, maintenance, and protection of health of student; organization of services, examinations, screening, special services, communicable disease control, emergency care, school environment, forms and records. Prerequisite: SEd 123 or junior standing.

SEd 401. **Research.** Terms and hours to be arranged.

SEd 403. **Thesis.** Terms and hours to be arranged.

SEd 405. **Reading and Conference.** Terms and hours to be arranged.

SEd 407. **Seminar.** Terms and hours to be arranged.

Ed 408. **Special Secondary Methods.** 3 hours.
(b) Biological Science. (f) Mathematics. (g) Physical Science. See Ed 408 under SCHOOL OF EDUCATION.

SEd 431,432,433. **School Health Problems.** (G) 3 hours each term. 3 ①
Maintenance of health of school children; communicable diseases; school sanitation; planning of school buildings; health of school child; hygiene instruction. Prerequisite: Ed 310,312, and one year of upper division biology. LANGTON.

SEd 441,442,443. **Health Education.** (G) 3 hours each term. 3 ①
Philosophy and principles of health education, organization and administration, and coordination of school health activities with various resources. First term major emphasis is placed on health services and healthful school living; second term, on the elementary school health instruction program; third term, on secondary school health instruction program. Prerequisite: one year of upper division biological science and SEd 321 and 322, or equivalent.

SEd 481. **Alcohol Studies in School Curriculum.** (G) 3 hours. 3 ①
Incorporation of scientific information about alcohol in school curriculum; physiological, psychological, sociological, and legal aspects of alcoholism. Prerequisite: 24 hours upper division education.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

SEd 501. **Research.** Terms and hours to be arranged.

SEd 503. **Thesis.** Terms and hours to be arranged.

SEd 505. **Reading and Conference.** Terms and hours to be arranged.

SEd 507. **Seminar.** Terms and hours to be arranged.

SEd 591. **Practicum in Biological Science.** 3 hours. 2 ① 1 ②
To develop competencies in laboratory and demonstrative skills, program planning, maintaining and designing laboratory materials. Prerequisite: Ed 408b Ed 416, and teaching major in biological science. WILLIAMSON.

SEd 592. **Practicum in Physical Science.** 3 hours. 2 ① 1 ②
To develop competencies in laboratory and demonstration skills, program planning, maintaining and designing laboratory materials. Prerequisite: Ed 408g, Ed 416 and teaching major or minor in physical science. FOX.

SEd 595. **Evaluation Techniques.** 3 hours. 3 ①
Trends, practices, and techniques of evaluation in science education, with emphasis on construction of tests, rating scales, check lists, and development of criteria for analysis of student work product. Prerequisite: Ed 408b, g, or f, Ed 416, and teaching experience.

SEd 597. **Administration and Supervision of Programs.** 3 hours. 3 ①
Purposes, problems, and procedures for developing and directing science education programs; individual problems studied and reported. Prerequisite: Ed 408b, g, or f, Ed 416. and teaching experience.

SEd 598. **Science Curriculum in Secondary Schools.** 3 hours. 3 ①
Trends, problems, and procedures in junior high and secondary school science program. Prerequisite: 24 hours upper division education including Ed 416. WILLIAMSON.

School of Engineering and Industrial Arts

Faculty

As of January 1961

GEORGE WALTER GLEESON, Ch.E., Dean of the School of Engineering and Industrial Arts.

JAMES GEORGE KNUDSEN, Ph.D., Assistant Dean.

MARVIN REYNOLDS HAITH, B.S., Personnel and Placement Officer.

General Engineering: Professors RICHARDSON (department head), WILLEY (emeritus); Associate Professors GRAY, HAITH, JARVI; Assistant Professors BUCY, CAMPBELL, COX, JENSEN, MILLER, PARKINSON; Instructors CHARTERS, CROFF, DILLARD, GARRARD, SHROCK, STATON.

Agricultural Engineering: Professors RODGERS (department head), CROPSEY, LUNDE, SINNARD; Associate Professors BONNICKSEN, KIRK, LONG, WOLFE; Assistant Professors BOOSTER, CHRISTENSEN; Instructor SCHOOF.

Chemical Engineering: Professors WALTON (department head), WICKS;[1] Assistant Professors MEREDITH, MOEN, MRAZEK; Instructor MEYER.

Civil Engineering: Professors HOLCOMB (department head), COOPEY, MCCLELLAN, MERRYFIELD; Associate Professors BEHLKE, BURGESS, KOFOID, PAN, SHOEMAKER; Assistant Professors BEECROFT, BELL,[1] DRACUP, NORTHCRAFT; Instructors MARTIN, MIKSCH, PRITCHETT, YODER.

Electrical Engineering: Professors L. N. STONE (department head), ALBERT, COCKERLINE (emeritus), FEIKERT, MAGNUSSON; Associate Professors ENGLE, MICHAEL, OORTHUYS, WEBER;[1] Assistant Professors ALEXANDER,[1] AMORT, BEAM, JENSEN, LOONEY, S. A. STONE; Instructors DUNLAP, HALL, MOON.

Engineering Physics: Professor E. A. YUNKER (department head).

Industrial Engineering: Professors COX (department head), ENGESSER, SHEELY; Associate Professors FRAZIER, MEYER (emeritus), ROBLEY, WILLIAMSON; Assistant Professors HOEYE, JOHNSON (emeritus), RIESLAND, B. E. SMITH,[1] E. E. SMITH, WILSON; Instructors COLE, KAISER, LABAUN, LOVE, WITHYCOMBE.

Mechanical Engineering: Professors SLEGEL (department head), GRAF (emeritus), HEATH, HUGHES, MARTIN (emeritus), PAASCHE, PAUL, PHILLIPS (emeritus), THOMAS (emeritus); Associate Professors LARSON, OLLEMAN, SMITH, THORNBURGH; Assistant Professors BOUBEL,[1] DALY, GELLER, JOHNSON, LEVINSON, MCCLURE, MINGLE, ZAWORSKI; Instructors CLAUDSON, RIGGS, WELTY, WILSON.

General Statement

ENGINEERS *apply* science. They apply scientific knowledge and principles to the design and operation of machines, to the selection of materials, and to the use of men, money, and energy. Engineering, therefore, is known as "applied science."

Men and women trained in engineering have numerous job opportunities. A continuing demand exists for personnel trained in design, research, and development. Companies search constantly for men and women capable of assuming important positions in production, operation, and construction. There are opportunities in consulting, maintenance, sales, service, and administrative work. Salaries and rate of advancement compare favorably with other recognized professions. Personal characteristics of initiative, patience, thoroughness, orderliness, accuracy, persistence, and reliability are unusually well rewarded.

A young man or woman who plans to enter the profession of engineering must have a comprehensive knowledge of the basic sciences, particularly mathematics, physics, and chemistry. Some of this knowledge can be acquired in high school by taking the maximum number of courses available in these subjects.

[1] On leave 1961-62.

To succeed in the study of engineering in college, students should be from the upper two-thirds of their high school graduating classes. They should have demonstrated proficiency in mathematics, the physical sciences, and English. They should also have an interest in material things and a patient, sustained enthusiasm for working hard at difficult tasks.

Because engineering is a job of *heads* rather than *hands,* a person taking engineering must develop habits of problem solving which result in some final plan or design, or procedure, or method. Many professions other than engineering involve problem solving. An engineering education, therefore, serves purposes other than those of the professional engineer. The educational pattern is strong and rigorous, compatible with the technical aspects of modern society, providing sound preparation for many pursuits other than engineering.

Those who go into professional engineering practice find that the profession is regulated by state laws. A professional engineer must have a license from the state in which he practices. To obtain such a license he must show that he has had satisfactory engineering education and practical experience. The Engineers' Council for Professional Development periodically inspects and evaluates college courses in engineering to make sure that they meet the standards of the profession. Once a curriculum of a school of engineering passes this inspection it becomes "accredited"; it keeps this rating as long as it maintains high standards. Satisfactory completion of such an accredited curriculum—that is, graduation from an accredited school of engineering—is almost everywhere a requisite for a state license or a civil service appointment.

Departments and Options. The School of Engineering is divided into several departments. With the exception of production technology students, all freshmen are enrolled in the Department of General Engineering for the first year. At the end of the common freshman year, selection is made from among the several curricula of agricultural, chemical, civil, electrical, or mechanical engineering, or engineering physics. In many of the departments, various options are available which provide opportunity for specialization in secondary areas during the senior year. Four or more years, including the freshman year, are necessary to complete the requirements for a first (B.S.) degree. Additional studies lead to the M.S., Ph.D., or professional degrees.

Associated with engineering, but not an engineering curriculum, is a course of study, Production Technology, in which only the B.S. degree is offered. In this curriculum a student has a choice of one of three options: wood industries, metal industries, or tool design. This training leads to positions in the manufacturing industries associated with mass-production procedures. Freshman students who elect Production Technology as a major report directly to the Department of Industrial Engineering and Industrial Arts.

Advisement. Each student in the School is assigned to a faculty adviser. Details of procedure, registration, course selection, professional opportunities, personal requirements, academic regulations, and so forth, should be discussed with the adviser. Entering students whose backgrounds are weak, particularly in mathematics and English, will be advised to enroll in refresher work prior to attempting a regular course pattern. Transfer students from nonaccredited institutions may be required to complete an examination in the field of their major to establish their ability to engage in courses at the level indicated by their prior academic record. The School of Engineering relies upon prior advisement at the secondary school level and, in the case of transfer students, at the college level for basic preparation rather than upon the stipulation of specific course requirements for admission.

Double Degrees. Many students wish to major in more than one area. It is possible to meet the requirements for more than one degree, either within or outside of the School. The additional degree generally involves extension of time beyond four years. Persons interested in second degrees are referred to section on DEGREES AND CERTIFICATES, particularly the section *Requirements for Bachelor's Degree,* in the General Catalog.

Requirements for Advanced Degrees. Advanced degrees of Master of Science, Master of Arts, and Doctor of Philosophy are offered in the several departments. Programs for advanced degrees are developed to satisfy the interests and objectives of the individual candidate. General regulations and requirements for all advanced degrees, including professional degrees, are printed under GRADUATE SCHOOL.

Placement. The School of Engineering maintains an organized, central placement office under the immediate direction of the dean of Engineering. The service of the placement office is available to industrial organizations, undergraduate and graduate students, and alumni. Services are not restricted to engineering, but are available to all associated fields including chemistry, mathematics, physics, and business and technology.

Curricula in Engineering and Industrial Arts

B.A., B.S., M.A., M.S.,
A.E., Ch.E., C.E., E.E., I.E., M.E., Min.E., Ph.D. Degrees

Agricultural Engineering
Chemical Engineering
Civil Engineering
Electrical Engineering
Industrial Engineering
Mechanical Engineering
Engineering Physics
Production Technology

Freshman Year

Common to Agricultural, Chemical, Civil, Electrical, Industrial, and Mechanical Engineering, and Engineering Physics.

	Term hours		
	F	W	S
Engineering Concepts (GE 101,102,103)	3	3	3
Engineering Graphics (GE 111,112,113)	2	2	2
Mathematics (Mth 101,102)	4	4	....
Calculus with Analytic Geometry (Mth 200)	....	....	4
General Chemistry (Ch 201,202,203)	3	3	3
English Composition (Wr 111,112,113)	3	3	3
Air, Military, or Naval Science	1–3	1–3	1–3
Physical Education and General Hygiene	1	1	1

Sophomore Year Norm

Common to Agricultural, Chemical, Civil, Electrical, Industrial, and Mechanical Engineering, and Engineering Physics.

	Term hours		
	F	W	S
Calculus with Analytic Geometry (Mth 201,202,203)	4	4	4
Engineering Physics (Ph 207,208,209)	4	4	4
Air, Military, or Naval Science	1–3	1–3	1–3
Physical Education and General Hygiene	1	1	1

Agricultural Engineering

E.C.P.D. Accredited

Sophomore Year	*Hours*
Sophomore Year Norm	30–36
Mechanics of Materials (ME 217,218, 219)	9
Machine Tool Practices (IE 260)	2
Elements of Horticulture (Hrt 111) or General Botany (Bot 201)	3
Farm Mechanics (AE 221)	3
[1]Introduction to Dairy and Animal Science (DAH 121)	3

Junior Year	*Hours*
Dynamics of Solids and Fluids (ME 317,318,319)	9
Engines and Tractors (AE 311)	3
Soils (Sls 211,212)	6
Plane Surveying (CE 226) or (CE 221)	3
Approved social science	9
Air, Military, or Naval Science, or Electives	9
Restricted Electives	15

Senior Year	*Hours*
Farm Structures (AE 461)	3
Power Farming Machinery (AE 491)	3
Rural Electrification (AE 431)	3
Soil and Water Conservation (AE 471)	3
Thermodynamics and Heat Transfer (ME 321)	3
Differential Equations (Mth 321)	3
Electrical Fundamentals (EE 351)	3
Seminar	1
Air, Military, or Naval Science, or Electives	9
Restricted Electives	18

Chemical Engineering

E.C.P.D. Accredited

Sophomore Year	*Hours*
Sophomore Year Norm	30–36
Stoichiometry and Thermodynamics (ChE 211,212,213)	6
Chemical Theory (Ch 241)	4
Quantitative Analysis for Chemical Engineering Students (Ch 232)	4
Instrumental Methods (Ch 243)	4

Junior Year	*Hours*
Chemical Engineering Thermodynamics (ChE 311,312)	6
Transfer Processes (ChE 313)	3
Organic Chemistry (Ch 430,431,432)	12
Physical Chemistry (Ch 440,441,442)	9
Physical Chemistry Laboratory (Ch 443, 444,445)	3
Differential Equations (Mth 321)	3
Mechanics of Materials (ME 217)	3
Strength of Materials (ME 311)	3
Engineering Materials (ME 315)	3
Field Trip	0
Air, Military, or Naval Science, or Electives	12

Senior Year	*Hours*
Unit Operations (ChE 411,412,413)	8
Elements of Process Industries (ChE 442,443)	4
Chemical Engineering Laboratory (ChE 414,415)	6
Chemical Plant Design (ChE 432)	3
[2]Chemical Engineering Calculations (ChE 425)	3
[3]Electrical Fundamentals (EE 351,352), or Circuits and Fields (EE 201,202)	6–8
Field Trip	0
International Politics and National Power (SSc 441,442,443) or Other Social Sciences	9
Air, Military, or Naval Science, or Electives	9

Civil Engineering

E.C.P.D. Accredited

Sophomore Year	*Hours*
Sophomore Year Norm	30-36
[4]Introduction to Civil Engineering (CE 201,202,203)	6
Mechanics and Strength of Materials (CE 211,212,213)	9
Plane Surveying (CE 221,222,223)	9

Junior Year	*Hours*
Dynamics and Fluid Mechanics (CE 311,312,313)	9
Structural Theory (CE 381,382,383)	9
Materials Testing Laboratory (ME 316)	3
Soil Mechanics (CE 372)	3
Industrial Electricity (EE 356,357)	6
Thermodynamics and Heat Transfer (ME 321)	3
[5]Social Science or Humanities	9
Military Science or Social Science Electives	9

[1] Naval Science students omit this course.
[2] An approved 300 or 400 number course in mathematics may be substituted.
[3] EE 352 not required for students taking 400 sequence in ROTC.
[4] Naval Science students omit CE 202,203, and elective.
[5] American Governments (PS 201), Introduction to Sociology (Soc 212), Outlines of Economics (Ec 212), International Politics and National Power (SSc 441,442,443), or approved humanities courses.

Senior Year

	Hours
Hydrology (CE 411)	3
Hydraulics (CE 412)	3
Structural Engineering (CE 481,482, 483)	9
Sanitary Engineering (CE 451)	3
Estimating and Contracts (CE 463)	4
Highway Engineering (CE 421)	3
Foundations (CE 472)	3
Indeterminate Structures (CE 485)	3
Seminar (CE 407)	1
[1]Optional Restricted Electives	10
Military Science or Electives	9

Electrical Engineering

E.C.P.D. Accredited

Sophomore Year

	Hours
Sophomore Year Norm	30-36
Circuits and Fields (EE 201,202,203)	12
[2]Engineering Science	9

Junior Year

	Hours
Electromagnetics (EE 311,312,313)	9
Electronics (EE 321,322,323)	9
Differential Equations (Mth 321)	3
Circuit Theory (EE 330)	3
Electromagnetic Waves (EE 331)	3
[2]Engineering Science	9
[3]Humanities or Social Science Electives	9
[4]Air, Military, or Naval Science, or Restricted Electives	9

Senior Year

	Hours
Electrical Engineering Economy (EE 411)	3
Transmission Systems (EE 421,422)	6
Seminar (EE 407)	3
Field Trip	0
Major Electives (Communication, Control or Power Engineering)	9
[5]Air, Military, or Naval Science, or Restricted Technical Electives	9
Engineering Science or Science	9
[3]Humanities or Social Science	9

Engineering Physics

Students electing the curriculum in Engineering Physics register as sophomores under the School of Engineering in the Department of Physics by cooperative arrangement.

Sophomore Year

	Hours
Sophomore Year Norm	30-36
Mechanics of Materials (ME 217,218, 219)	9
Group Requirements in Social Science	9

Junior Year

	Hours
Introduction to Modern Physics (Ph 311,312,313)	9
Differential Equations (Mth 321,322)	6
Electronics (EE 321,322,323)	9
Thermodynamics and Heat Transfer (ME 321,322,323)	9
Electricity and Magnetism (Ph 331, 332)	8
Air, Military, or Naval Science or Elective in Language, Literature, or Social Science	9

Senior Year

	Hours
Atomic and Nuclear Physics (Ph 474, 475,476)	9
Introduction to Field Theory (Ph 477, 478,479)	9
Geometrical and Physical Optics (Ph 465,466)	6
Elementary Physical Chemistry (Ch 340)	3
Air, Military, or Naval Science or Electives in Language, Literature, or Social Science	9
Approved Technical Electives	15

[1] Optional restricted electives—3 credits winter and spring—Highway Engineering (CE 422), Hydraulic Machinery (CE 433), Cement and Concrete (ME 414), Sanitary Engineering (CE 452,453), Building Design (CE 489), and Indeterminate Structures (CE 486).

[2] Specific courses and sequence to be indicated after further review of courses available or being developed.

[3] Choice of specific courses to be indicated after further review of courses available or being developed.

[4] Electives to be physics or mathematics.

[5] Electives to be selected from electrical engineering or appropriate business administration courses.

Industrial Engineering

E.C.P.D. Accredited

Sophomore Year

	Hours
Sophomore Year Norm	30-36
Foundry Practices (IE 240)	2
Machine Tool Practices (IE 260)	2
Introduction to Scientific Management IE 290)	3
Mechanics of Materials (ME 217,218, 219)	9
Forging and Welding (IE 250)	2
Outlines of Economics (Ec 212)	3
American Governments (PS 201)	3

Junior Year

	Hours
Mass Production Methods (IE 361, 362)	6
Methods and Motion Study (IE 391)	3
Time Study (IE 392)	3
Production Planning and Control (IE 393)	3
Field Trip	0
Metallurgy and Materials (ME 312,313)	6
Dynamics of Solids and Fluids (ME 317, 318,319)	9
Practical Psychology (Psy 212)	3
Air, Military, or Naval Science, or Electives	18

Senior Year

	Hours
Tool Engineering (IE 464)	3
Production Planning and Control (IE 491,492)	6
Ind. Supervision Principles (IE 490)	3
Safety in Industry (IE 390)	2
Field Trip	0
Electrical Fundamentals (EE 351,352)	6
Machine Design (ME 411)	3
Mechanical Engineering Analysis (ME 371)	3
Fundamentals of Accounting (BA 214, 215)	6
Industrial Cost Accounting (BA 421)	3
Air, Military, or Naval Science, or Electives	9

Mechanical Engineering

E.C.P.D. Accredited

Sophomore Year

	Hours
Sophomore Year Norm	30-36
Mechanics of Materials (ME 217,218, 219)	9
Foundry Practices (IE 240)	2
Machine Tool Practices (IE 260)	2
Forging and Welding (IE 250)	2
Approved Electives in Social Science	9

Junior Year

	Hours
Thermodynamics and Heat Transfer (ME 321,322,323)	9
Dynamics of Solids and Fluids (ME 317,318,319)	9
Gas Dynamics (ME 324)	3
Electrical Fundamentals (EE 351,352, 353)	9
Mechanical Engineering Analysis (ME 371)	3
Metallurgy and Materials (ME 312,313)	6
Mechanical Laboratory (ME 351)	3
[1]Air, Military, or Naval Science, or Electives	9
Field Trip	0

Senior Year

Senior Year Norm	Hours
Machine Design (ME 411,412,413)	9
Mechanical Laboratory (ME 437,438)	6
Fuels and Lubricants (ME 425)	3
Mechanical Engineering Economy (ME 460)	3
	21

General Option	
Senior Year Norm	21
Vibrations (ME 419) or Elasticity (ME 416) or Theory of Structures (ME 447)	3
Power Plant Engineering (ME 431)	3
Heating and Air Conditioning (ME 421)	3
Refrigeration (ME 423)	3
Electives	15

Applied Mechanics Option	Hours
Senior Year Norm	21
Theory of Structures (ME 447,448, 449)	9
Elasticity (ME 416,417)	6
Vibrations (ME 419)	3
Electives	9

Aeronautical Option	Hours
Senior Year Norm	21
Theory of Structures (ME 447,448,449)	9
Fluid Flow (Aerodynamics) (ME 454, 455,456)	9
Aircraft Performance (ME 457,458)	6
Electives	3

Air, Military, or Naval Science Option

Students in Air, Military, or Naval Science Option take the Senior Year Norm, 9 credit hours of Air, Military, or Naval Science, 18 hours of electives of which at least 9 hours must be in approved mechanical engineering courses.

Metallurgy Option	Hours
Senior Year Norm	21
Metallography (ME 482,483,484)	9
Metallurgy (Met 331,332 333)	9
Electives	9

[1] Students in Nuclear Option take Introduction to Modern Physics (Ph 311,312,313).

AUTOMOTIVE OPTION

Senior Year Norm	21
Automotive Engineering (ME 491,492, 493)	9
Gas Turbines and Jet Engines (ME 434)	3
Vibrations (ME 419)	3
Metallography (ME 482)	3
Electives	9

NUCLEAR OPTION

Subject Matter by Arrangement	18
Electives	9

Production Technology

Freshman Year

	Hours
Pattern Making (IE 111)	3
Foundry Practices (IE 140)	3
Methods in Woodworking (IE 112,113)	6
Forging and Welding (IE 150)	3
Machine Tool Practices (IE 160)	3
Engineering Graphics (GE 111,112,113)	6
[1]Intermediate Algebra (Mth 100)	4
Mathematics (Mth 101,102)	8
English Composition (Wr 111,112,113)	9
Physical Education and General Hygiene	3
Air, Military, or Naval Science, or Electives	3–9

Sophomore Year

	Hours
Introduction to Scientific Management (IE 290) or House Planning and Architectural Drawing (AA 180)	3
Abridged General Physics (Ph 211,212)	6
Descriptive General Chemistry (Ch 130)	3
Outlines of Economics (Ec 212)	3
Economic Development of the United States (Ec 215)	3
American Governments (PS 201)	3
Extempore Speaking (Sp 111)	3
Business English (Wr 214)	3
Technical Report Writing (Wr 227)	3
[2]Optional Restricted Electives	14
Physical Education	3
Air, Military, or Naval Science, or Electives	3–9

Junior Year

	Hours
Methods and Motion Study (IE 391)	3
Time Study (IE 392)	3
Production Planning and Control (IE 393)	3
Field Trip	0
Fundamentals of Accounting (BA 214, 215)	6
Industrial Cost Accounting (BA 421)	3
Optional Restricted Electives (see list below.)	25
Air Military, or Naval Science, or Electives	9

Senior Year

	Hours
Safety in Industry (IE 390)	2
Industrial Supervision Principles (IE 490)	3
Field Trip	0
Business Law (BA 411,412, or 413)	6
Practical Psychology (Psy 212)	3
Money and Banking (Ec 424)	4
Labor Problems (Ec 425)	4
Optional Restricted Electives (see list below.)	20
Air, Military, or Naval Science, or Electives	9

Optional Restricted Electives

METAL INDUSTRIES OPTION

SOPHOMORE YEAR: IE 265,344,354,361.
JUNIOR YEAR: IE 345,355,361,362,363,365; GE 311.
SENIOR YEAR: IE 464,465; ME 480.

TOOL DESIGN OPTION

SOPHOMORE YEAR: IE 354, 361.
JUNIOR YEAR: IE 344,361,362,363,365; ME 480; GE 311.
SENIOR YEAR: IE 464,465,466.

BUILDING CONSTRUCTION OPTION

SOPHOMORE YEAR: IE 220 225,380; AA 178,179,180,223,281.
JUNIOR YEAR: IE 311,316,333; CE 226; LA 279.
SENIOR YEAR: AE 465.

FURNITURE AND MILL-CABINET OPTION

SOPHOMORE YEAR: IE 220,225,380; AA 178,179,180,223,281.
JUNIOR YEAR: IE 311,313,314 316,333.
SENIOR YEAR: AE 465.

[1] Students electing the Tool Design option must complete mathematics through Mth 200.
[2] Selected upon approval of adviser, in accord with objectives of Metals Industries, Wood Industries, or Tool Design option.

General Engineering

Engineering courses required in the common freshman year for agricultural, chemical, civil, electrical, industrial, and mechanical engineering and engineering physics are grouped in the Department of General Engineering.

Lower Division Courses

GE 101, 102, 103. **Engineering Concepts.** 3 hours each term. 3 ②
Lectures and elementary problems dealing with basic concepts common to all fields of engineering; engineering analysis and methods of work. Prerequisite: Mth 100 or equivalent.

GE 104. **Engineering Fundamentals.** 3 hours spring. 1 ① 2 ③
Basic concepts and principles of physical science; elementary technical problems; algebraic composition; training in use of slide rule. For production technology students.

GE 111, 112, 113. **Engineering Graphics.** 2 hours each term. 3 ②
Fundamental principles and rules of composition of the graphic language of engineering.

GE 115. **Engineering Drawing.** 3 hours. 1 ① 3 ②
Fundamental principles and rules of composition of the graphic language of industry. For forestry students only.

GE 121, 122. **Engineering Drawing.** 3 hours each term. 1 ① 3 ②
Fundamentals of graphic composition with particular emphasis on reading and interpretation of line drawings, charts, and diagrams. For students in Business and Technology.

Upper Division Service Courses

GE 311. **Applied Mechanisms.** 3 hours spring. 2 ① 1 ②
Theory, application, and selection of mechanisms as applied to product design and production tooling.

GE 461. **Historical Development of Engineering.** (g) 3 hours. 3 ①
Historical development of engineering processes and thought. Class investigations and case studies. Prerequisite: senior standing.

Agricultural Engineering

The curriculum in agricultural engineering is planned to prepare students for positions in the major fields of agricultural engineering: power and machinery, rural electrification, farm structures, soil and water control and conservation, and crop processing. The curriculum is planned also to give the student general training in agriculture since a sympathetic understanding of the problems of agriculture is essential to anyone going into agricultural engineering. The Department of Agricultural Engineering is a joint department within the School of Engineering and the School of Agriculture.

Facilities are provided in the Agricultural Engineering Building for teaching and experimental work in the major fields. Modern equipment and demonstration material are loaned to the institution by leading manufacturers and distributors for study and operation by the student. The power and motor vehicle laboratories are well equipped with modern tools and testing equipment including an engine-testing dynamometer. Well lighted drafting rooms with modern equipment are available to students studying farm structures. Numerous samples of building materials, models, modern farm buildings, farm water systems, centrifugal and turbine pumps, and sprinkler irrigation equipment are available for instruction purposes.

Lower Division Course

AE 221. **Farm Mechanics.** 3 hours. 1 ① 2 ③
Use of hand and power tools for wood and metal working, arc and acetylene welding, construction of wood and metal farm appliances, concrete work.

Upper Division Courses

AE 311. **Engines and Tractors.** 3 hours any term. 2 ① 1 ③
The internal combustion engine as used in agriculture. Gasoline and diesel engine principles, construction; parts, accessories, lubrication and fuels. Tractor design and construction. Cannot be taken for credit if student has had AE 312. (See AGRICULTURE.)

AE 313. **Motor Vehicles.** 3 hours any term. 1 ① 2 ③
Practical problems in preventive maintenance procedures for automotive equipment. Maintenance schedules, lubrication, adjustments, engine tuneup, carburetion, brake service, chassis and accessory unit repairs. Prerequisite: AE 311 or 312.

AE 314. **Motor Vehicles.** 3 hours spring. 2 ① 1 ③
Study and use of precision diagnostic, test, and repair equipment and tools for automotive vehicle maintenance. Engine and other major unit rebuilding procedures; electrical systems. Prerequisite: AE 313.

AE 401. **Research.** Terms and hours to be arranged

AE 405. **Reading and Conference.** Terms and hours to be arranged.

AE 406. **Projects.** Terms and hours to be arranged.

AE 407. **Seminar.** Terms and hours to be arranged.

AE 431. **Rural Electrification.** (g) 3 hours spring. 2 ① 1 ③
Fundamentals of alternating currents, code and wiring, electric motors; principles of using electricity profitably on the farm. Prerequisite: EE 351.

AE 461. **Farm Structures.** (g) 3 hours fall. 1 ① 2 ③
Materials and types of construction; services, uses, and economics of farm structures; structural, environmental, and system designing. Prerequisite: ME 219 or CE 213 and ME 321 recommended.

AE 465. **Building Cost Estimating.** (g) 3 hours spring. 2 ① 1 ②
Complete and approximate estimates; general and detailed considerations in establishing unit prices; quantity surveying; overhead costs and profit estimates; specification interpretations; estimates for separate contracts and subcontracts. Prerequisite: AA 179 or AE 361 or AE 461.

AE 471. **Soil and Water Conservation.** (g) 3 hours fall. 3 ①
Basic concepts of irrigation, drainage, and erosion control, including fluid flow in saturated soil; evaporation and consumptive use; soil erosion principles; hydraulics of water control structures and channels. Prerequisite: CE 313 or ME 319.

AE 472. **Drainage Engineering.** (g) 3 hours winter. 2 ① 1 ③
Design of surface and subsurface farm drainage systems; procedures for investigating drainage problems; erosion control structures; small earth dams. Prerequisite: AE 471.

AE 473. **Irrigation System Design.** (g) 3 hours spring. 2 ① 1 ③
Sprinkler and gravity irrigation methods; design of farm irrigation systems; land leveling; selection and testing of pumping equipment. Prerequisite: AE 471.

AE 481. **Agricultural Machine Design.** (g) 3 hours winter. 1 ① 2 ③
Application of principles of mechanism, mechanics, and strength of materials to design of agricultural machinery. Prerequisite: ME 219.

AE 491. **Power Farming Machinery.** (g) 3 hours winter. 2 ① 1 ③
Modern power farming equipment; operation, maintenance, and adjustment. Prerequisite: AE 311; ME 219.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

AE 501. **Research.** Terms and hours to be arranged.

AE 503. **Thesis.** Terms and hours to be arranged.

AE 505. **Reading and Conference.** Terms and hours to be arranged.

AE 506. **Projects.** Terms and hours to be arranged.

AE 507. **Seminar.** Terms and hours to be arranged.

AE 508. **Workshop.** Terms and hours to be arranged.

AE 515. **Agricultural Machine Applications and Methods.** 3 hours winter. 2 ① 1 ③

Application of machines to changing agricultural methods; mechanization and labor economy; labor-saving equipment and applications; hydraulic control systems; specialty crop machines. Offered alternate years. Not offered 1961-62.

AE 520. **Ground Water.** 3 hours spring. 3 ①

Occurrence, development, and conservative use of ground waters for irrigation; permeability; flow of water into wells; ground water hydrology. Prerequisite: Mth 322; AE 471. Students who do not have prerequisites must have consent of instructor. Offered alternate years. Offered 1961-62.

2 ① 1 ③

AE 525. **Processing Equipment for Agricultural Products.** 3 hours fall.

Fundamental theory and applications of various methods and equipment in the processing of farm products. Offered alternate years. Offered 1961-62.

2 ① 1 ③

AE 530. **Agricultural Instrumentation and Application.** 3 hours spring.

Basic theory and application of instruments used in agricultural research with emphasis on pyrometry, air measurements, psychrometry, soil and field-crop moisture determinations, and water measurements. Offered alternate years. Not offered 1961-62.

Chemical Engineering

Chemical engineering is based on those operations involving mass transfer, heat transfer, and energy transfer, which in their proper sequence and coordination constitute transport processes as conducted on the industrial scale. The design of industrial equipment for carrying out such processes is an important part of chemical engineering, as is research on influence of various transfer phenomena on the chemical processes themselves.

The curriculum is designed to give a broad training in the principles fundamental to chemical engineering. It aims to lay a foundation for responsible work in laboratory and plant, and to prepare for graduate work in engineering or in physical sciences. The curriculum is equally applicable in preparation for research, design, control, operation, or technical sales. The student is given a thorough foundation in chemistry, mathematics, English, and physics. This training is accompanied by professional subject matter falling into three groups: (1) courses providing a knowledge of more advanced principles of chemistry, (2) courses in engineering science, and (3) courses dealing with chemical engineering as a separate entity. The last group includes a thorough study of basic transfer phenomena including application to numerous unit operations of chemical engineering and their applications to chemical processes. Courses in nuclear energy are available.

The curriculum aims to give a broad training in scientific fundamentals rather than specialized training for a narrow field. A corresponding breadth of opportunity exists for the graduate in the chemical and manufacturing industries. Many positions of responsibility, particularly in research and development work, demand a more extensive training than can be given in four years, and students with proper qualifications may pursue graduate work leading to advanced degrees. Some specialization is possible in the senior year.

Courses in Chemical Engineering

Lower Division Courses

ChE 211, 212, 213. **Stoichiometry and Thermodynamics.** 2 hours each term. 1 ① 1 ②
Stoichiometric computations involving heat and material balances. Basic thermodynamic relationships; energy balances, and thermo-physical calculations.

Upper Division Courses

ChE 311, 312. **Chemical Engineering Thermodynamics.** 3 hours fall and winter. 1 ① 2 ②
Principles and relationships of thermodynamics applied to typical problems of chemical engineering. Prerequisite: Ch 440 or concurrent enrollment.

ChE 313. **Transfer Processes.** 3 hours. 2 ① 1 ②
Transfer of momentum, heat, and mass. Molecular and turbulent transport properties of fluids. Applications to typical fluid flow, heat transfer, and mass transfer problems.

Met 331, 332, 333. **Metallurgy.** 3 hours each term. 1 ① 2 ②
General operations and principles of physical and extractive metallurgy; behavior and production of metals; metallurgical calculations. Prerequisite: Mth 203.

ChE 401. **Research.** Terms and project to be arranged.

ChE 403. **Thesis.** Terms and hours to be arranged.

ChE 405. **Reading and Conference.** Terms, hours, and subject to be arranged.

ChE 406. **Projects.** Terms and hours to be arranged.

ChE 407. **Seminar.** 1 hour any term. 1 ①

ChE 411, 412. **Unit Operation.** (g) 3 hours fall and winter 1 ① 2 ②
Quantitative application of principles of mass, momentum, and heat transfer operations to typical engineering problems.

ChE 413. **Unit Operation.** (g) 2 hours spring. 1 ① 1 ②
Quantitative treatment of mass transport as encountered in such operations as adsorption, extraction, and related processes.

ChE 414, 415, 416. **Chemical Engineering Laboratory.** (g) 3 hours each term. 1 ① 1 ④
Quantitative laboratory study of the unit operations and transfer processes of chemical engineering; emphasis placed on preparation of technical reports. Prerequisite or parallel: ChE 411.

ChE 425, 426, 427. **Chemical Engineering Calculations.** (G) 3 hours each term. 3 ①
Mathematical analysis of chemical engineering problems with particular emphasis on setting up differential equations; special methods of solving problems. Prerequisite: ChE 313.

ChE 432. **Chemical Plant Design.** (g) 3 hours. 2 ① 1 ②
Problems in the design of a chemical plant and chemical engineering equipment. Reports required. Prerequisite or parallel: ChE 413.

ChE 441, 442, 443. **Elements of Process Industries.** (g) 2 hours each term. 1① 1 ②
Inorganic and organic chemical technology; the development and economic aspects of commercial operations; kinetics.

ChE 451, 452, 453. **Nuclear Processes.** (g) 3 hours each term. 2 ① 1 ②
Theory of nuclear radiations and their effect on engineering materials; problems in chemical processing of radioactive material; laboratory experiments on interaction of nuclear radiation with materials used in chemical process industries and in construction.

ChE 460. **Mineral Dressing.** (g) 3 hours fall. 3 ①
Principles of comminution, concentration, and related processes; methods of treatment and machinery used. Prerequisite or parallel: G 312.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

ChE 501. **Research.** Terms and hours to be arranged.

ChE 503. **Thesis.** Terms and hours to be arranged.

ChE 505. **Reading and Conference.** Terms and hours to be arranged.

ChE 506. **Projects.** Terms and hours to be arranged.

ChE 507. **Seminar.** Terms and hours to be arranged.

ChE 511. **Industrial Plastics.** 3 hours. 3 ①
Classification of modern plastics; preparation, properties, and special fields of application; commercial processes of manufacture; fabrication. Prerequisite: Ch 432.

ChE 512. **Economic Balance.** 3 hours. 3 ①
Solution of typical chemical engineering and applied chemistry problems from the standpoint of economic considerations; optimum conditions of design and operation.

ChE 514. **Fluid Flow.** 3 hours. 2 ① 1 ②
Investigation of special phases of fluid flow such as high pressure gas transmission systems, economics, and multiple, parallel lines; special attention to recent literature. Prerequisite: ChE 413.

ChE 520, 521. **Diffusional Operations.** 3 hours fall and spring 2 ① 1 ②
Unit operations of evaporation, distillation, absorption, and extraction at an advanced level; stress on methods of solution of problems dealing with multicomponent mixtures and azeotropes. Prerequisite: ChE 413.

ChE 522. **Heat Transmission.** 3 hours. 2 ① 1 ②
Mechanisms of transference of heat energy; engineering applications.

1 ① 1 ②

ChE 531, 532, 533. **Electrochemical Engineering.** 3 hours each term.
Fuel cells; electro-organic reactions; electro-dialysis and electro-winning; mass transfer and polarization; fuzed salt electrolysis; cell analogies; theory of electrolytic conduction; electrochemistry in non-aqueous solvents; current distribution.

ChE 537, 538. **Chemical Engineering Thermodynamics.** 3 hours each term. 2 ① 1 ②
Application of laws of energy and thermodynamics to chemical engineering design; irreversible processes and nonideal systems. Prerequisite: ChE 412,413.

ChE 539. **Thermodynamics of Irreversible Processes.** 3 hours. 3 ①
Non-equilibrium systems with finite potential differences but restricted to time invariancy are studied. Rate of entropy production in such systems considered.

ChE 540. **Applied Reaction Kinetics.** 3 hours. 2 ① 1 ②
Application of fundamental theories of reaction kinetics and adsorption to catalytic and noncatalytic processes; emphasis on evaluating experimental data and designing industrial reaction vessels.

Civil Engineering

The curriculum in civil engineering is organized to train young men in those principles of engineering science and technology that are basic and common to the fields of geodesy and surveying, highways, railroads, irrigation and drainage, river and harbor improvements, structures, hydraulics, sanitation, and municipal engineering, and to permit some latitude of choice in the four general fields of structures, hydraulics, sanitation, and highways. The curriculum is planned to prepare graduates for advancement to responsible positions.

Lower Division Courses

2 ③

CE 201, 202, 203. **Introduction to Civil Engineering.** 2 hours each term.
Fundamentals of graphic analysis, descriptive geometry, structural and topographic drafting; hydrostatics, and field geometry. Prerequisite: for *CE 201:* GE 113; for *CE 202:* GE 101; for *CE 203:* CE 221 or CE 226 and Mth 102.

CE 211, 212, 213. **Mechanics and Strength of Materials.** 3 hours each term. 1 ① 2 ②
Fall: Theory and application of force systems applied to rigid bodies. *Winter* and *Spring:* General principles of mechanics applied to the elements of engineering structures to determine their strength and fitness. Prerequisite: GE 101,112, and Mth 200.

CE 221, 222, 223. **Plane Surveying.** 3 hours each term. 1 ① 2 ③
Fall: Theory and use of engineer's survey instruments, evaluation of errors of measurement. *Winter:* Construction, land, and control surveys, photogrammetry and map projections. *Spring:* Stadia, plane table, coordinate systems, field astronomy. Prerequisite: Mth 101; GE 112.

CE 224, 225. **Surveying for Landscape Architecture Students.** 3 hours each term. 1 ① 2 ③
Practical use of engineer's level, tape, and transit in planning and layout of projects in landscape architecture; principles of topographic mapping; use of engineer's transit and telescopic alidade in making stadia surveys; practical use of plane table; practical problems in making and using topographic data.

CE 226. **Plane Surveying.** 3 hours. 1 ① 2 ③
Theory and use of engineer's transit, tape, and level; application of surveying methods to problems in construction and area survey. Prerequisite: Mth 102.

Upper Division Courses

1 ① 2 ②

CE 311, 312, 313. **Dynamics and Fluid Mechanics.** 3 hours each term.
Principles and problems of kinematics and kinetics of bodies; force as a factor causing motion; work, energy, friction, and impact; application of mechanics to compressible and incompressible fluids, laws of similitude, laboratory studies. Prerequisite: CE 211; Mth 202.

CE 322. **Elementary Hydraulics.** 3 hours. 2 ① 1 ③
Principles underlying pressure and flow of water; laboratory measurements. For students in Mechanical Technology in Agriculture. Prerequisite: Mth 200.

CE 362. **Modern Construction Methods.** 2 hours. 1 ① 1 ③
Study of construction equipment and performance factors, plant selection, calculation of productivity and costs.

CE 372, 373. **Soil Mechanics.** 3 hours each term. 2 ① 1 ③
Settlement, analysis, slope stability, lateral pressure, composition, and stabilization. Prerequisite: CE 213,312.

CE 381, 382, 383. **Structural Theory.** 3 hours each term. 2 ① 1 ③
Fall: Analytical and graphical analysis of structural members and frames. *Winter* and *Spring:* Elastic and plastic theory of reinforced concrete and composite structures. Prerequisite: CE 213; Mth 203.

CE 401. **Research.** Terms and hours to be arranged.

CE 403. **Thesis.** Terms and hours to be arranged.

CE 405. **Reading and Conference.** Terms and hours to be arranged.

CE 406. **Projects.** Terms and hours to be arranged.

CE 407. **Seminar.** 1 hour. 1 ①

CE 411. **Hydrology.** 3 hours. 1 ① 2 ②
Precipitation, storage, and runoff; field studies in stardard methods of measurement. Prerequisite: CE 312.

CE 412. **Hydraulics.** 3 hours. 1 ① 2 ②
Reservoirs, dams, spillways and outlet works, open channels, water hammer, pipe networks, hydraulic machinery, economic aspects of hydraulic projects, water law. Prerequisite: CE 313.

CE 414. **Sanitary Water Measurements.** (g) 3 hours. 1 ① 2 ③
Measurement of sanitary quality and quantity of domestic wastes and of streams. Primarily for biology students, particularly those majoring in fisheries field. Prerequisite: Ch 103; Bac 204; FG 276.

CE 421, 422. **Highway Engineering.** (g) 3 hours each term. 2 ① 1 ③
Highway and street design; theory of pavement design, subgrade treatments, drainage design, highway planning, traffic surveys, highway economics and finance. Prerequisite: senior standing.

CE 433. **Hydraulic Machinery.** 3 hours. 1 ① 2 ②
Theory, operation, characteristics, efficiency, design, and installation of pumps and turbines; laboratory studies. Prerequisite: CE 313.

CE 451,452,453. **Sanitary Engineering.** (g) 3 hours each term. 2 ① 1 ③
Theory and Design of domestic and industrial water supply and waste disposal collection, storage, pumping, and treatment facilities. Prerequisite: CE 313.

CE 463. **Estimating and Contracts.** (g) 4 hours. 3 ① 1 ③
Quantity surveying; study of unit prices, subcontracts, overhead costs, profits; general principles and laws of contracts applied to engineering. Prerequisite: CE 412,421,481.

CE 472. **Foundations.** (g) 3 hours. 2 ① 1 ③
Study and design of foundations for engineering structures. Prerequisite: CE 383.

CE 481,482,483. **Structural Engineering.** (g) 3 hours each term. 2 ① 1 ③
Study of elements of steel, timber, and concrete structures; elastic and plastic design, and detail problems. Prerequisite: CE 213,382,383.

CE 485,486. **Indeterminate Structures.** (g) 3 hours each term. 2 ① 1 ③
Elastic deflections and stress analysis of statically indeterminate structures. Prerequisite: CE 213,382.

CE 489. **Building Design.** (g) 3 hours. 1 ① 2 ③
Study and design of building elements constructed of steel, reinforced concrete, timber, and miscellaneous building materials; fabrication and construction. Prerequisite: CE 472,481.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

CE 501. **Research.** Terms and hours to be arranged.

CE 503. **Thesis.** Terms and hours to be arranged.

CE 505. **Reading and Conference.** Terms and hours to be arranged.

CE 506. **Projects.** Terms and hours to be arranged.

CE 507. **Seminar.** Terms and hours to be arranged.

CE 519. **Soil Mechanics.** 3 hours. 3 ①
Factors affecting settlement of building foundations; stability of earth dams and dikes; variations in shear strength of clays; principle of flow nets; trends in soil mechanics.

CE 520. **Measurement of Water.** 3 hours. 3 ①
Intensive study of reports on the measurement of flowing water by means of weirs, orifices, venturi meters, pitot tubes, current meters, bends, salt-velocity and Parshall flumes.

CE 521, 522, 523. **Fluid Mechanics.** 3 hours each term. 3 ①
Dimensional analysis; principles of energy, continuity and momentum; boundary layer theory; unsteady flow in pipes.

CE 525. **River Control and Utilization.** 3 hours. 3 ①
Study of the methods of controlling flood flow in streams; design of dikes, shore protection facilities, retarding and impounding basins; laws of similitude; use of hydraulic models. Prerequisite: CE 522.

CE 526. **Hydraulics of Open Channels.** 3 hours. 3 ①
Steady, uniform, and nonuniform flow in open channels including transitions, delivery curves, side channel spillways, cavitation, and open channel surges. Prerequisite: CE 521.

CE 527, 528. **Hydrology.** 3 hours each term. 3 ①
CE 527: Weather, climate, precipitation, evaporation, transpiration, stream flow, basin analysis, overland flow, sedimentation, ground water. *CE 528:* Statistical methods, runoff relations, runoff distribution, waves and flood routing, frequency analysis, design problems, project operations, flood forecasting. Prerequisite: CE 411.

CE 529. **Seepage and Ground Water.** 3 hours. 3 ①
Practical approach to solution of ground-water problems covering theory of ground-water flow; graphical solution by flow net analysis; flow through dams and levees; flow toward wells and wellpoint systems; base course drainage. Prerequisite: CE 521.

CE 530. **Structural Model Analysis.** 3 hours. 1 ① 2 ③
Theory, design, and construction of models for solution of stresses in continuous frames.

CE 531, 532, 533. **Analysis and Design of Engineering Structures.** 3 hours each term. 3 ①
Fall: Stress analysis of statically indeterminate frameworks. *Winter* and *Spring:* Analysis and design of steel and concrete structures. Prerequisite: CE 483,485.

CE 534. **Mechanics of Materials.** 3 hours. 2 ① 1 ③
Behavior of structural materials; theories of failure, multiaxial stress conditions, torsion, shear distortions. impact and vibrations, energy methods of analysis, stresses in plates and shells. Prerequisite: CE 313,485.

CE 535. **Prestressed Concrete.** 3 hours. 2 ① 1 ②
Analysis and design of prestressed concrete structural elements; systems of prestressing, material specifications, stress analysis, linear and circular prestressing, economics. Prerequisite: CE 313,383; ME 316.

CE 540. **Sanitary Engineering Design.** 3 hours. 3 ①
Measurements, computations, and estimates of storm and sanitary sewers. Flow networks investigations. Design and estimates of water and sewage treatment plants.

CE 541. **Stream Purification.** 3 hours. 3 ①
A study of stream pollution, oxygen sag, reaeration, and their effects.

CE 542. **Water and Sewage Treatment Processes.** 3 hours. 3 ①
Critical review of recent and current researches in the field of water and sewage treatment

CE 543. **Treatment Plant Operation and Control.** 3 hours. 3 ①
Field analysis of water and sewage treatment plant operations and methods of control.

CE 544, 545, 546. **Water Supply and Waste Disposal.** 3 hours each term. 2 ① 1 ③
Engineering, mathematical, chemical, and biological aspects of domestic and industrial water supply and waste disposal. Prerequisite: CE 313,452,454.

CE 550. **Municipal Engineering and City Planning.** 3 hours. 3 ①
Modern city streets, boulevards, transportation systems; drainage and sanitation; water supply; lighting.

CE 551, 552, 553. **Transportation Engineering.** 3 hours each term. 3 ①
Study of engineering factors pertaining to transportation systems. Study of the organization, administration, and finance of highway systems and the control of traffic for ultimate efficiency.

Electrical Engineering

The curriculum is designed to provide a professional education in electrical engineering. Into it are integrated courses in physics, chemistry, mathematics, engineering science, and social science. The Electrical Engineering Department provides the additional electrical science and engineering courses in analysis and synthesis of systems required for the professional curriculum.

An experienced professional staff and adequate facilities provide competent instruction in the following major areas: communications, computers, control, electronics, electromagnetic radiation, high voltage, illumination, instrumentation, power, and servomechanisms. Laboratories and equipment are available for undergraduate, graduate, and staff research. Those in specialized study are accommodated by the Reading and Conference and Projects courses.

Important areas of advanced study are available in the graduate program. Electives in the junior and senior years may be used for additional mathematics, physics, chemistry, or languages either as a preparation for graduate work or as part of a broader undergraduate program.

Lower Division Courses

EE 201, 202, 203. **Circuits and Fields.** 4 hours each term. 2 ① 2 ②
Fundamentals of magnetic and electric fields and associated circuits, and electric circuit theory. Prerequisite: GE 103, Mth 200, or equivalents. Ph sequence may be concurrent.

Upper Division Courses

EE 311, 312, 313. **Electromagnetics.** 3 hours each term. 2 ① 1 ③
Electromagnetic circuits and electromechanical energy conversion. Circuit characteristics of electromagnetic and electromechanical energy converters; control characteristics of rotating amplifiers. Prerequisite: EE 203; Mth 203.

EE 321, 322, 323. **Electronics.** 3 hours each term. 2 ① 1 ③
Fundamental theory of electronics including thermionic emission, cold cathode emission, photelectric emission, space charge, and discharge in gases; principles of vacuum, gas, and vapor tubes. solid state electronic devices, and their basic associated circuits. Prerequisite: EE 203; Ph 209.

EE 330. **Circuit Theory.** 3 hours. 3 ①
Transit response of networks with lumped constants, including analysis of Laplace transformation. Prerequisite: EE 203; Mth 321.

EE 331. **Electromagnetic Waves.** 3 hours. 3 ①
Basic laws of electromagnetic fields and waves; propagation and reflection of plane waves. Prerequisite: EE 330.

EE 351,352,353. **Electrical Fundamentals.** 3 hours each term. 1 ① 2 ②
Fundamentals of electric circuits and equipment emphasizing the application to industry. Prerequisite: GE 103; Ph 209; Mth 203.

EE 356. **Industrial Electricity.** 3 hours. 2 ① 1 ③
Abbreviated course covering direct and alternating current circuits and machines. For civil engineering students. Prerequisite; junior standing.

EE 357. **Industrial Electricity.** 3 hours. 2 ① 1 ③
Distribution systems for industrial power and lighting, including equipment, safety appliances, and economic aspects. Prerequisite: EE 356.

EE 401. **Research.** Terms and hours to be arranged.

EE 403. **Thesis.** 3 hours each term.

EE 405. **Reading and Conference.** Terms and hours to be arranged.

EE 406. **Projects.** Terms and hours to be arranged.

EE 407. **Seminar.** 1 hour each term, 3 terms. 1 ②
Presentation and evaluation of material pertinent to the professional aspects of electrical engineering and industry. Prerequisite: senior standing in electrical engineering.

EE 411. **Electrical Engineering Economy.** (g) 3 hours. 3 ①
Power and communication utility economy including plant investment, operation, regulation, and public relations problems; engineering management, labor relations, taxation, feasibility studies, specifications, and contracts. Prerequisite: EE 313.

EE 414, 415, 416. **Instrumentation.** (g) 3 hours each term. 2 ① 1 ③
Fundamentals of measurements, theory of electrical instruments and transducers; applications to measurement of both electrical and nonelectrical quantities, data processing, transmission, and display. Prerequisite: EE 313,323.

EE 421, 422. **Transmission Systems.** (g) 3 hours each term. 2 ① 1 ②
Generalized theory of transmission lines, networks, and waveguides. Prerequisite: EE 313,331.

EE 431, 432, 433. **Power Engineering** (g) 3 hours each term. 2 ① 1 ③
Generation, transmission, and conversion of electric energy. Electronic, electromagnetic, and solid state high energy transformation devices. Computer solution to system problems. Prerequisite: EE 313,323.

2 ① 1 ③
EE 461, 462, 463. **Communication Engineering.** (g) 3 hours each term.
Theory and practice of electric communication including telegraphy, telephony, radio, and television. Prerequisite: EE 313,323.

EE 465. **Television.** (g) 3 hours. 2 ① 1 ③
Theory of black-and-white and color television; television transmitters, antennas, and receivers. Prerequisite: EE 422,462.

EE 471, 472, 473. **Illumination.** (g) 3 hours each term. 2 ① 1 ③
Fundamentals of light and sight; study of luminaries, reflectors, and diffusing media; the application of basic principles to lighting problems. Prerequisite: EE 313 or EE 323.

EE 481,482,483. **Communication Design.** (g) 1 hour each term. 1 ②
Design of communication facilities, particularly for radio and television systems. Prerequisite: EE 323,331.

EE 491, 492, 493. **Control Engineering.** (g) 3 hours each term. 2 ① 1 ③
Servomechanisms, analog computers, and digital computers; application to control systerms; steady-state and transit analysis of feedback. Prerequisite: EE 313,323, and 330.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit. Courses at the graduate level are given when warranted by demand.

EE 501. **Research.** Terms and hours to be arranged.

EE 503. **Thesis.** Terms and hours to be arranged.

EE 505. **Reading and Conference.** Terms and hours to be arranged.

EE 506. **Projects.** Terms and hours to be arranged.

EE 507. **Seminar.** Terms and hours to be arranged.

EE 511, 512, 513. **Electron Devices.** 3 hours each term. 2 ① 1 ③
Theory of electron tubes and semiconductor devices emphasizing klystrons, traveling wave tubes, transistors, and their associated circuits.

EE 521, 522, 523. **High-Voltage Systems.** 3 hours each term. 2 ① 1 ③
Analysis and synthesis of high-voltage systems; fundamentals of dielectrics associated with high voltage; high voltage sources, corona characteristics.

EE 525, 526, 527. **Computer Systems.** 3 hours each term. 2 ① 1 ③
Analysis and synthesis of digital and analog computing systems; pulse and digital circuitry applied to digital computers; analysis and evaluation of computer components.

EE 531. **Materials.** 3 hours. 2 ① 1 ③
Properties of electrical conductors and insulators and of dielectric and magnetic materials.

EE 535, 536, 537. **Circuits and Fields.** 3 hours each term. 3 ①
Mathematical analysis of circuit response and of electromagnetic radiation and propagation.

EE 541, 542, 543. **Power Systems.** 3 hours each term. 2 ① 1 ③
Advanced study of electric power generation, transmission, distribution, and utilization.

EE 554, 555, 556. **Control Systems.** 3 hours each term. 2 ① 1 ③
Control system synthesis using signal flow diagrams and statistical design principles; nonlinear system analysis using describing function approach and phase-plane method.

EE 561, 562, 563. **Communication Systems.** 3 hours each term. 2 ① 1 ③
Theory and design of devices and circuits and their interconnection and functioning in communication systems. Prerequisite: EE 463 or equivalent.

EE 581, 582, 583. **Design.** 3 hours each term. 2 ① 1 ③
Design and synthesis of circuits and systems with emphasis on operating reliability of electronic equipment. Prerequisite: EE 313,323,330.

Industrial Engineering and Industrial Arts

The Department of Industrial Engineering and Industrial Arts provides technical and professional training for industrial engineering, production technology, production control, and other phases of scientific management vital to business and industry. Both the managers and the artisans of industry, from skilled labor to the industrial designers and production managers, are dependent upon an integral and intimate knowledge of industrial processes, the skills, and the machine applications necessary to produce the articles they collectively create. These are the specific concerns of the industrial engineer and the production technologist.

The Department of Industrial Engineering and Industrial Arts also provides instruction in the technical courses required for the preparation of industrial arts teachers (see curriculum under SCHOOL OF EDUCATION) and offers service courses in engineering shopwork. Service courses and electives are available to others as facilities permit.

The Production Technology Curriculum is designed to meet the demand in industry for men with basic skills and technical knowledge, supplemented with studies in scientific management and business administration. This program includes a study of accepted principles and practices by which the manufacturing industries have evolved a system of production and quality control. Correlation of the technical studies, production processes, and management principles is emphasized, so that graduates of the program can progress to supervisory and executive positions. The options (*Metal Industries,* with subdivisions involving applications in Metal Castings, Machinery and Tooling, and Welded Fabrications; *Tool Design; Wood Industries,* with subdivisions in Building Construction and Mill-Cabinet Work) and the electives enable a student to specialize in the particular phase of industry consistent with his in-

terests and aptitudes. The program affords opportunity in technical training and business applications appropriate for industrial technicians, tool designers, production managers, and works managers. Students in each of the several options are assigned to individual advisers. Restricted electives in each option, appropriate to the objectives of the option and compatible with the educational goal of the student, will be selected with the approval of the adviser.

The Industrial Engineering Curriculum is designed to train students for the engineering, production, or technological-administrative departments of industry. The youngest branch of the engineering profession, industrial engineering is represented on the Joint Engineering Council by the American Institute of Industrial Engineering. The curriculum at Oregon State College, and in 36 other such schools, is fully accredited by the Engineering Council for Professional Development. Provision is made in Oregon as in most other states for the professional registration of industrial engineers. At Oregon State, particular emphasis is placed on engineering and industrial management as applied to operations research, operation analysis, labor problems, work simplification, plant layout, and production planning and control. Students are prepared for those positions in industry which require primarily a combination of engineering and business judgment in the management of men, materials, machines, and processes. The goal of the professional industrial engineer is to produce a superior product at the minimum cost consistent with fair employer-employee relationships. After satisfactory experience in engineering practice, graduates should be qualified for the highest executive positions.

Lower Division Courses

*IE 111. **Pattern Making.** 3 hours. 2 ① 1 ④
Fundamentals of pattern making; relation of pattern making to drafting, design, foundry and machine-shop operation.

*IE 112, 113. **Methods in Woodworking.** 3 hours each term. 1 ① 2 ③
Woodworking, with special reference to tool techniques, applied design, and craftsmanship in group and individual projects. IE 112 prerequisite for IE 113.

*IE 140. **Foundry Practices.** 3 hours. 2 ① 1 ④
Constitution, properties, and design limitations of casting in gray iron, malleable iron, and steel; methods used in the production of castings.

*IE 150. **Forging and Welding.** 3 hours. 2 ① 1 ④
Forging, forming, and heat-treating of steel, followed by gas and electric-arc welding, flame cutting, brazing, and resistance-welding operations.

*IE 160. **Machine Tool Practices.** 3 hours. 2 ① 1 ④
Use of basic machine tools on prescribed projects representative of industrial operations. Prerequisite: Mth 10.

IE 220. **Wood Turning.** 2 hours. 1 ① 1 ④ or 2 ②
Tool processes and lathe technique; designing, turning, and finishing of individual projects of merit. Prerequisite: IE 111 or IE 112.

IE 225. **Machine and Tool Maintenance: Wood Shop.** 2 hours 1 ① 1 ④
Methods of care and maintenance of woodworking tools, machines, and supplementary equipment. Prerequisite: IE 111 or 112.

*IE 240. **Foundry Practices.** 2 hours any term. 1 ① 1 ④
Introductory course covering constitution, properties, and design limitations of castings in iron and steel; fundamental methods in the production of castings.

*IE 250. **Forging and Welding.** 2 hours any term. 1 ① 1 ④
Forging, forming, and heat-treating of steel, followed by gas and electric-arc welding, flame cutting, brazing, and resistance welding operations; primary attention to applications in engineering design and construction and to industrial production problems.

* In courses designated by asterisks, in addition to the regularly scheduled meetings, the student may be required to attend three general lectures during the term.

*IE 260, 261. **Machine Tool Practices.** 2 hours each term. 1 ① 1 ④
Basic and advanced operations of machine tools on prescribed projects illustrative of industrial operations. Correlation of engineering and manufacturing problems and processes. Prerequisite: for *IE 260:* Mth 100; for *IE 261:* Mth 100 and IE 160 or 260.

IE 265. **Machine and Tool Maintenance: Metals.** 3 hours. 2 ① 1 ④
Maintenance and repair problems for mechanical equipment. Methods and procedures in tool and cutter sharpening. Prerequisite: IE 160 or 260.

IE 270. **General Metals Laboratory.** 3 hours. 1 ① 2 ③
Introductory course covering basic operations and processes of forging, heat-treating, welding, nonferrous metal casting, and machine tool work. For industrial arts teachers who wish to add these areas to a general shop program and to enrich their understanding of modern industrial metal-processing methods.

IE 290. **Introduction to Scientific Management.** 3 hours. 3 ①
History, development, and scope of scientific management. Laws of scientific management as applied to manufacturing.

Upper Division Courses

IE 311. **Millwork: Machine Woodwork.** 3 hours. 1 ① 2 ③
A production course in machine woodworking. Prerequisite: IE 112.

2 ③

IE 312, 313, 314. **Furniture Design and Construction.** 2 hours each term.
The designing and construction of furniture and cabinet work, according to the needs and ability of the individual student. Prerequisite: For *IE 312:* AA 281,282; for *IE 313:* IE 311.

IE 316. **Wood and Metal Finishing.** 3 hours. 1 ① 2 ③
Materials and processes for application of modern finishes to both old and new work on both wood and metal surfaces; brush and spray application of finishing materials. Prerequisite: IE 112.

IE 320. **Boat Design and Construction.** 3 hours. 1 ① 2 ③
Design and construction of small boats, with particular reference to "seaworthiness" and safety, high utility, performance, and stability. Development of typical plans and actual construction under practical conditions. Prerequisite: IE 112, 333.

IE 332. **Pattern Making.** 2 hours. 1 ① 1 ④
Continuation of IE 111, with emphasis on problems in making of patterns for more complicated machine parts and on factors influencing production costs of these parts. Prerequisite: IE 111.

IE 333. **Carpentry and Building Construction.** 3 hours. 1 ① 2 ③
Application of carpentry fundamentals including actual construction in miniature from architect's plans; laboratory work in framing of rafters and selected architectural sections with fullsize lumber. Prerequisite: IE 112.

IE 340. **Foundry Practices.** 3 hours. 2 ① 1 ④
Equipment for school and home workshops; processes and projects suited to public-school applications in industrial arts classes. Prerequisite: IE 140 or 240.

IE 344, 345, 346. **Casting Processes.** 3 hours each term. 2 ① 1 ④
Casting methods and techniques applied to ferrous, nonferrous, and reactive metals; foundry raw materials and controls; quality control as influenced by casting design; melting and sand practices; special molding methods; gating, risering, and solidification problems. Prerequisite: IE 140 or 240.

IE 350. **Forging and Welding.** 3 hours. 2 ① 1 ③
Experiments, practice, and projects in forging, heat-treating and welding of ferrous and nonferrous metals; special attention to problems of instruction, equipment maintenance, and general fabrication. Intended for students in Industrial Arts (School of Education) and Production Technology (Wood Industries option). Prerequisite: IE 150 or 250.

* In courses designated by asterisks, in addition to the regularly scheduled meetings, the student may be required to attend three general lectures during the term.

IE 354, 355, 356. **Welding Processes and Applications.** 3 hours each term. 2 ① 1 ③
A study of welding processes and techniques applied to ferrous and nonferrous metals. Selection of processes for typical production welding jobs; design and use of production welding devices—jigs, fixtures, forming, and handling equipment; welded product design and construction, including the engineering and economic problems involved. Prerequisite: IE 150 or 250.

IE 360. **Machine Shop Practices.** 3 hours. 2 ① 1 ④
Machine shop practices and techniques through individual and group projects. For industrial arts education majors. Not open to engineering majors. Prerequisite: IE 160 or 260.

2 ① 1 ④

IE 361, 362, 363. **Mass Production Methods.** 3 hours each term.
The selection, setup, and operation of producing machines in relation to quantity and quality. The construction, use, and application of jigs and fixtures. Job shop problems. Group projects and quality control. Prerequisite: IE 160 or 260.

IE 365. **Materials Technology.** 3 hours. 2 ① 1 ②
Principles of mechanics applied to the elements of product design; determination of strength of tooling elements used in manufacturing processes. Prerequisite: Mth 102, junior standing. For production technology students only.

IE 370. **Applied Electricity.** 3 hours. 1 ① 2 ③
Basic instruction in practical electricity; principles of electrical circuits and controls, with applications in fields of light and power wiring, stagecraft and lighting, communication. Intended primarily for prospective industrial arts teachers. Prerequisite: junior standing.

IE 380. **Sheet Metalwork.** 3 hours. 1 ① 2 ③
Projects in sheet metalwork and pattern drafting involving the fundamental machine and hand-tool operations. Prerequisite: GE 112.

IE 387. **Metal Crafts.** 3 hours. 1 ① 2 ③
Diversified metal crafts; metal spinning and craft work in iron, copper, and Britannia metal. Prerequisite: AA 282; IE 350 or 380.

IE 388. **Lapidary Techniques and Processes.** 2 hours. 1 ① 1 ④
Gem materials and methods used to process the rough material into display specimens or mounted jewelry pieces. Prerequisite: AA 281; IE 387.

IE 390. **Safety in Industry.** 2 hours. 2 ①
History of industrial safety; safety legislation, organization, services, and training; accident costs and causes; methods of safe practice, safety and health standards and records. Prerequisite: junior standing.

IE 391. **Methods and Motion Study.** 3 hours. 1 ① 2 ③
Theory and application of methods study; types of methods studies; operation and analysis sheets; principles of motion practice; micromotion studies; standardization and process charts. Prerequisite: junior standing.

IE 392. **Time Study.** 3 hours. 1 ① 2 ③
Theory and application of time-study techniques; job analysis and standardization; construction of standard data and formula applications; synthetic determination of time standards; wage payment systems and merit rating. Prerequisite: junior standing.

IE 393. **Production Planning and Control.** 3 hours. 1 ① 2 ③
Departmental organization and types of production control techniques; codification and symbolization; forecasting, materials control, routine, scheduling, dispatching, and inspecting. Prerequisite: junior standing.

IE 394. **Materials Handling.** 3 hours. 2 ① 1 ②
Selection of material-handling equipment, its application, coordination; effect of materials handling on plant layout in industrial situations. Prerequisite: junior standing in engineering.

IE 405. **Reading and Conference.** Terms and hours to be arranged.

IE 406. **Projects.** Terms and hours to be arranged.

IE 407. **Seminar.** 2 hours. ② 1
Prerequisite: senior standing.

IE 464, 465, 466. **Tool Engineering.** 3 hours each term. 1 ① 2 ③
Fundamentals of tool engineering; tools, jigs, fixtures, and die design. Analysis of operation sequence, dimensional and quality control. Power press applications on the plastic working of metals and nonmetals. Prerequisite: IE 362,365.

IE 490. **Industrial Supervision Principles.** (G) 3 hours. 3 ①
Basic company, supervisor, and operator objectives and responsibilities, and their relationship to one another; solutions of case problems compared with fundamentals established by industrial leaders. Prerequisite: IE 391,392,393.

3 ①
IE 491, 492. **Production Planning and Control.** (G) 3 hours each term.
Quantitative analysis and economic optimum selection of machines, equipment, and labor; quantitative control in inverse relationships, least-cost combination in purchasing quantities and in seasonal production. Prerequisite: calculus and IE 391,392,393.

IE 495. **Quality Control.** (G) 3 hours. 3 ①
Principles of quality control applied to industrial production; frequency distribution, variable, and attribute control charts: acceptance sampling techniques; inspection management; introduction to probability. Prerequisite: Mth 102; IE 393.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit. Graduate courses in Industrial Education are listed under SCHOOL OF EDUCATION.

IE 501. **Research.** Terms and hours to be arranged.

IE 503. **Thesis.** Terms and hours to be arranged.

IE 505. **Reading and Conference.** Terms and hours to be arranged.

IE 506. **Projects.** Terms and hours to be arranged.

IE 507. **Seminar.** Terms and hours to be arranged.

IE 511. **Shop Planning and Organization.** 3 hours. 1 ① 2 ③
Planning and organizing the physical plant for different types of school shops. Prerequisite: Ed 408 and IEd 420.

IE 525. **Recreational Handicrafts.** 3 hours. 1 ① 2 ③
Materials, projects, and procedures in developing a recreational handicraft program in secondary schools, on an extracurricular or curricular basis, and in evening adult classes; laboratory applications. Prerequisite: Ed 408 and courses in woodwork and metalwork equivalent to IE 220, 313, and 380.

IE 587. **Metalcraft Problems.** 3 hours. 1 ① 2 ③
Utilization of semiprecious metals in school and home shop work; advanced skills in metal spinning, and craft work in copper, brass, and Britannia metal; processes applied to projects of practical value and artistic merit. Prerequisite: Ed 408 AA 281,282,283, and IE 387.

IE 591. **Operation Analysis.** 3 hours. 3 ①
Current operation analysis techniques; application of methods and cost studies to advanced problems. Prerequisite: IE 391,392.

IE 592. **Timing Techniques.** 3 hours. 3 ①
Modern time-study methods; critical study of allowances, skill levels, and other advanced problems. Prerequisite: IE 391,392.

IE 594. **Plant Layout.** 3 hours. 3 ①
Application of principles governing selection of a plant site; development of plant layout; selection and planning of building for economic production. Prerequisite: IE 392. 394,490.

Mechanical Engineering

The curriculum in mechanical engineering is planned to prepare young men for useful and responsible positions in power plants, various manufacturing enterprises, oil refineries, the metal industries, heating and ventilating, refrigerating, air conditioning, and in the aeronautical and automotive industries. In the senior year, opportunity is provided for limited specialization in metallurgy, applied mechanics, heating and air conditioning, power, nuclear engineering, automotive engineering, or aeronautical engineering.

The Department has drafting and computing rooms supplied with the necessary desks, boards, and lockers. The laboratories are equipped for tests and demonstrations in steam, gas, and aeronautical engineering, and in engineering materials. This equipment is located in the engineering laboratory, Mines Building, and in the aeronautical engines laboratory. The steam laboratory contains representative turbines, engines, and boilers all of which are set up for testing. Also available are domestic heating, air conditioning, and refrigeration units which may be used for testing or research. The internal combustion engines laboratory contains gasoline and diesel engines connected to generators and dynamometers. Included are ASTM-CFR fuel research engines for both gasoline and diesel oil. All of these engines are fully equipped with accessories and instruments. The power laboratory is also equipped with a gas turbine completely instrumented for testing, as well as jet engines for demonstration. The aeronautical laboratory contains a small wind tunnel, a smoke tunnel, miscellaneous aircraft parts and instruments, and a variety of aircraft engines. Engineering laboratories include facilities and machines for testing and research on metallic and nonmetallic structural materials, and fuels and lubricants. Equipment and instruments, such as balancing machines, vibrometers, photoelasticity apparatus, and a shaking table, are available for instruction and advanced studies in applied mechanics. An analog computer is available for instructional purposes. A completely operative nuclear reactor and a wide range of detecting and counting instruments are available.

Lower Division Courses

ME 217, 218, 219. **Mechanics of Materials.** 3 hours each term. 2 ① 1 ②
Mechanics as applied to stress and strain distribution and deflections in machine and structural members. Prerequisite: Mth 200; GE 103.

Upper Division Courses

ME 311. **Strength of Materials.** 3 hours. 2 ① 1 ②
Mechanics as applied to stress and strain distribution and deflections in machine and structural members. Service course for nonmajors. Prerequisite: ME 217.

ME 312, 313. **Metallurgy and Materials.** 3 hours each term. 2 ① 1 ③
Nature of the solid state, atomic and crystal structure, electron and band theories of solids; constitution diagrams, solidification; deformation of metals; physical and mechanical properties of metals; methods of control of properties; corrosion; nonmetallic materials. Prerequisite: ME 218; Ph 209.

ME 315. **Engineering Materials.** 3 hours. 2 ① 1 ③
Properties and structure of engineering materials. Test procedures and specifications. Prerequisite: ME 218 or 311.

ME 316. **Materials Testing Laboratory.** 3 hours. 2 ① 1 ③
Materials of engineering construction; testing methods and specifications adopted by the American Society for Testing Materials, etc.; preparation of reports. Service course for nonmajors.

2 ① 1 ②

ME 317, 318, 319. **Dynamics of Solids and Fluids.** 3 hours each term.
Fall: Mechanics of fluid flow, compressible and incompressible fluids (fluid mechanics). *Winter:* Continuation of fluid mechanics for first half of term; second half of term covers kinematics and kinetics of solids; momentum; energy (dynamics). *Spring:* Continuation of dynamics; vibrations, balancing of rotating and reciprocating bodies; periodic motion, mechanism and introduction to vector mathematics. Prerequisite: Mth 203; ME 217; Ph 209.

ME 321, 322, 323. **Thermodynamics and Heat Transfer.** 3 hours each term. 2 ① 1 ②
Study of gas laws, processes and cycles, fuels and combustion, properties of steam and other vapors, vapor cycles, boilers, steam engines and turbines, internal combustion engines, gas turbines, refrigeration cycles and heat transfer. Prerequisite: Mth 202; Ph 209; Ch 193.

ME 324. **Gas Dynamics.** 3 hours. 2 ① 1 ②
Engineering applications of dynamics and thermodynamics to the flow of gases using Mach number as fundamental variable. Prerequisite: ME 318,322.

ME 335. **Refrigeration and Cold Storage.** 3 hours. 2 ① 1 ②
Principles and practice of refrigeration and cold storage. For students in dairy manufacturing, horticulture, food industries, etc. Prerequisite: algebra and elementary physics.

ME 337. **Heat Engines.** 3 hours. 2 ① 1 ②
Construction, operation, and performance of internal-combustion engines with emphasis on diesel types; fuels, combustion, and lubrication as applied to internal-combustion engines; boilers and auxiliaries. Prerequisite: elementary physics and chemistry. Service course for forest engineering students.

ME 351. **Mechanical Laboratory.** 3 hours. 1 ① 2 ②
Selection, calibration, and application of instruments for the testing of machines and processes. Analysis of test results and preparation of engineering reports. Prerequisite: ME 321.

ME 371. **Mechanical Engineering Analysis.** 3 hours. 2 ① 1 ②
Application of mathematical analysis to problems in mechanics of solids and fluids, strength of materials, thermodynamics, electricity, and data reduction. Prerequisite: Mth 203; EE 351.

ME 401. **Research.** Terms and hours to be arranged.

ME 403. **Thesis.** 3 hours any term.

ME 405. **Reading and Conference.** Terms and hours to be arranged.

ME 406. **Projects.** Terms and hours to be arranged.

ME 407. **Seminar.** Terms and hours to be arranged.

ME 411, 412, 413. **Machine Design.** (g) 3 hours each term. 1 ① 2 ②
Application of the principles of mechanism, mechanics, and strength of materials to design of machine elements. Prerequisite: ME 219,319.

ME 414. **Cement and Concrete Laboratory.** (g) 3 hours. 1 ① 1 ④
Design of Portland cement concrete and asphaltic concrete. Specifications and test procedures for cements, concretes, and mineral aggregates. Use of entrained air and other admixtures. Prerequisite: ME 312,315, or 316.

ME 416, 417, 418. **Elasticity.** (g) 3 hours each term. 2 ① 1 ②
Elementary mathematical theory of elasticity and application of the theory to engineering problems which cannot be treated by means of the theory of strength of materials; discussion and demonstration of various methods in experimental stress analysis. Prerequisite: ME 219,371.

ME 419. **Vibrations.** (g) 3 hours. 2 ① 1 ③
Mechanical vibrations of systems of one degree of freedom and of systems of several degrees of freedom; torsional vibrations; shaft critical speeds; vibration measuring instruments; vibration isolation and absorption; machine balancing; Rayleigh's (energy) method. Prerequisite: ME 371.

2 ① 1 ②

ME 421, 422. **Heating and Air Conditioning.** (g) 3 hours each term.
Application of basic principles to heating, ventilating, and air conditioning of buildings for human comfort or industrial processes; design, selection, construction, and operation of air conditioning equipment, including warm air, steam, hot water, and refrigeration systems; testing of air conditioning equipment and controls. Prerequisite: ME 323.

ME 423. **Refrigeration.** (g) 3 hours. 2 ① 1 ②
Thermodynamics of refrigeration; systems in use and principal characteristics of each; fundamentals of design; principal applications. Prerequisite: ME 323.

ME 425. **Fuels and Lubricants.** (g) 3 hours. 2 ① 1 ③
Heating value and calorimetry; properties of solid, liquid, and gaseous fuels; survey of rocket and nuclear fuels; lubrication theory and properties of lubricants; laboratory tests and specifications. Prerequisite: ME 323,324,351.

2 ① 1 ③

ME 429, 430. **Nuclear Reactor Analysis.** (g) 3 hours winter and spring.
Survey of engineering analysis of nuclear reactor in steady state and transient operation; elementary reactor theory; shielding; heat transfer and fluid flow problems. Prerequisite: ME 323; Ph 313.

2 ① 1 ②

ME 431, 432. **Power Plant Engineering.** (g) 3 hours each term.
Selection of fuels and combustion equipment, steam generators and auxiliaries, and power generation equipment including internal combustion engines, gas turbines, hydroelectric and nuclear power plants. Economics of power plant design and operation. Prerequisite: ME 323.

ME 434. **Gas Turbines and Jet Engines.** (g) 3 hours. 2 ① 1 ③
Gas turbines as applied to power generation, process industries, and aircraft; study of various cycles and component equipment, including compressors, combustion chambers, gas turbines, heat exchangers; jets and ducts; properties of gases, fuels, and high-temperature materials. Prerequisite: ME 323.

ME 437, 438. **Mechanical Laboratory.** (g) 3 hours each term. 1 ① 2 ③
Testing of basic types of mechanical equipment, including development and supervision of test procedures, analysis of test data, calculation of heat balances, and preparation of engineering reports. Prerequisite: ME 323,351.

2 ① 1 ②

ME 447, 448, 449. **Theory of Structures.** (g) 3 hours each term.
Theory and application of principles of mechanics to structural analysis of mechanical and aeronautical components. Prerequisite: ME 219,371.

ME 454. **Fluid Flow: Aerodynamics.** (g) 3 hours. 2 ① 1 ②
Scalar and vector fields, the equations of conservation of mass. Newton's second law and the second law of thermodynamics for a fluid element, vortex filaments, the law of Biot-Savart, infinite and finite thin wing theory. Prerequisite: ME 324.

ME 455. **Fluid Flow: Aerodynamics.** (g) 3 hours. 2 ① 1 ②
The energy equation, thermally and calorically perfect and imperfect gas flows. Prandtl-Meyer expansion waves, normal and oblique shock waves. Linearized subsonic and supersonic flow. Subsonic and hypersonic similarity parameters. Prerequisite: ME 454.

ME 456. **Fluid Flow: Aerodynamics.** (g) 3 hours. 2 ① 1 ②
The Navier-Stokes equations and boundary layer equations. Blasius's solution, the integral relations, turbulent flow, Reynolds' stresses and introduction to the compressible boundary layer. Prerequisite: ME 455.

ME 457, 458. **Aircraft Performance.** (g) 3 hours each term. 2 ① 1 ②
Theory dealing with problems of aircraft performance, stability, and control; special attention to characteristics of power plants such as reciprocating engine, turboprop, turbojet, ramjet, and rocket. Prerequisite: ME 324.

ME 460. **Mechanical Engineering Economy.** (g) 3 hours. 3 ①
Consideration of the time value of money as it affects alternative engineering proposals. Financial aspects of common investments. Prerequisite: senior standing.

ME 470, 471, 472. **Mechanical Engineering Analysis.** (G) 3 hours each term. 2 ① 1 ②
Continuation of ME 371 with emphasis on analysis of professional engineering type problems using advanced mathematical methods. Prerequisite: ME 371.

ME 474. **Analog Computers.** (g) 3 hours. 2 ① 1 ④
History and development of mechanical and electrical computers and analyzers. Emphasis given to the electronic operational analog and the mathematical equations representing physical systems. Network analyzers, digital computers, membrane and conducting sheet analogies studied in an introductory manner. Laboratory work essentially devoted to solution of problems and analyses of systems using operational analog equipment. Prerequisite: Mth 203; Ph 209.

ME 476. **Industrial Instrumentation.** (G) 3 hours. 2 ① 1 ③
Survey and selection of instruments and control devices for machines and industrial processes; calibration methods, static and dynamic testing, and analysis of instrument characteristics including mechanical, pneumatic, electric, and electronic devices. Prerequisite: ME 437.

ME 480. **Metallurgy.** 3 hours. 2 ① 1 ②
Survey of metallurgy and properties of ferrous products and nonferrous alloys from utilization standpoint; metallographic and other inspection techniques; principles of heat treatment and machining and forming operations. Service course for production technology students only. Prerequisite: junior standing.

ME 482, 483, 484. **Metallography.** (g) 3 hours each term. 2 ① 1 ③
Internal structure, constitution, heat treatment, physical and mechanical properties of ferrous and nonferrous metals and alloys; preparation of metallographic specimens; use of metallographical microscope; photomicrography. Prerequisite: ME 312,313.

2 ① 1 ③

ME 491, 492, 493. **Automotive Engineering.** (g) 3 hours each term.
Correlation of fuel and lubricant characteristics with engine performance; fuel induction systems, interpretation of exhaust gas analyses, and power-plant testing; automobile body and chassis engineering; tractive resistance; fleet operation, maintenance, and economics. Prerequisite: ME 323.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

ME 501. **Research.** Terms and hours to be arranged.

ME 503. **Thesis.** Terms and hours to be arranged.

ME 505. **Reading and Conference.** Terms and hours to be arranged.

ME 506. **Projects.** Terms and hours to be arranged.

ME 507. **Seminar.** Terms and hours to be arranged.

ME 511, 512, 513. **Engineering Materials.** 3 hours each term. 1 ① 2 ②
Critical study of materials specifications and testing procedures. Recent developments and applications in the fields of engineering materials. *Fall:* Ferrous metals and alloys. *Winter:* Nonferrous metals and alloys. *Spring:* Nonmetallic materials. Prerequisite: ME 313 or 315.

ME 514. **Mechanical Design.** 3 hours. 1 ① 2 ②
Systematic approach to design, starting from the first suggestion or indication of the need or desirability through the preliminary steps leading to the initial design; the design itself; and finally a cursory treatment of the development, redesign, testing, manufacturing, and servicing aspects. Prerequisite: ME 413 or equivalent.

ME 516,517,518. **Elasticity.** 3 hours each term. ME 516: 3 ①
ME 517,518: 2 ① 1 ③
Mathematical theory of elasticity; experimental solution of problems in elasticity by means of photoelastic method; use of various types of strain gages, and mathematical analysis.

ME 519. **Vibrations.** 3 hours. 3 ①
General theory of systems having more than one degree of freedom; torsional vibration; geared systems; vibration of elastic structures; harmonic analysis; vibration of frames, plates, casings, turbine disks, rotors; nonlinear systems. Prerequisite: ME 419 or equivalent.

ME 520. **Limit Analysis and Design.** 3 hours. 3 ①
An analysis of structures beyond the elastic limit emphasizing the conditions under which a plastic analysis is justified. Structures treated include beams, frames, slabs with cutouts and plates. Prerequisite: ME 416 or 447 or 516.

ME 521. **Theory of Plasticity.** 3 hours. 3 ①
Stress-strain relations. Plastic flow of perfectly plastic materials. Plastic flow of strain hardening materials. Theory of metal forming processes. Prerequisite: ME 417 or 516.

ME 525, 526. **Thermodynamics.** 3 hours each term. 3 ①
Advanced study of classical thermodynamics, properties of imperfect gases, availability functions and equilibrium constants. Prerequisite: ME 322.

ME 527. **Heat Transfer.** 3 hours. 3 ①
Unsteady state and three-dimensional conduction, boundary heat transfer, mass and heat transfer. Prerequisite: ME 323.

ME 532. **Fuel Technology.** 3 hours. 3 ①
Manufactured and natural gas production, transmission, and distribution; industrial application. Synthetic fuels processes; combustion reactions and flame temperatures taking into account dissociation. Prerequisite: ME 425.

ME 534. **Gas Turbine Design.** 3 hours. 2 ① 1 ③
Fields of application for gas turbines; factors affecting design of compressors, combustion chambers, turbines, heat exchangers, ducts, and nozzles; design of gas turbine unit for a specific application, including auxiliary equipment; testing of various components in laboratory. Prerequisite: ME 434.

ME 546, 547, 548. **Aerodynamics.** 3 hours each term. 3 ①
Theories of flow of perfect, viscous, and compressible fluids; theory of wings of finite and infinite spans.

ME 550. **Incompressible Fluid Mechanics.** 3 hours. 3 ①
Generalized fluid mechanics. Principle methods of fluid dynamics. Hydrostatics. Kinematics of liquids and gases; methods of description, geometry of the vector field, acceleration of a fluid particle, continuity equation. Dynamics of non-viscous fluids; Eulerian equation, potential motion, two-dimensional potential motion, vortex motion, energy and momentum theorems. Prerequisite: ME 319 and Mth 321 or ME 371.

ME 551. **Dynamics.** 3 hours. 3 ①
Newtonian dynamics: Hamilton's principle and Lagrange's Equations; central force motion; rigid body dynamics; oscilatory motion. Prerequisite: ME 319 and Mth 321 or ME 371.

ME 581. **Theoretical Structural Metallurgy.** 3 hours. 3 ①
Structure of the atom; structure of metal crystals; electron theory of metals; rate processes in metal structures; kinetics of phase changes; shear processes in metal crystals. Prerequisite: ME 312.313.

ME 582, 583. **X-Ray Metallography.** 3 hours each term. 2 ① 1 ③
The space lattice; diffraction of X-rays by crystals; experimental techniques in X-ray diffractions; effects of plastic deformation on X-ray diffraction patterns; radiographic inspection of metal castings and welds. Prerequisite: ME 581.

School of Forestry

Faculty

As of January 1961

WALTER FRASER MCCULLOCH, Ed.D., Dean of the School of Forestry; Associate Director of Forest Research Division, Agricultural Experiment Station; Professor of Forest Management.

GEORGE HECTOR BARNES, Ph.D., Assistant Director of Forest Research Division, Agricultural Experiment Station; Professor of Forest Management.

CHARLES WESLEY DANE, M.S., Assistant to the Dean.

WILLIAM PERRY WHEELER, M.F., Personnel Director, School of Forestry; Associate Professor of Forest Management.

Forest Engineering: Professors DAVIES (department head), PATTERSON (emeritus); Associate Professors O'LEARY, WILSON.

Forest Management: Professors DILWORTH (department head), JEFFERS, ROBINSON; Associate Professors FERRELL, KENISTON, NETTLETON, WHEELER, YODER; Assistant Professors BELL, IRGENS-MOLLER, JAENICKE (emeritus), KRYGIER,[1] RANDALL, SUTHERLAND; Instructor NEWTON.

Forest Products: Professor WEST (department head); Associate Professor MCKIMMY; Assistant Professor VAN VLIET.

Forest Properties: Professor DAVIES, forest supervisor.

Forest Extension: Farm Forestry Specialist Ross; Forest Products Marketing Specialist SANDER.

General Statement

THE AIM of the School of Forestry at Oregon State University is the best possible development of men, citizens, and foresters—in that order.

The school personnel program provides every student with an adviser, but ultimate success is dependent on the student. He must prove himself both on the job and on the campus; seasonal and graduate work performance is carefully appraised by the school. Foresters from Oregon State University must be competent and they must be respected. Forestry is an exacting and competitive profession with high academic and ethical standards. Students are required to abide by the Code of Ethics of the Society of American Foresters, and to conduct themselves in all respects as befits professional foresters. Departure from these requirements may be reason for terminating a student. The School is accredited by the Society of American Foresters, and maintains the high standards of that Society.

Forestry, the major industry of Oregon, is also of great importance to Washington, Idaho, and California. There is a strong, continuing demand for foresters in this region. Graduates in wood processing and technology are prepared for responsible positions with industrial organizations. Graduates in forest engineering and forest management are prepared to work with private and public organizations in raising, protecting, and harvesting the forest crop. Since the School stresses administrative management in all areas, graduates have excellent opportunities for advancement to supervisory and executive positions.

The School arranges seasonal employment for students and operates a placement service for graduates. Earlier graduates now in managerial positions give special consideration to the career development of present-day Oregon State foresters. Opportunities for good men in forestry are excellent; a forestry career is pleasant work, and it is a growing field with expanding possibilities, particularly on the West Coast.

[1] On leave 1960-61.

The most important preparatory subjects for forestry are English, mathematics, and science. Deficiencies revealed by placement tests in English and mathematics must be corrected. To be admitted to the School of Forestry, a prospective student must have completed the entrance requirements at OSU and place in Mathematics 100 or above in the mathematics placement test. To achieve a satisfactory score in this test, a student should have had algebra, trigonometry, and solid or plane geometry in high school. Those failing to place in Mathematics 100 or above must enroll in the preforestry program in the School of Humanities and Social Sciences. When the preforestry student has completed the remedial mathematics courses, and has achieved a satisfactory grade-point average, he may apply to the Dean of Forestry for admission.

Transfer students will complete graduation requirements more readily if they come to Oregon State not later than the end of the first year. Students transferring two years of college credit to Oregon State will require more than two additional years to complete the 4-year professional forestry program. Those who must remain in junior college for two years should concentrate on general education subjects, leaving professional forestry subjects to the School of Forestry. Vocational forestry courses do not carry college credit.

The School of Forestry offers curricula in three specialized but interrelated fields: Forest Engineering, Forest Management, and Forest Products. In all three fields emphasis is given to West Coast forestry. Each curriculum leads to a degree, either Bachelor of Science or Bachelor of Forestry. There is a combined Management-Engineering program leading to degrees in both departments and a 5-year program embracing a civil engineering option. Of special value to forestry students are the Oregon Forest Research Center and the forest science laboratory of the U.S. Forest Service located on the campus.

For the bachelor's degree the student is required to complete: (1) a minimum of 204 term hours of college work including institutional requirements (see p. 24) plus any additional credit hours required to complete remedial work, (2) a minimum of 80 term hours of professional courses approved by the Dean, (3) 9 hours of approved upper division electives in an area supporting the student's major interest, and (4) at least six months of practical field work satisfactory to the employer and to the school. Through the Graduate School, all departments of the School of Forestry offer graduate work leading to a master's degree, and the Forest Management Department also gives the Ph.D. degree.

No summer camp is required. The school forest is only 20 minutes from the campus, and a fleet of trucks takes forestry classes there daily for field instruction. During each school year, many trips are made to woods and plants in order to give the students first-hand contact with practical phases of engineering, management, and utilization.

School of Forestry properties include the 6,809-acre McDonald Forest, seven miles from the campus, established in 1929 through a gift of the late Mrs. Mary J. L. McDonald of San Francisco; the 181-acre George W. Peavy Arboretum; the 4,000-acre Paul Dunn Forest adjacent to the McDonald Forest; the Spaulding Tract in Benton County; and the Blodgett Tract in Columbia County. Forest research is carried on in the Forest Research Division of the Agricultural Experiment Station.

Curricula in Forestry

B.S., B.F., M.S., M.F., Ph.D. Degrees

Forest Engineering *Forest Management* *Forest Products*

Forest Engineering

Accredited Society of American Foresters

4-Year Curriculum

Freshman Year[1]

	Hours
Botany (Bot 201)	3
Chemistry (Ch 101,102)	6
Extempore Speaking (Sp 111)	3
Forest Engineering (FE 123)	3
[2]Forest Orientation (F 40)	...
General Forestry (F 111)	3
Tree Identification (F 153)	3
Mathematics (Mth 101,102,200)	12
English Composition (Wr 111,112,113)	9
Engineering Drawing (GE 115)	3
Air or Military Science	3
Physical Education, General Hygiene	3
	51

Sophomore Year

	Hours
Mensuration (F 224)	5
Forest Engineering (FE 223)	4
Wood Technology (FP 210)	3
Forest Protection (F 231)	3
General Physics (Ph 201,202,203)	12
Calculus with Anal Geom (Mth 201)	4
American Governments (PS 201)	3
Principles of Economics (Ec 201,202)	6
Technical Report Writing (Wr 227)	3
Air or Military Science	3
Physical Education	3
Basic Geology	3
	52

Junior Year

	Hours
Forest Valuation (F 324)	3
Logging Methods (FE 392)	3
Forest Engineering (FE 323)	3
Logging Roads (FE 361)	3
Silviculture: Forest Practices (F 342)	4
Timber Mechanics (FP 321)	4
Aerial Photo-Interp in For (F 320)	3
Principles of Accounting (BA 214,215)	6
Heat Engines (ME 337)	3
Humanities or Social Science Electives	9
Electives	9
	50

Senior Year

	Hours
Logging Plans (FE 461)	5
Logging Transportation (FE 462)	5
Logging Costs (FE 463)	5
Forest Economics (F 412)	3
Forest Administration (F 415)	3
Timber Management (F 425)	5
Fire Control (F 431)	4
Seminar (FE 407)	1
Business Law (BA 411)	3
Electives	17
	51

Forest Engineering

Accredited Society of American Foresters

5-Year Curriculum

First Year[1]

	Hours
Botany (Bot 201)	3
Extempore Speaking (Sp 111)	3
General Forestry (F 111)	3
[2]Forest Orientation (F 40)	...
Tree Identification (F 153)	3
Forest Engineering (FE 123)	3
Math (Mth 101,102) Calc with Analytic Geom (Mth 200)	12
English Composition (Wr 111,112,113)	9
Engineering Drawing (GE 115)	3
Physical Education	3
Humanities or Social Sciences Elective	3
Air or Military Science	3
	48

Second Year

	Hours
Engineering Concepts (GE 101,102,103)	9
General Chemistry (Ch 201,202,203)	9
Forest Engineering (FE 223)	4
Mensuration (F 224)	5
Wood Technology (FP 210)	3
Forest Protection (F 231)	3
Principles of Economics (Ec 201,202)	6
Technical Report Writing (Wr 227)	3
American Governments (PS 201)	3
Physical Education	3
Air or Military Science	3
	51

[1] Remedial courses in mathematics preceding the college courses will be required unless the student demonstrates ability to undertake college-level work. All students receiving credit for the English sequence but who fail to pass a comprehensive examination given upon completion fo the sequence will be required to take additional English courses.

[2] Noncredit course required of all freshmen.

Third Year

	Hours
Calc. with Analytical Geom. (Mth 201, 202,203)	12
Engineering Physics (Ph 207,208,209)	12
Statics (CE 211)	3
Strength of Materials (CE 212,213)	6
Forest Engineering (FE 323)	3
Accounting (BA 214,215)	6
Forest Practices (F 342)	4
Basic Geology	3
	49

Fourth Year

	Hours
Fluid Mechanics (CE 312) or (CE 322)	3
Dynamics (CE 311)	3
Structural Analysis (CE 381,382)	6
Materials Testing Lab (ME 316)	3
Soil Mechanics (CE 372)	3
Logging Methods (FE 392)	3
Logging Roads (FE 361)	3
Heat Engines (ME 337)	3
Forest Valuation (F 324)	3
Aerial Photo-Interp in For (F 320)	3
Business Law (BA 411)	3
Humanities or Social Science Elective	3
Electives	9
	48

Fifth Year

	Hours
Structural Design (CE 482)	3
Reinforced Concrete (CE 383)	3
Logging Plans (FE 461)	5
Logging Transportation (FE 462)	5
Logging Costs (FE 463)	5
Seminar (FE 407)	1
Forest Economics (F 412)	3
Forest Administration (F 415)	3
Fire Control (F 431)	4
Timber Management (F 425)	5
Electives	12
	49

Forest Management

Accredited Society of American Foresters

Freshman Year[1]

	Hours
General Botany (Bot 201,202)	6
Extempore Speaking (Sp 111)	3
General Forestry (F 111)	3
[2]Forest Orientation (F 40)	---
Dendrology (F 154)	4
Forest Engineering (FE 123)	3
Mathematics (Mth 101,102)	8
English Composition (Wr 111,112,113)	9
Engineering Drawing (GE 115)	3
Air or Military Science	3
Physical Education, General Hygiene	3
Humanities or Social Science Elective	6
	51

Sophomore Year

	Hours
Mensuration (F 224)	5
[3]Forest Protection (F 231)	3
Forest Engineering (FE 223)	4
Wood Technology (FP 210)	3
Basic Geology	3
American Governments (PS 201)	3
Forest Soils (Sls 214)	4
Principles of Economics (Ec 201,202)	6
Abridged General Physics (Ph 211,212)	6
General Chemistry (Ch 101,102)	6
Physical Education	3
Air or Military Science	3
Technical Report Writing (Wr 227)	3
	52

Junior Year

	Hours
Aerial Photo-Interp in For (F 320)	3
Wood Utilization (FP 310)	3
Mensuration: Timber Growth (F 327)	5
Logging Methods (FE 392)	3
Forest Ecology (F 341)	4
Forest Practices (F 342)	4
Forestation (F 343)	3
Forest Valuation (F 324)	3
Forest Engineering (FE 323)	3
Forest Recreation (F 365)	3
Electives	17
	51

Senior Year

	Hours
Watershed Management (F 424)	3
Forest Economics (F 412)	3
Forest Engineering (FE 423)	4
Timber Management (F 425)	5
Forest Administration (F 415)	3
Fire Control (F 431)	4
Seminar (F 407)	1
Range Management (DAH or FC 341)	3
Humanities or Social Science Electives	6
Electives	18
	50

[1] See fottnote[1] page 245.
[2] Noncredit course required of all freshmen.
[3] Bot 415 and Ent 321 may be taken instead of F 231.

Forest Products

Freshman Year[1]

	Hours
[2]General Chemistry (Ch 101,102,103)	9
General Botany (Bot 201,202)	6
Math (Mth 101,102) Calc with Analytic Geom (Mth 200)	12
[3]Forest Orientation (F 40)	---
General Forestry (F 111)	3
Tree Identification (F 153)	3
English Composition (Wr 111,112,113)	9
Engineering Drawing (GE 115)	3
Air or Military Science	3
Physical Education, General Hygiene	3
	51

Sophomore Year

	Hours
Mensuration (F 224)	5
[4]Forest Protection (F 231)	3
Forest Engineering (FE 123)	3
Wood Identification (FP 311)	3
Principles of Accounting (BA 214,215)	6
General Physics (Ph 201,202,203)	12
Extempore Speaking (Sp 111)	3
Technical Report Writing (Wr 227)	3
American Governments (PS 201)	3
Humanities or Social Science Elective	3
Air or Military Science	3
Physical Education	3
	50

Junior Year

	Hours
Logging Methods (FE 392)	3
Wood Properties (FP 314)	4
Timber Mechanics (FP 321,322)	8
Wood Utilization (FP 310)	3
Principles of Economics (Ec 201,202)	6
Humanities or Social Science Electives	6
Electives	22
	52

Senior Year

	Hours
Forest Economics (F 412)	3
Forest Administration (F 415)	3
Seminar (FP 407)	1
Lumber Plant (FP 451)	3
Wood Industry Problems (FP 452)	3
Forest Products Merchandising (FP 453)	3
Ply and Laminated Products (FP 464)	3
Wood Seasoning (FP 465)	3
Wood Preservation (FP 466)	3
Electives	26
	51

Forest Engineering

Courses in forest engineering are designed to prepare men to deal with the woods problems peculiar to the forest industry of the Pacific Northwest. Emphasis is placed on the preparation of logging plans and the transportation of timber from the woods to the mills.

Lower Divison Courses

FE 123. Forest Engineering. 3 hours. 2 ① 1 ④
Measurement of distance, direction, and elevation. Prerequisite: Mth 102.

FE 223. Forest Engineering. 4 hours. 2 ① 1 ⑥
Topographic surveying; direct and indirect leveling; computing and plotting of field data. Prerequisite: FE 123, engineering drawing.

Upper Division Courses

FE 323. Forest Engineering. 3 hours. 2 ① 1 ④
Public land survey; stadia; plane table; polar and solar observation; triangulation; drafting of field data. Prerequisite: FE 223.

FE 360. Northwest Logging. 4 hours. 2 ① 1 ⑥
A basic course in logging methods and equipment with particular application to the Pacific Northwest. Prerequisite: Mth 200; F 224; FE 223.

FE 361. Logging Roads. 3 hours. 2 ① 1 ③
Design of logging roads. Prerequisite: Ph 201; FE 223; F 320; and basic geology.

FE 392. Logging Methods. 3 hours. 2 ① 1 ③
Relation between logging and forest production; felling and bucking; skidding, loading, hauling; relative merits of various methods. Prerequisite: FE 123; F 224.

[1] See footnote[1] page 245.
[2] Ch 201,202,203 suggested for those students who have had high school chemistry.
[3] Noncredit course required of all freshmen.
[4] May substitute Ent 321 or Bot 415.

FE 401. **Research.** Terms and hours to be arranged.

FE 403. **Thesis.** Terms and hours to be arranged.

FE 405. **Reading and Conference.** Terms and hours to be arranged.

FE 406. **Projects.** Terms and hours to be arranged.

FE 407. **Seminar.** Terms and hours to be arranged.

FE 423. **Forest Engineering.** (g) 4 hours. 3 ① 1 ④
Basic logging plans and route surveys. Prerequisite: FE 323,392.

FE 461. **Logging Plans.** (g) 5 hours. 2 ① 1 ③ 1 ⑥
Basic logging plans; analysis of timbered areas for development of logging operations; preliminary transportation plans. Prerequisite: FE 323,361,392.

FE 462. **Logging Transportation.** (g) 5 hours. 2 ① 1 ③ 1 ⑥
Working plans from data obtained in FE 461; development of transportation systems. Prerequisite: FE 461; FP 321.

FE 463. **Logging Costs.** (g) 5 hours. 2 ① 1 ③ 1 ⑥
Management control; economic theory of location and construction; costs of surveys, construction, operation, and maintenance. Prerequisite: FE 462.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

FE 501. **Research.** Terms and hours to be arranged.

FE 503. **Thesis.** Terms and hours to be arranged.

FE 505. **Reading and Conference.** Terms and hours to be arranged.

FE 506. **Projects.** Terms and hours to be arranged.

FE 507. **Seminar.** Terms and hours to be arranged.
Subject matter as required by graduate programs.

FE 525. **Forest Engineering.** 3 hours. 2 ① 1 ④
Advanced logging plans and route surveys. Not open to forest engineering majors.

FE 560. **Logging Methods.** 4 hours. 2 ① 1 ⑥
Studies of current developments in logging methods and equipment.

FE 561, 562, 563. **Logging Engineering.** 5 hours each term. 2 ① 1 ③ 1 ⑥
Advanced study of logging plans and timber transportation systems.

FE 581. **Timber Bridge Design.** 3 hours. 1 ① 1 ⑥
Problems in location, design, and construction of timber bridges in logging transportation systems.

Forest Management

The courses in forest management afford basic training for the practice of forestry, particularly in the Pacific Northwest. Emphasis is placed upon the technical and administrative measures necessary to produce the greatest values from all forest resources.

Lower Division Courses

F 40. **Forest Orientation.** No credit. 1 ①
Personal orientation of the student to the College and to the profession.

F 111. **General Forestry.** 3 hours. 3 ①
Preliminary survey of the entire field of forestry including the development of the conservation movement in the United States; fields of specialization; vocational opportunities. Restricted to forestry students.

F 153. **Tree Identification.** 3 hours. 1 ① 2 ②
Principal Pacific Coast timber trees; range, occurrence, size, growth, form; climate, soil, moisture requirements, value; wildlife uses.

F 154. **Dendrology.** 4 hours. 2 ① 2 ②
Principal timber trees of the United States with special emphasis on Western species; characteristics, classification, identification.

F 224. **Mensuration.** 5 hours. 3 ① 1 ⑥
Measurement of standing and felled timber and timber products. Prerequisite: FE 123; F 153.

F 231. **Forest Protection.** 3 hours. 2 ① 1 ③
Major causes of forest damage, including insects, disease and fire, and their influence on forest management; recognition of damage, methods of salvage, preventive measures, control of damage. Prerequisite: F 153.

F 260. **Conservation of Natural Resources.** 3 hours. 3 ①
Nature, extent, and importance of natural resources of United States and operation of various forest agencies in conserving them; forest, forage, recreation, wildlife, soil, and water aspects. Not open to forestry majors.

Upper Division Courses

F 320. **Aerial Photo-Interpretation in Forestry.** 3 hours. 2 ① 1 ③
Techniques and principals of forest photointerpretation; forest type mapping; volume estimation from aerial photographs. Prerequisite: F 224.

F 324. **Forest Valuation.** 3 hours. 2 ① 1 ③
Valuation as a tool of management in forest enterprise; methods of valuing various types of assets, including land, stumpage, capital equipment, and the going operation.

F 327. **Mensuration: Timber Growth.** 5 hours. 3 ① 2 ③
Growth of even-aged stands, many-aged stands, and individual trees. Prerequisite: F 224.

F 341. **Forest Ecology.** 4 hours. 3 ① 1 ③
Influence of environmental factors on the development, distribution, and succession of forest vegetation. Prerequisite: F 231; Sls 214; basic geology.

F 342. **Silvicultural Practices.** 4 hours. 3 ① 1 ③
Treatment of stands to insure perpetuation of forest resources. Prerequisite: F 341 (for forest management majors).

F 343. **Forestation.** 3 hours. 2 ① 1 ③
Forest land examination and classification; reproduction surveys; planting plans; establishment and maintenance of plantations; nursery practices. Prerequisite: F 341, Sls 214.

F 344. **Farm Forestry.** 3 hours. 2 ① 1 ③
Relation of forest resources and forestry to agriculture, with emphasis on techniques of farm-woodland management and utilization of farm-forest products. Designed especially for agricultural students. Offered alternate years. Offered 1960-61.

F 364. **Park Forestry.** 3 hours. 2 ① 1 ③
Trees and their treatment for park and recreational purposes. Offered alternate years. Not offered 1961-62.

F 365. **Forest Recreation.** 3 hours. 2 ① 1 ③
Forest recreation, its importance and nature; planning forest use for recreational purposes in relation to other forest use.

F 370. **Field Work.** 1 to 6 hours.
Practical field work between the sophomore and junior years or the junior and senior years carried on with private concerns or public agencies; report based on an approved outline. (See Section of Academic Regulations in General Catalog regarding work done in absentia.)

F 401. **Research.** Terms and hours to be arranged.

F 403. **Thesis.** Terms and hours to be arranged.

F 405. **Reading and Conference.** Terms and hours to be arranged.

F 406. **Projects.** Terms and hours to be arranged.

F 407. **Seminar.** Terms and hours to be arranged.

F 412. **Forest Economics.** (g) 3 hours. 3 ①
Economics of forest management and utilization; forest credit, taxation, and marketing. Prerequisite: Ec 202; for forest management majors, F 324 and 327.

F 415. **Forest Administration.** (g) 3 hours. 3 ①
Administrative organization and personnel work of public and private forest agencies. Prerequisite: Senior standing.

F 424. **Watershed Management.** (g) 3 hours. 2 ① 1 ③
Principles of forest management applied to integrated use of all forest resources for the production of water. Prerequisite: F 342.

F 425. **Timber Management.** (g) 5 hours. 4 ① 1 ③
Principles and practices in the regulation of forest properties for sustained yield; timber inventories and management plans. Prerequisite: F 324, F 327, for management majors.

F 427. **Industrial Forestry.** (G) 3 hours. 3 ①
The principles and methods employed in the operation of industrial forest properties in the Northwest. Prerequisite: senior standing.

F 431. **Fire Control.** (g) 4 hours. 3 ① 1 ③
Basis for fire control. Fire-control planning and administration. Prerequisite: F 231.

F 442. **Pine Forest Practices.** (G) 2 hours spring. 2 ①
Silvicultural problems and treatment of pine forest types in western United States. Prerequisite: F 342; senior standing.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

F 501. **Research.** Terms and hours to be arranged.

F 503. **Thesis.** Terms and hours to be arranged.

F 505. **Reading and Conference.** Terms and hours to be arranged.

F 506. **Projects.** Terms and hours to be arranged.

F 507. **Seminar.** Terms and hours to be arranged.
Subject matter as required by graduate programs.

F 511. **Economics of Private Forestry.** 3 hours. 3 ①
Economic and financial problems of private forestry, including insurance, forest credit, cost analysis, and practical problems in forest finance.

F 512. **Economics of the Forest Resource.** 3 hours. 3 ①
Place of forests in national and regional economy; structure of forest industries; forest ownership, taxation, and public policy.

F 513. **Economics of Forest Utilization.** 3 hours. 3 ①
Factors affecting costs and returns in forest industries.

F 514. **Forest Land Use.** 3 hours. 3 ①
Application of principles and techniques of economic planning to the problem of coordinating forest land uses with one another and with other forms of land use. Prerequisite F 412.

F 515. **Forest Administration.** 3 hours. 3 ①
Organization, administration, operating problems of public and private forestry agencies.

F 519. **Photogrammetry.** 3 hours. 1 ② 2 ③
Use of multiplex and Balplex plotters in topographic mapping and road location. Prerequisite: F 320; FE 323; and consent of instructor.

F 520. **Aerial Photo Mensuration.** 3 hours. 1 ① 2 ③
Advanced methods in use of aerial photographs in forest inventory; photomensurational techniques in preparation of stand and tree volume tables; planning large scale photomensurational projects.

F 521. **Research Methods.** 3 hours. 3 ①
Research project analyses and working plans, investigative procedures, principles and practices in scientific writing.

F 522. **Multiple-Use Management.** 3 hours. 2 ① 1 ③
Forest regulation, continuous forest inventory, and multiple-use management planning. Prerequisite: F 425.

F 523. **Forest Management Problems.** 3 hours. 2 ① 1 ③
Analysis of special problems relative to forest land management. Prerequisite: F 412, 425.

F 531. **Fire control.** 3 hours. 2 ① 1 ③
Forest-fire plans, their preparation and execution.

F 541,542,543. **Silviculture.** 3 hours each term. 2 ① 1 ③
Advanced approach in treatment of stands; research methods.

F 544. **Forest Genetics.** 3 hours winter. 2 ① 1 ③
Application of principles of plant genetics to silvicultural practices. Prerequisite: Sls 214; F 341 or Bot 341; Z 341.

Forest Products

The curriculum is intended to prepare men for careers in forest products and allied industries. It is designed to give a broad education in principles fundamental to the science of wood, its adaptability to processes, and wise use of products. The curriculum is equally applicable in preparation for production, sales, research and product development, technical services, and utilization areas of employment. In meeting student objectives in these areas an opportunity is given through electives to arrange course programs, under staff guidance, in cooperation with courses offered in architecture, humanities, social sciences, business, sciences, industrial arts, engineering, forest management, and forest engineering.

Lower Division Course

FP 210. **Wood Technology.** 3 hours. 2 ① 1 ②
Wood structure, properties, seasoning, grading, and treatment; wood identification with the hand lens. Abbreviated course for students not majoring in forest products. Prerequisite: F 111 or F 260, F 153 or 154.

Upper Division Courses

FP 310. **Wood Utilization.** 3 hours. 3 ①
Principal wood-using industries; economics, species used, manufacturing processes, and products; special emphasis on Pacific Coast industries. Prerequisite: FP 210 or 311.

FP 311. **Wood Identification.** 3 hours. 1 ① 2 ③
Identification of commercial woods with a hand lens; brief introduction to their microscopic structure. Prerequisite: F 153; Bot 201.

FP 314. **Wood Properties.** 4 hours. 3 ① 1 ③
Anatomy of wood; physical and chemical characteristics as related to behavior and uses; modified woods. Prerequisite: FP 311.

FP 321. **Timber Mechanics.** 4 hours. 2 ① 2 ③
Graphic and analytic statics applied to simple structures and structural elements of wood; stress, strain, strength, and elastic characteristics of wood; design and selection of structural elements. Prerequisite: Mth 200; FP 210 or 314; Ph 201.

FP 322. **Timber Mechanics.** 4 hours. 2 ① 2 ③
Development, scope, and procedures of timber testing; factors affecting the strength of wood; gathering and analysis of mechanical properties data; timber fastenings and fabrication; design problems. Prerequisite: FP 321.

FP 401. **Research.** Terms and hours to be arranged.

FP 403. **Thesis.** Terms and hours to be arranged.

FP 405. **Reading and Conference.** Terms and hours to be arranged.

FP 406. **Projects.** Terms and hours to be arranged.

FP 407. **Seminar.** Terms and hours to be arranged.

FP 451. **The Lumber Plant.** (g) 3 hours. 2 ① 1 ③
Grading principles; manufacturing plants, equipment selection, layout; production practices; plant visits. Prerequisite: FP 310.

FP 452. **Wood Industry Problems.** (g) 3 hours. 2 ① 1 ③
Manufacturing problems in wood-using industries; raw material, types of products, production problems, cost analysis, residue utilization, and administration; plant visits. Prerequisite: FP 451.

FP 453. **Forest Products Merchandising.** (g) 3 hours. 3 ①
Trade practices and customs pertaining to distribution of forest products, wholesale and retail. Prerequisite: FP 310; FP 451, for forest products majors.

FP 464. **Ply and Laminated Products.** (g) 3 hours. 2 ① 1 ③
Gluing of wood; production and properties of glues, veneers, ply and laminated products; gluing techniques and commercial practices; equipment used; plant visits. Prerequisite: senior standing in forest products.

FP 465. **Wood Seasoning.** (g) 3 hours. 2 ① 1 ③
Wood drying; types, operation, and maintenance of drying facilities; lumber, veneer, and particles; plant visits. Prerequisite: FP 314.

FP 466. **Wood Preservation.** (g) 3 hours. 2 ① 1 ③
Deterioration; good building practices; preservatives, processes, and treating equipment; properties of treated materials; economic aspects; plant visits. Prerequisite: FP 314.

Graduate Courses

Courses numbered 400-499 and designated *(g)* or *(G)* may be taken for graduate credit.

FP 501. **Research.** Terms and hours to be arranged.

FP 503. **Thesis.** Terms and hours to be arranged.

FP 505. **Reading and Conference.** Terms and hours to be arranged.

FP 506. **Projects.** Terms and hours to be arranged.

FP 507. **Seminar.** Terms and hours to be arranged.
Subject matter as required by graduate program.

FP 516. **Wood Microtechnique.** 3 hours. 3 ③
Preparation, sectioning or maceration, staining, and mounting of slides of wood and wood-base materials for microscopic study. Prerequisite: FP 314.

FP 517. **Wood Anatomy.** 3 hours. 1 ① 2 ③
Intensive anatomical studies; techniques; literature survey. Prerequisite: FP 314.

FP 518. **Wood Properties.** 3 hours. 2 ① 1 ③
Advanced specialized, analytical, and experimental investigations of mechanical or other physical properties of wood; relation of physical properties to specific uses. Prerequisite: FP 314.

FP 551,552,553. **Wood Industry Problems.** 3 hours each term.
Plant layout planning; production studies; production control; residue utilization; management; merchandising.

FP 555. **Forest Products Photographic Techniques.** 3 hours. 3 ③
Application of macro and micro photography to wood technology problems. Prerequisite: FP 314.

FP 564. **Ply and Laminated Products.** 3 hours. 2 ① 1 ③
Special gluing problems; testing adhesives used in ply and laminated construction; physical properties of wood related to bonding problems; study of technical literature.

FP 565. **Wood Seasoning.** 3 hours. 2 ① 1 ③
Special problems in drying of wood; procedures and equipment; design of schedules.

FP 566. **Wood Preservation.** 3 hours. 2 ① 1 ③
Advanced work in wood preservation designed to meet needs of individual students, with special attention to theoretical consideration and factors that control efficiency of treating processes.

School of Home Economics

Faculty

As of January 1961

MIRIAM G. SCHOLL, Ed.D., Dean of the School of Home Economics.

WINNIFRED KEIL FULMER, M.S., Head Counselor.

AVA MILAM CLARK, M.A., Professor Emeritus of Home Economics. (Dean and Director School of Home Economics 1917-1950.)

VERA BRANDON, Ph.D., Professor Emeritus of Home Economics. (Acting Dean School of Home Economics 1950-1954, Associate Dean 1954-1955.)

Clothing, Textiles, and Related Arts: Professors PETZEL[10] (department head), FRITCHOFF (emeritus), GATTON (emeritus), PATTERSON, STRICKLAND (emeritus); Associate Professors DIEDESCH, EDABURN, INGALLS, LEDBETTER, MOSER; Assistant Professors CARLSON, GRANT,[1] SMITH, WELLS; Instructor LEMMAN;[2] Graduate Assistants BOERSMA, KIEL.

Family Life and Home Administration: Professors READ[3] (department head), BRANDON (emeritus), KIRKENDALL, PRENTISS (emeritus); Associate Professors KANE,[4] SCHALOCK, VAN HORN, WIGGENHORN;[5] Assistant Professors AIKIN,[6] COLLARD,[7] PLONK, STATON; Instructors CROFT, OLESON, PLANTS, VAN WINKLE; Graduate Assistants ANDERSON, OMID,[7] VAN LOAN.

Foods and Nutrition: Professors FINCKE (department head), MACKEY, STORVICK, WILLIAMS (emeritus); Associate Professors CHARLEY, HAWTHORNE, McLEAN,[9] TANK; Assistant Professors BARTE, GARRISON (emeritus), HARRIS, WARE; Instructors FENNER,[8] PETERS, WALLACE; Graduate Assistant PHILLIPS.

Home Economics Education: Professor DUBOIS (department head); State Supervisor and Teacher-Educator KOHLHAGEN; Associate Professor McQUESTEN; Instructor WOHLGENANT.

Home Economics Research: Professors STORVICK (chairman), MACKEY, PETZEL, KIRKENDALL, WILSON (emeritus); Associate Professors CHARLEY, HAWTHORNE, TANK, SCHALOCK; Junior Nutritionists (Instructors) BENSON, EDWARDS, FISHER; Junior Home Economist (Instructor) JOINER; Assistant in Nutrition WOODRING; Research Assistants BERGSTAD, SMITH.

Institution Management: Associate Professor MULHERN (chairman, manager food service, dormitories); Assistant Professor CLEVELAND (manager cafeterias).

Home Economics Extension: Professors MACK (assistant director, Federal Cooperative Extension Service), TASKERUD (coordinator, home economics extension programs), SCALES (State agent); Associate Professors ABBOTT (State agent), FRASIER (family life specialist), FUNK (State agent), KLIPPSTEIN (nutrition specialist), MALLALIEU (recreation specialist), REIGLE (consumer marketing specialist); ROUTH (clothing specialist), SHERRILL (home management specialist), STRAWN (home management and equipment specialist), STREUFERT (clothing specialist); Assistant Professors BRASHER (State agent, 4-H Clubs), McCANDLESS (consumer marketing specialist), MILLER (information specialist), REDMAN (State agent, 4-H Clubs).

General Statement

OREGON STATE UNIVERSITY has provided education in home economics since 1889, when home economics was in its early beginnings and first organized as a body of knowledge having to do with the science and art of homemaking. Since then tremendous changes in living have taken place, and a vast amount of knowledge is now available to enhance home and family life. Each year the home economics profession makes increasing contributions to community and society and to the well-being of individuals and families around the world. For these and other reasons the demand for women with college education in home economics continues to increase. They are sought after in

[1] On leave of absence until January 1962.
[2] Spring term only.
[3] On leave of absence winter term, 1961.
[4] Spring term only.
[5] On leave of absence.
[6] On sabbatical leave spring term, 1961.
[7] Winter and spring terms only.
[8] Winter term only.
[9] On leave of absence fall term of 1960.
[10] On sabbatical leave fall term, 1960.

commerce and industry, by government, and by educational, philanthropic, and international agencies for positions in teaching, extension, business, and research.

The School of Home Economics has three major objectives: (1) to provide the best possible educational opportunities for women, (2) to assist students in fitting themselves for their varied and dual roles as individuals and homemakers, and (3) to provide preparation for professional careers.

All home economics students take some work in each of the basic areas: clothing, textiles, and related arts; foods and nutrition; and family life and home administration. They also take work in humanities, social sciences, and science.

Excellent facilities for all phases of home economics work are provided in the Home Economics Building, the home management houses, the nursery schools, and the dormitory housing and dining services.

Curriculum. All students fulfill requirements of one core curriculum for graduation from the School of Home Economics. The core includes the following requirements:

Home Economics:
- 12 hours in clothing, textiles, and home furnishings: CT 210, 211, 250, 331.
- 12 hours in foods and nutrition: FN 225; 211, 212 or 220, 221; 313.
- 9 hours in child development and family life: FL 225, 311, 422.
- 12 hours in household equipment, home management, and finance: HAd 240, 330, 341, 450.
- 1 hour in home economics orientation: HEc 101.
- [1]9 hours upper division electives in home economics subjects.

Science and Social Science:
- [1]15 hours in science, of which 9-12 are a laboratory sequence (not a survey)
- 24 hours in social science to include:
  - 6 hours in general psychology
  - 9 hours in a history sequence
  - 3 hours each in economics, political science, and sociology.
- [1]6 hours of electives in science or social science.

Other combinations of social science courses for students with special needs may be taken with specific approval of the dean.

Humanities:
- 9 hours of English composition
- 9 hours of literature (or literature in a foreign language) or 6 hours of literature and 3 hours of speech
- 3 hours of art: Color and Composition
- 3 hours of art or music
- 3 hours of architecture: Home Planning and Architectural Drawing.

Other requirements:

Mathematics 10 or exempt

Physical Education: 5 terms in activity courses and one term in general hygiene. Also required for senior standing.

Students majoring in home economics choose additional hours of work from the Areas of Concentration on pages 258-263 in order to provide breadth and depth in their programs, to develop special interests, and to meet course requirements of specific professional fields.

Students who enrolled in Curricula A, B, and C in 1959-60 or earlier may continue their programs and receive their degrees as the curricula are outlined on pages 327-329 of the 1959-60 Catalog.

[1] For recommended and required courses for the various earning fields, see Areas of Concentration, pages 258-263.

Transfer students who have taken some of their home economics courses elsewhere are required to take at least one course in each of the basic home economics subject matter areas at Oregon State University to qualify for graduation.

One- and two-year students who are interested in home economics but who are not candidates for degrees may plan, with the help of their advisers, special programs to meet individual needs, capabilities, and interests. In such special programs students may elect a variety of courses in other schools and departments of the college.

Graduate Study and Research. Through the Graduate School, all departments of the School of Home Economics offer work leading to the master's degree (M.A., M.S., M.H.Ec.). The Master of Home Economics degree may also be completed with a major in general home economics. The Doctor of Philosophy degree is offered in foods and nutrition and in child development and family relations.

Through research and extension, effort is constantly directed toward the solution of problems of home and family life. The School of Home Economics cooperates with the Agricultural Experiment Station in research programs and undertakes studies supported by Federal, State, private, and general research funds.

Correspondence Study. Home Economics Courses are also offered by Correspondence through the General Extension Division of the Oregon State System of Higher Education.

The Merrill-Palmer School. The School of Home Economics carries an affiliation with the Merrill-Palmer School in Detroit. Students interested in any phase of child development, family relations, or social service work may apply and be selected to study at the Merrill-Palmer School during one term of their junior or senior years. For information about applications, see the dean of the School of Home Economics.

Curriculum in Home Economics

B.A., B.S. Degrees[1]

Freshman Year

	Hours
Color and Composition (AA 160)	3
Art or Music	3
[2]Science Sequence with Laboratory (not a survey)	9–12
[3]Mathematics 10 or exempt	(0–4)
English Composition (Wr 111,112,113)	9
Intro to Home Economics (HEc 101)	1
Nutrition (FN 225)	3
Clothing Construction (CT 210)	3
Clothing Selection (CT 211)	3
Textiles (CT 250)	3
Speech or Literature	3
Physical Education	3–4
Electives or Courses in Area of Concentration	0–6

Sophomore Year

	Hours
Foods (FN 211,212) or (220,221)	6
[2]Science	3–6
Child Development (FL 225)	3
Management in Family Living (HAd 240)	2
House Planning and Architectural Drawing (AA 178)	3
General Psychology (Psy 201,202)	6
History of Western Civilization (Hst 101,102,103)	9
Literature or Literature in a Foreign Language	6
Physical Education	3–4
Electives or Courses in Area of Concentration	2–7

[1] See DEGREES AND CERTIFICATES, page 23.

[2] For recommended and required courses for the various earning fields, see Areas of Concentration, pages 258-263.

[3] Does not count in hours for graduation.

Junior Year	Hours
Family Finance Mgt (HAd 341)	2
Child Development (FL 311)	3
Household Equipment (HAd 330)	3
Meal Planning and Service (FN 313)	3
*Outlines of Economies (Ec 212)	3
[1]General Sociology (Soc 212)	3
Political Science	3
Home Furnishing (CT 331)	3
Electives or Courses in Area of Concentration	19
[2]Electives in Science or Social Science	6

Senior Year	Hours
Family Relationships (FL 422)	3
Home Management House (HAd 450)	5
[2]Upper Division Electives in Home Economics	9
Electives or Courses in Area of Concentration	34

AREAS OF CONCENTRATION AND MINORS

The following areas of concentration and minors have been set up to help direct students in their professional interests in home economics. Students need to consult staff members as early as possible in their college careers to plan their total programs for personal and professional preparation as well as to meet graduation requirements. The areas of concentration and minors list recommended courses and are not requirements for graduation.

Students interested in areas other than those listed may plan special programs with their advisers.

Clothing, Textiles, and Related Arts

Clothing and Textiles in Business

Students in this area may prepare for merchandising, promotional and fashion careers in textiles and clothing.

Recommended Basic Courses:

Clothing Construction (CT 212)
Consumer Buying in Clothing and Textiles (CT 350)
The Clothing Buyer (CT 470)
Speech (Sp 111)
Business English (Wr 214)
Marketing (BA 313)
Retail Merchandising (BA 463)

Other Suggested Electives:

Upper division courses in clothing, textiles, and related arts
Journalism, radio speaking and basic television
Principles of Accounting (BA 211)
Advertising (BA 464)
Salesmanship (BA 465)
Human Rels in Bus and Ind (BA 497)
Prin of Econ (Ec 201,202,203 or 213,214)
French
Survey of Visual Arts (AA 201,202,203)
Drawing (AA 291)
Basic Design (AA 295)
Display Design (AA 296)
History of Art (AA 363,364,365)

Home Furnishings and Interior Design

Students interested in these fields may take courses to gain a background for further training, for apprenticeship or other positions in merchandising, or because of general interest. Experience and further education are required to become a professional interior designer. Students may enter the field of interior design either from Schools of Home Economics or from Schools of Architecture and Allied Arts.

Recommended Basic Courses:

Graphics (AA 111,112)
Color and Composition (AA 161)
Design Studio I (AA 187)
House Planning and Arch Draw (AA 180)
Survey of Visual Arts (AA 201,202,203)
Graphics (AA 211,212,213)
Elements of Interiors (AA 223)
Crafts (AA 259)
Architectural Design (AA 287)
Interior Design (AA 288)
Basic Design (AA 295)
Display Design (AA 296)
Clothing Construction (CT 212)
Home Furnishings Laboratory (CT 332)
Applied Home Furnishings (CT 333)
Textile Design (CT 335)
Consumer Buying in Clothing and Textiles (CT 350)
Quantity Textile Purchasing (CT 351)
Home Furnishing (CT 431)
Historic Textiles (CT 460)
Org and Use of House Space (HAd 335)
House Plan in Rel to Function (HAd 435)
Functional Design of Dwellings (HAd 436)
Family Housing (HAd 439)
Household Utilities (AE 435)
Home Ground Planning (LA 279)

Other Suggested Electives:

Hist of Amer Civ (Hst 224,225,226)
Amer Thought and Cult (Hst 460,461,462)
Creative Epochs in Western Thought (Hum 311,312,313)
House Plan and Arch Draw (AA 179)
Construction Materials (AA 121)
Building Cost Estimates (AE 465)
Courses in speech, journalism, radio speaking and television
Courses in business administration

[1] [2] See corresponding footnotes on previous page.
* Course may also be first term of a sequence if the sequence is to be completed.

College Teaching and Research in Clothing, Textiles, and Related Arts

Students may enter this area to prepare for graduate work leading to college teaching or because of general interest in this field.

Recommended Basic Courses:

General Chemistry (Ch 101,102,103)
Principles of Economics (Ec 201,202,203) or Sociology (Soc 204,205,206)
Clothing Construction (CT 212)
Historic Costume (CT 309)
Flat Pattern and Draping (CT 310)
Textile Design (CT 335)
Consumer Buying in Clothing and Textiles (CT 350)
Survey of Visual Arts (AA 201,202,203)

Other Electives:

Upper division courses in clothing, textiles, and related arts
Upper division courses in home admin (housing)

Concentrated work in one or more of the areas listed below:

Art and architecture
Bacteriology
Chemistry
Economics
History
Mathematics
Modern languages
Physics
Psychology
Sociology

Textile Research

Students in this area may prepare for graduate work leading to research or college teaching of textiles. Chemistry is essential for this field.

Recommended Basic Courses:

General Chemistry (Ch 101,102,103)
Intermediate Algebra (Mth 100)
College Algebra (Mth 101)
General Bacteriology (Bac 204)
Organic Chemistry (Ch 221,222, or Ch 226, 227)
Abridged General Physics (Ph 211,212) or General Physics (Ph 201,202,203)
Technical Report Writing (Wr 227)
Consumer Buying in Cloth & Text (CT 350)

Other Suggested Electives:

Trigonometry (Mth 102)
Calculus with Anal Geom (Mth 200,201, 202,203)
Clothing Construction (CT 212)
Quantity Textile Purchasing (CT 351)
Textiles (CT 450)
Qualitative Analysis (Ch 206)
Quantitative Analysis (Ch 234)
Elementary Physical Chemistry (Ch 340) or Physical Chemistry (Ch 440,441,442)
French or German

Child Development and Family Relations

Nursery School Teaching

Students taking courses in this area prepare for nursery school teaching.

Recommended Basic Courses:

General Biology (GS 101,102,103)
Physical Science (GS 104,105, or 106—two terms)
Child Development (FL 312)
Parent Education (FL 423)
The Nursery School Child (FL 425)
Nursery School Procedures (FL 427)
Curriculum Enrichment for Young Children (FL 428)
Supervised Nursery School Experience (FL 429)
Seminar: Nursery School Experience (FL 430)

Other Suggested Electives:

Creative Arts and Crafts for Elemen Teach (AA 311,312,313)
Music for Elemen Teach (Mus 371,372,373)
Children's Literature (Lib 388)
Group Dynamics (Psy 361)
Mental Hygiene (Psy 411)
Child Development (FL 413)
Behavior Deviations (Psy 462)
Family Nutrition (FN 325)
Economics of the Family (HAd 441)
Additional courses in psychology
Additional courses in sociology
Courses in education required for teaching credential

College Teaching and Research in Child Development and Family Relations

Students may prepare for graduate work leading to college teaching and research in the areas of child development and family relations.

Recommended Basic Courses:

General Zoology (Z 201,202 203)
Physiology (Z 331,332)
Intermediate Algebra (Mth 100)
Psychology Laboratory (Psy 208,209)
Child Development (FL 312)
Statistical Techniques (St 314,315)
Genetics (Z 341)
Group Dynamics (Psy 361)
The Nursery School Child (FL 425)
Economics of the Family (HAd 441)
The Family in the Community (HAd 445)

Other Suggested Electives:

Individual programs for students in each of the above areas are arranged from offerings in home economics, social sciences, humanities, education, and other fields.

Home Administration

Family Finance and Home Management

Students may prepare for graduate work leading to college teaching or for positions in business or social agencies in these areas.

Recommended Basic Courses:
Principles of Economics (Ec 201,202,203)
Statistical Techniques (St 314,315)
Consumer Buying in Clothing and Textiles (CT 350)
Family Food Buying (FN 411)
Family Housing (HAd 439)
Management in Family Living (HAd 440)
Economics of the Family (HAd 441)
Management Problems in Home-Community Relations (HAd 445)
Organization and Use of House Space (HAd 335)
Food Management (FN 412)
Seminars in home management

Household Equipment in Business

Students may prepare for work with utility and equipment companies.

Recommended Basic Courses:
General Physics (Ph 201,202,203) or Abridged General Physics (Ph 211,212)
General Chemistry (Ch 101,102,103)
Physiology (Z 331,332)
Courses in journalism, speech, radio speaking and television
Food Demonstration (FN 410)
Org and Use of House Space (HAd 335)
Human Rel in Bus and Ind (BA 497)

Other Suggested Electives:
Business English (Wr 214)
Consumer Buying in Clothing and Textiles (CT 350)
Family Food Buying (FN 411)
Economics of the Family (HAd 441)
Household Utilities (AE 435)
Management Problems in Home-Community Relations (HAd 445)
Textiles (CT 450)
Seminars in home management

Housing

For students preparing for positions or graduate work in the field of housing.

Recommended Basic Courses:
General Physics (Ph 201,202,203) or Abridged General Physics (Ph 211,212)
Intermediate Algebra (Mth 100)
College Algebra (Mth 101)
Construction Materials (AA 121)
Rural House Planning (AE 451)
Organization and Use of House Space (HAd 335)
Housing Planning in Relation to Function (HAd 435)
Functional Design of Dwellings (HAd 436)

Other Suggested Electives:
Family Housing (HAd 439)
Economics of the Family (HAd 441)
For additional course suggestions, see home furnishings and interior design, page 258.

Foods and Nutrition

Foods and Nutrition in Business

Students in this area may prepare for positions in test kitchens and in consumer service work with food, equipment, and utility companies. See also home economics communications and food research areas.

Recommended Basic Courses:
General Chemistry (Ch 101,102,103)
Organic Chemistry (Ch 221,222)
General Bacteriology (Bac 204)
Foods (FN 220,221)
Extempore Speaking (Sp 111)
Radio Speaking (Sp 361,362,363)
Basic Television (Sp 367)
Elementary Journalism (J 111)
Food Demonstrations (FN 410)

Other Suggested Electives:
Family Nutrition (FN 325), or Nutrition (FN 321)
Family Food Buying (FN 411)
Food Management (FN 412)
Experimental Food Studies (FN 435)
Technical Writing (J 319)
Advertising (BA 464)
Human Rel in Bus and Ind (BA 497)
Home Food Preservation (FN 414)
Recent Advances in Foods (FN 425)

College Teaching and Research in Foods and Nutrition

Students in this area may prepare for graduate study leading to college teaching and to research positions in foods or nutrition in colleges, government, or industry. A sound basis in chemistry is essential.

Recommended Basic Courses:
General Chemistry (Ch 101,102,103)
Organic Chemistry (Ch 226,227)
Bacteriology (Bac 204)
Foods (FN 220,221)
Quantitative Analysis (Ch 234)
Biochemistry (Ch 350)
Intermediate Algebra (Mth 100)
Physiology (Z 331,332)
Nutrition (FN 321)

Other Suggested Electives:
Bacteriology (Bac 205)
College Algebra (Mth 101)
Trigonometry (Mth 102)
Calculus with Analytical Geometry (Mth 200)
Experimental Food Studies (FN 435)
Recent Advances in Foods (FN 425)
Readings in Nutrition (FN 481)
Child Nutrition (FN 421)
Nutrition in Disease (FN 420)
Family Food Buying (FN 411)
Home Food Preservation (FN 414)
Modern Language 1 to 2 years
General Physics (Ph 201,202,203) or Abridged General Physics (Ph 211,212)

Public Health Nutrition

Graduate work in public health nutrition is required for positions as nutritionists in public health or other community agencies. Programs to help meet entrance requirements of graduate schools of public health can be arranged.

Institution Management and Dietetics

Students in this area may prepare for positions as dietitians in hospitals, school and college food service, and industry. The following courses will meet the requirements of the American Dietetic Association.

Required Courses:

General Chemistry (Ch 101,102,103)
Organic Chemistry (Ch 221,222)
Bacteriology (Bac 204)
Foods (FN 220,221)
Physiology (Z 331,332)
Institution Org and Admin (IM 430)
Quantity Cookery (IM 311)
Purchasing for Institutions (IM 440)
Institution Experience (IM 450)
Biochemistry (CH 350)
Nutrition (FN 321)

Eighteen hours to be selected from the following:

Accounting (BA 211)
Personnel Management (BA 451) or Industrial Psychology (Psy 431)
Educational Psychology: Learning (Ed 312)
Nutrition in Disease (FN 420)
Experimental Food Studies (FN 435)
Recent Advances in Foods (FN 425)
Child Nutrition (FN 421)

Students preparing for college or industrial internships may take 22 hours from the following in place of the above group:

Accounting (BA 211,212,213)
Advanced Food Production Management (IM 407)
Personnel Management (BA 451)
Institutional Equipment (IM 407)
Business Law (BA 411,412,413)
Communications
Human Relations in Business and Technology (BA 497)
Industrial Psychology (Psy 431)
Labor Problems (Ec 425)

Home Economics Communications

Students interested in fields of journalism, radio and television may combine their home economics preparation with the following recommended elective courses in one or more types of communications.

Journalism

Recommended Basic Courses:

Journalism (J 111,112)
Copy Editing (J 214)
Public Information Methods (J 318)
Special Feature Articles (J 317)
Technical Writing (J 319)
Photo-Journalism (J 334)
Journalism Projects (J 351,352,353)

Radio and Television

Recommended Basic Courses:

Extempore Speaking (Sp 111)
Voice and Diction (Sp 120)
Interpretation (Sp 121)
Radio Speaking (Sp 361, 362 363)
Basic Television (Sp 367)
Television Programing (Sp 368)
Audio-Visual Aids in Radio-Tel (Sp 451)

Other Suggested Electives for Communication Fields:

Food Demonstrations (FN 410)
Family Food Buying (FN 411)
Food Management (FN 412)
Clothing Construction (CT 212)
Historic Costume (CT 309)
Consumer Buying in Cloth and Tex (CT 350)
Home Furnishings Laboratory (CT 332)
Org and Use of House Space (HAd 335)
Economics of the Family (HAd 441)

Home Economics Education

Students interested in preparing to teach home economics in junior or senior high school are expected to have strong home economics preparation as well as to be working towards a teaching minor in a second high school subject. They may meet both vocational and provisional certification requirements for Oregon. Certification for other states may also be obtained.

Required courses to be included in Home Economics Education which are not listed specifically in Core Curriculum:

Physiology (Z 331,332)
Art (Color and Composition, AA 161; or Basic Design, AA 295) for 3 credits in art or music
Clothing Construction (CT 212)
Child Development (FL 413) or Human Development (Psy 311)
The Nursery School Child (FL 425)

Courses in a Teaching Minor:

(See SCHOOL OF EDUCATION teaching majors and minors, page 195.)

Courses in Education:

Field Experience (Home Ec) (Ed 200)
School in American Life (Ed 310)
Educational Psychology (Ed 312)
Methods in Reading (Ed 350)
Special Secondary Meth (Home Ec) (Ed 408d)
Student Teaching: Secondary (Ed 416)
Seminar: Student Teaching (Ed 407)
Organization and Administration of Homemaking Education (HEd 422)
Homemaking Education in the Community High School (HEd 440)

Home Economics Extension

Students interested in the field of extension as county agents, 4-H Club agents, or similar types of work may combine their home economics preparation with elective courses in home economics extension.

Recommended Basic Courses:

General Chemistry (Ch 101,102,103)
Bacteriology (Bac 204)
Physiology (Z 331,332)
Courses in journalism, speech, radio speaking and television
Personality and Development (Psy 111)
Business English (Wr 214)
Clothing Construction (CT 212)
Flat Pattern and Draping (CT 310)
Consumer Buying in Clothing and Textiles (CT 350)
Home Furnishings Laboratory (CT 332)
Applied Home Furnishings (CT 333)
Child Development (FL 413)
Family Nutrition (FN 325)
Home Food Preservation (FN 414)
Group Dynamics (Psy 361)
Mental Hygiene (Psy 411)
Educational Psychology: Learning (Ed 312)
Extension Methods (EM 411)
Field Work in Home Ec Extension (EM 453)
The Nursery School Child (FL 425)

Other Suggested Electives:

Tailoring (CT 312)
Clothing for Children (CT 320)
Home Furnishings (CT 431)
Parent Education (FL 423)
Community Organization (Soc 475)
Home Ground Planning (LA 279)
Leadership Training (Ed 296)
Recreation Leadership (PE 240)
Management in Family Living (HAd 440)
Economics of the Family (HAd 441)

Positions With Social Welfare Agencies

Students may prepare for positions as beginning caseworker in public welfare and other social agencies, or for graduate work in schools of social work. (Graduate work is required for positions in specialized fields such as child welfare, family economics, and management.) Programs are planned individually with students depending on their interests. Also see Public Health Nutrition.

Recommended Basic Courses:

General Biology (GS 101,102,103)
General Sociology (Soc 204,205,206)
Descriptive Statistics (St 311)
Child Development (FL 312)
The Nursery School Child (FL 425)
Child Development (FL 413)
Economics of the Family (HAd 441)
Family Housing (HAd 439)
Mgt Prob in Home-Commty Rel (HAd 445)

Other Suggested Electives:

Seminars in family life and home management
Courses in sociology, psychology, economics, history, political science, philosophy, foods and nutrition

Minor in Business and Technology

If a student or instructor is interested, a program that is a correlated whole may be arranged by consulting the School of Business and Technology.

	Hours		*Hours*
Principles of Accounting (BA 211)	3	Personnel Management (BA 451)	3
Finance (BA 312)	4	Retail Merchandising (BA 463)	3
Business Law (BA 411)	3	Advertising (BA 464)	3
Real Estate Law (BA 414)	3	Salesmanship (BA 465)	3
Income Tax Procedure (BA 434)	3	Sales Management (BA 466)	3
General Insurance (BA 435)	3	Human Relations in Business and Industry (BA 497)	3
Investments (BA 436)	3		

See also SCHOOL OF BUSINESS AND TECHNOLOGY for technical minors in clothing and textiles and institution management.

Minors in Other Areas

Students in home economics may take minors in:

Humanities
Biological science
Physical education, recreation, or camping education
Physical science
Secretarial science
Social science

A minor ordinarily totals at least 27 term hours, and in most cases includes at least 9 hours of upper division course work. Descriptions of courses available will be found in the departmental sections under the SCHOOL OF SCIENCE, SCHOOL OF BUSINESS AND TECHNOLOGY, SCHOOL OF EDUCATION, SCHOOL OF HUMANITIES AND SOCIAL SCIENCES, and DIVISION OF PHYSICAL EDUCATION. Students should consult their advisers.

Clothing, Textiles, and Related Arts

The Department of Clothing, Textiles, and Related Arts offers instruction in the basic principles of clothing construction, fabric analysis and identification, and selection of clothing. Advanced courses are offered in clothing construction, textiles, consumer education, home furnishing, and applied arts. Students in business and technology and in humanities and social sciences may minor in the area of clothing and textiles. Service courses are open to students not enrolled in home economics.

Students planning to register for clothing construction courses should keep in mind, when planning their wardrobes for the college year, that these courses require construction of garments.

Lower Division Courses

CT 210. **Clothing Construction.** 3 hours any term. 3 ②
Fundamental principles of clothing construction; selection, construction, and management problems applied to a cotton dress and a wool skirt.

CT 211. **Clothing Selection.** 3 hours any term. 3 ①
Artistic and economic factors in the selection of adult clothing; wardrobe needs of college students. Prerequisite: AA 160.

CT 212. **Clothing Construction.** 3 hours any term. 3 ②
Commercial patterns and their adaptation; organization and management problem applied to a cotton garment; fitting and construction principles applied to a wool dress. Prerequisite: CT 210 or 218, CT 211.

CT 216. **Clothing Construction (Men).** 3 hours. 3 ②
Garment construction with emphasis on correct procedures and terminology; various types and styles of men's, women's, and children's garments.

CT 217. **Clothing Selection.** 3 hours. 3 ①
Personal wardrobe selection from standpoint of beauty, health, and economy. Elective for students not in home economics degree curriculum.

CT 218, 219. **Clothing Construction.** 3 hours each term. 3 ②
CT 218: Principles of selection, construction, and management applied in making a cotton dress and a wool skirt. Elective for students not in home economics degree curriculum. *CT 219:* Selection and construction of two dresses (an afternoon dress and a speed project) and a child's dress. Prerequisite for CT 219: CT 210 or 218.

CT 231. **Home Furnishing.** 3 hours. 2 ① 1 ②
Aims to develop appreciation of beauty and suitability in the home and its furnishings.

CT 235. **Textile Design and Weaving.** 3 hours. 3 ②
Decorative art involving consideration of line, texture, and color as applied to problems in weaving

CT 250. **Textiles.** 3 hours any term. 2 ① 1 ②
Properties, identification, selection, use, and care of textile fibers and fabrics.

Upper Division Courses

CT 309. **Historic Costume.** 3 hours. 3 ①
Historic costume and its relation to modern dress. Prerequisite: CT 250; junior standing. History recommended. DIEDESCH.

CT 310. **Flat Pattern and Draping.** 3 hours any term. 3 ②
Principles of flat pattern and draping on half-size dress forms with practical application of principles to the construction of afternoon and evening garments. Prerequisite: CT 212, 250. EDABURN.

CT 311. **Costume Design.** 1 hour. 1 ②
Emphasis on designing of fashionable and appropriate ensembles for various occasions and figure types. Prerequisite: AA 161 or 291; CT 210, 250. DIEDESCH.

CT 312. **Tailoring.** 4 hours any term. 2 ④
Principles of tailoring; planning and constructing coat and skirt or suit. Prerequisite: CT 212,250. LEDBETTER.

CT 320. **Clothing for Children.** 3 hours any term. 3 ②
Selection and construction of garments for children with emphasis on child development, good design, and the saving of time, money, and energy. Prerequisite: CT 212, 250. INGALLS.

CT 331. **Home Furnishing.** 3 hours any term. 1 ① 2 ②
Furnishing a small home from standpoint of comfort, beauty, convenience, and economy; influence of historic design. Prerequisite: CT 250; AA 160, 178. PATTERSON.

CT 332. **Home Furnishing Laboratory.** 3 hours. 2 ③
Principles of drapery and slipcover construction; finishing furniture and interior woodwork; estimating yardage and costs of fabrics; simple upholstering techniques. Student furnishes own furniture and fabrics. Prerequisite: CT 212 or 219; CT 231 or 331 recommended. PATTERSON, MOSER.

CT 333. **Applied Home Furnishing.** 3 hours. 1 ① 2 ②
Home furnishing and decoration. Students work with actual home interiors and with dealers. Prerequisite: CT 331, 332. PATTERSON.

CT 335. **Textile Design.** 3 hours. 3 ②
Line, texture, and color as applied to design of woven textiles; contemporary weaving techniques. Prerequisite: AA 160; CT 250 and 210 or 218. PATTERSON.

3 ①

CT 350. **Consumer Buying in Clothing and Textiles.** 3 hours any term.
Problems and aids in purchasing clothing and textiles from consumer's point of view. Prerequisite: CT 210 or 216; CT 211, 250; Ec 212. DIEDESCH.

CT 351. **Quantity Textile Purchasing.** 3 hours. 3 ①
Problems in selection, purchase, and care of textiles by manufacturers, wholesalers, retailers, and institutions; use of specifications. Prerequisite or parallel: CT 350. GRANT.

CT 355. **Textile Processing.** 3 hours. 3 ①
Processing and manufacturing of fibers, yarns, and fabrics. Prerequisite: CT 250. CARLSON.

CT 401. **Research.** Terms and hours to be arranged.

CT 403. **Thesis.** Terms and hours to be arranged.

CT 405. **Reading and Conference.** Terms and hours to be arranged.

CT 407. **Seminar.** Terms and hours to be arranged.

CT 408. **Workshop.** Terms and hours to be arranged.

CT 410. **Flat Pattern and Draping.** (G) 3 hours. 2 ③
Principles of flat pattern designing and of draping in varied textures; practical application to afternoon and evening garments. Each student may make a dress form. Prerequisite: CT 310 (CT 309 and 311 recommended). EDABURN.

CT 411. **Costume Design.** (G) 3 hours. 3 ②
Creative designing of clothing and accessories for women. Prerequisite: CT 212,309, 311. DIEDESCH.

CT 431. **Home Furnishing.** (G) 3 hours. 3 ②
Contemporary designers, materials, prices, and manufacturers of fabrics, furniture, rugs, china, silver, and ceramics. Prerequisite: CT 331. PATTERSON.

CT 435. **Textile Design.** (G) 3 hours. 2 ③
Advanced work in textile design for students who have had CT 335. PATTERSON.

CT 450. **Textiles.** (G) 3 hours. 1 ① 2 ②
Planning and conducting investigations of physical properties of yarns and fabrics; evaluation of data in relation to serviceability; survey of textile research laboratories and standard procedures for physical analysis of textiles. Prerequisite: CT 250 and senior standing.

CT 460,461. **Historic Textiles.** (G) 3 hours each term. 3 ①
CT 460: Textiles from ancient times to present from an appreciative and historical point of view. *CT 461:* National fabrics of past and present from each continent; special textiles; tapestries, rugs, laces, embroideries, painted and printed fabrics. Prerequisite for both courses: CT 250 and senior standing. PETZEL.

CT 470. **The Clothing Buyer.** 3 hours. 1 ① 1 ②
Buying ready-to-wear clothing for retail markets; merchandise selection and fashion trends. Management and personnel responsibilities of the buyer. Prerequisite: CT 350. LEMMAN.

Graduate Courses

Courses numbered 400-499 and designated *(g)* or *(G)* may be taken for graduate credit.

CT 501. **Research.** Terms and hours to be arranged.

CT 503. **Thesis.** Terms and hours to be arranged.

CT 505. **Reading and Conference.** Terms and hours to be arranged.

CT 507. **Seminar.** Terms and hours to be arranged.

CT 508. **Workshop.** Terms and hours to be arranged.

CT 551. **Textile Fibers.** 3 hours. 2 ① 1 ②
Composition and chemical properties of textile fibers; relation to certain structural and physical characteristics. Prerequisite: 12 term hours in clothing and textiles including CT 250; 1 year of chemistry. PETZEL.

CT 552. **Textile Analysis.** 4 hours. 1 ① 2 ③
Principles and practice in identification of textile fibers by chemical methods and quantitative analysis for moisture content, total nonfibrous materials, and fiber content. Prerequisite or *parallel:* CT 551. PETZEL.

Family Life and Home Administration

The Department of Family Life and Home Administration offers instruction in general areas of family living—marriage and family relationships, child development, home management, family economics, household equipment, and housing. Advanced courses prepare students for nursery school teaching and work in housing, equipment, and family economics. Laboratories for instruction include two home management houses and two nursery schools on campus, and housing and equipment laboratories in the Home Economics Building.

Courses in marriage, family living, child development, home management, family finance, and equipment and housing are offered for men and women in other schools who wish some preparation for homemaking.

Courses in Child Development and Family Relations

Lower Division Courses

FL 222. **Marriage.** 2 hours. 2 ①
Open to men and women. Courtship period, factors in a successful marriage. KIRKENDALL, SCHALOCK.

FL 223. **Family Living.** 2 hours. 2 ①
Open to men and women. Marriage and relationships in the beginning family. KIRKENDALL, SCHALOCK.

FL 225. **Child Development.** 3 hours. 3 ① 1 ①
Growth and development of the infant and young child; observations in nursery school. AIKIN.

Upper Division Courses

FL 311. **Child Development.** 3 hours. 3 ① 1 ①
Behavior and development of preschool children. Observation and participation in nursery school. Prerequisite: Psy 202; FL 225. AIKIN.

FL 312. **Child Development.** 3 hours. 3 ①
Theory and basic research in the area of child development. Prerequisite: FL 311. AIKIN.

FL 401. **Research.** Terms and hours to be arranged.

FL 403. **Thesis.** Terms and hours to be arranged.

FL 405. **Reading and Conference.** Terms and hours to be arranged.

FL 407. **Seminar.** Terms and hours to be arranged. (See titles under FL 507.)

FL 408. **Workshop.** Terms and hours to be arranged.

FL 413. **Child Development.** (G) 3 hours. 3 ①
Growth and development in middle and late childhood and early adolescence. Prerequisite: FL 311. AIKIN.

FL 421. **Behavior of Young Children.** 2 hours. 2 ①
For men. Understanding development problems of young children; observation in nursery school. Prerequisite: senior standing or consent of instructor. READ.

FL 422. **Family Relationships.** (g) 3 hours. 3 ①
Stages and adjustments in the family cycle; the family and the community. Prerequisite: FL 311. KIRKENDALL.

FL 423. **Parent Education.** (G) 3 hours. 1 ① 1 ②
Relationships of parents and children; resources for meeting problems with emphasis on discussion as a method. Prerequisite: FL 425. READ.

FL 425. **The Nursery School Child.** (g) 3 hours. 2 ① 1 ④
Developing insight into child behavior and child-adult relations through participation in the nursery school program. Prerequisite: FL 311.

FL 426. **The Nursery School Child Laboratory.** (G) 1 hour. 1 ③
Must parallel FL 425 or FL 427.

FL 427. **Nursery School Procedure.** (G) 3 hours. 2 ① 1 ④
Program planning and administration in a nursery school; home-school relations. Prerequisite: FL 425.

FL 428. **Curriculum Enrichment for Young Children.** (G) 2 hours spring. 2 ①
Methods of relating literature, art, music, and science activities to child interests; projects for nursery school. Prerequisite or parallel: FL 425.

FL 429. **Supervised Nursery School Experience.** (G) 5 hours.
Full participation in nursery school program. Laboratory and field experiences arranged. Consent of instructor required. Prerequisite: FL 425.

FL 430. **Supervised Nursery School Experience.** (G) 3 hours.
Seminar to be arranged. Consent of instructor required. Prerequisite: FL 425.

FL 481. **Selected Topics in Child Development.** (G) 3 hours. 3 ①
Reading and interpretation of current literature on child development. Prerequisite: FL 311. SCHALOCK.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

FL 501. **Research.** Terms and hours to be arranged.

FL 503. **Thesis.** Terms and hours to be arranged.

FL 505. **Reading and Conference.** Terms and hours to be arranged.

FL 507. **Seminar.** Terms and hours to be arranged.
BASIC CONCEPTS IN HUMAN DEVELOPMENT. SCHALOCK.
INTERPERSONAL RELATIONS IN FAMILY LIVING. KIRKENDALL.
PHILOSOPHY AND METHODS OF BEHAVIOR RESEARCH. SCHALOCK.
UNDERSTANDING BEHAVIOR. AIKIN, READ.
PSYCHO-SEXUAL ADJUSTMENTS AND THE FAMILY CYCLE. KIRKENDALL.
DIRECTIONS IN THEORY AND RESEARCH IN HUMAN DEVELOPMENT. SCHALOCK.

FL 508. **Workshop.** Terms and hours to be arranged.

FL 520. **Nursery School Philosophy.** 3 hours fall. 3 ①
Philosophy underlying procedures in nursery education; role of nursery school teacher. Prerequisite: FL 425 or equivalent and consent of instructor. READ.

Courses in Home Administration

Lower Division Course

HAd 240. **Management in Family Living.** 2 hours. 2 ①
Managing time and energy in relation to goals of family living. VAN HORN.

Upper Division Courses

HAd 330. **Household Equipment.** 3 hours. 2 ① 1 ②
Selection, placement, use, and care of household equipment. PLONK.

HAd 335. **Organization and Use of House Space.** 3 hours. 2 ① 1 ②
Analysis of housing needs of families; optimum dimensions of activity areas; patterns for space units of family dwelling; evaluation of house plans in terms of family needs. Prerequisite: AA 178. PLONK.

HAd 341. **Family Finance Management.** 2 hours. 2 ①
Open to men and women. Management of income, expenditures, credit, savings, insurance, Social Security, and taxes. VAN HORN.

HAd 401. **Research.** Terms and hours to be arranged.

HAd 403. **Thesis.** Terms and hours to be arranged.

HAd 405. **Reading and Conference.** Terms and hours to be arranged.

HAd 407. **Seminar.** Terms and hours to be arranged. (See titles listed under HAd 507.)

HAd 408. **Workshop.** Terms and hours to be arranged.
2 ① 1 ②

HAd 435. **House Planning in Relation to Function.** (G) 3 hours.
Application of principles of functional design to various types of family dwellings and their surroundings. Prerequisite: HAd 335.

HAd 436. **Functional Design of Dwellings.** (G) Terms and hours to be arranged.
Problems in use of storage space; arrangement of equipment; floor plans for small dwellings; illustrative material for house planning classes. Prerequisite: HAd 435.

HAd 439. **Family Housing.** (G) 3 hours. 3 ①
Socio-economic aspects of housing in relation to family living. Prerequisite: Ec 212; Soc 212; senior or graduate standing. VAN HORN.

HAd 440. **Management in Family Living.** (G) 3 hours. 3 ①
Analysis of decision making throughout the family life cycle; case studies. Prerequisite: HAd 240, 341; Psy 202.

HAd 441. **Economics of the Family.** (G) 3 hours. 3 ①
Function of family and roles of its members in American economy; problems of setting, improving, and maintaining standards of living. Prerequisite: senior or graduate standing. VAN HORN.

HAd 445. **Management Problems in Home-Community Relations.** (G) 3 hours. 3 ①
Relation of family to society in civic, business, and other formal and informal associations. Prerequisite: HAd 240; Soc 212. VAN HORN.

HAd 450. **Home Management House.** 5 hours.
Experience in applying homemaking courses in a family-size group and in a family-type house. One-half term residence. Prerequisite: FN 313; FL 311; HAd 240. PLONK.

HAd 460. **Management in the Home.** 3 hours. 1 ① 1 ②
Supervised experience in applying management principles in home. Student's home used as laboratory. Open to married students only. Students who are married and living at home may substitute HAd 460 and an FL or HAd course beyond the core for HAd 450. Prerequisite: FN 313; FL 311; HAd 240. STATON.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

HAd 501. **Research.** Terms and hours to be arranged.

HAd 503. **Thesis.** Terms and hours to be arranged.

HAd 505. **Reading and Conference.** Terms and hours to be arranged.

HAd 507. **Seminar.** Terms and hours to be arranged.
THE FAMILY AND ECONOMIC CHANGE. VAN HORN.
HOME MANAGEMENT HOUSE SUPERVISION. *Fall*—PLONK.
WORK SIMPLIFICATION. PLONK.
CASE STUDIES IN FAMILY DECISION MAKING. VAN HORN.
CONSUMER BUYING DECISIONS. VAN HORN.

HAd 508. **Workshop.** Terms and hours to be arranged.

Foods and Nutrition

The Foods and Nutrition Department in its first nutrition course aims to teach the student the relation of nutrition to health and ways of meeting the nutritive allowances by good food selection. In courses in food preparation, applications of scientific principles are taught. The student is then able to plan and prepare meals which will be adequate nutritionally, attractive in taste and appearance, and economical of both money and time. Advanced courses prepare the student for the professional fields of high school teaching, hospital dietetics, school lunch administration, foods and nutrition in business, and graduate work leading to research, public health nutrition, and college teaching. Service courses are offered for the nonmajor in home economics or for home economics students not working for a degree. Students majoring in humanities and social sciences may minor in foods and nutrition.

Laboratories are provided for instruction in food preparation and meal service, for animal nutrition work, and for chemical studies related to foods and nutrition.

Lower Division Courses

FN 211, 212. **Foods.** 3 hours each term. 1 ① 1 ② 1 ③
Principles involved in the preparation of food; standards for judging food products. Prerequisite: FN 225. Prerequisite or parallel: one year of biological or physical science.

FN 218, 219. **Food Preparation.** 3 hours each term. 1 ① 2 ②
For men and women not majoring in home economics. Basic principles of food preparation, menu making, and meal service.

FN 220, 221. **Foods.** 3 hours each term. 1 ① 1 ② 1 ③
The application of chemical and physical principles in food preparation. Prerequisite: FN 225. Prerequisite or parallel: Ch 221,222.

FN 225. **Nutrition.** 3 hours any term. 3 ①
Principles of nutrition from the standpoint of newer scientific investigations; selection of an optimal diet for health; present day problems in nutrition.

Upper Division Courses

[1]FN 313. **Meal Planning and Service.** 3 hours. 1 ① 1 ② 1 ③
Planning, preparing, and serving meals. Prerequisite: FN 212 or 221.

FN 321. **Nutrition.** 4 hours fall or winter. 3 ① 1 ②
Fundamentals of nutrition; application of biochemistry and physiology to nutrition of the individual and family; animal experimentation. Prerequisite: FN 225; Ch 222; Z 331. Prerequisite or parallel: Z 332. HAWTHORNE.

FN 325. **Family Nutrition.** 2 hours. 2 ①
Principles of nutrition applied to family; maternal nutrition, nutrition of the infant and child through growth period; geriatric nutrition. Prerequisite: FN 212, 225.

FN 401. **Research.** Terms and hours to be arranged.

FN 403. **Thesis.** Terms and hours to be arranged.

FN 405. **Reading and Conference.** Terms and hours to be arranged.

FN 407. **Seminar.** Terms and hours to be arranged.

FN 408. **Workshop.** Terms and hours to be arranged.

[1] Home practice in food preparation is recommended for students who have completed FN 313. This practice should be completed before an advanced course in foods is taken.

[1]FN 410. **Food Demonstrations.** 3 hours winter or spring. 1 ① 1 ② 1 ③
Principles and techniques of classroom, extension, and commercial demonstration. Experience before audiences. Prerequisite: FN 313; Sp 111 or Ed 416, or equivalent. FN 411 or FN 412 is recommended but not required. McLEAN.

1 ① 1 ② 1 ③

[1]FN 411. **Family Food Buying.** (g) 3 hours winter or spring.
Practical and intelligent food buying for family; cost factors, food laws, quality standards; home adaptation of new trends in food manufacturing and packaging. Prerequisite: FN 313; Ec 212. McLEAN, HARRIS.

[1]FN 412. **Food Management.** 3 hours fall or winter. 1 ① 1 ② 1 ③
Advanced food preparation with emphasis on time, energy, and money management. Prerequisite: FN 313. BARTE.

[1]FN 414. **Home Food Preservation.** (g) 3 hours fall. 1 ① 1 ② 1 ③
Common home methods of preserving foods including freezing, canning, curing, pickling and preserving with sugar. Prerequisite: FN 313; Bac 204. Offered alternate years. Offered 1961-62. CHARLEY.

FN 420. **Nutrition in Disease.** (G) 3 hours spring. 2 ① 1 ②
Dietary adjustments for abnormal conditions. For students who plan to become hospital dietitians or nutrition specialists or who desire to broaden their training in nutrition. Prerequisite: FN 321. STORVICK.

FN 421. **Child Nutrition.** (G) 3 hours winter. 3 ①
Nutritional needs from prenatal life through childhood; maternal dietary requirements. Prerequisite: FN 321. FINCKE.

FN 425. **Recent Advances in Foods.** (G) 3 hours fall. 2 ① 1 ②
Consideration of major areas in the field with emphasis on underlying chemical and physical principles involved; review of literature and some experimentation. Prerequisite: FN 221. CHARLEY.

FN 435. **Experimental Food Studies.** (G) 3 hours winter. 1 ① 1 ② 1 ③
Experimental method applied to problems in food preparation; literature in field. Prerequisite: FN 221. CHARLEY.

FN 481. **Readings in Nutrition.** (G) 3 hours fall. 3 ①
Research studies in nutrition reviewed; interpretations and significance. Prerequisite: FN 321. FINCKE.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*)
may be taken for graduate credit.

FN 501. **Research.** Terms and hours to be arranged.

FN 503. **Thesis.** Terms and hours to be arranged.

FN 505. **Reading and Conference.** Terms and hours to be arranged.

FN 507. **Seminar.** Terms and hours to be arranged.

FN 508. **Workshop.** Terms and hours to be arranged.

FN 522,523. **Methods in Nutrition Research.** 3 hours each term. 2 ③
Introduction to methods and special techniques in nutrition research, emphasizing those methods used in human nutritional studies; blood studies; vitamin and/or mineral analyses; balance methods; special problems. Prerequisite: FN 321; Ch 233 or 234. Students may register for one or two terms. HAWTHORNE, STORVICK.

FN 531,532. **Food Preparation Investigation.** 3 or 5 hours each term. 2 ③
Independent investigations. Prerequisite: FN 435. Offered alternate years. Offered 1961-62. MACKEY.

FN 535. **Selected Topics in Foods.** 3 hours. 3 ①
New findings in principles of food preparation. Prerequisite: FN 221; Ch 222 or 227; FN 425 or FN 435. CHARLEY.

FN 551. **Selected Topics in Nutrition.** 3 hours. 3 ①
Prerequisite: FN 481. FINCKE.

[1] Home practice in food preparation is recommended for students who have completed FN 313. This practice should be completed before an advanced course in foods is taken.

Home Economics Education

Professional preparation for teachers of home economics is provided by the Department of Home Economics Education. A student in either the School of Education or the School of Home Economics may meet certification requirements. Before registering for teacher preparation courses, every student should receive permission for registering and guidance for selection of courses from the Home Economics Education staff. Home Economics students who have taken FL 225, FL 311 may substitute FL 413 for Psy 311. (For requirements for the State Teachers' Certificates and listing of courses see SCHOOL OF EDUCATION.)

Home Economics Extension

Professional preparation for positions as Home Economics Extension Agents or 4-H Club Agents is offered by the School of Home Economics. Course work provided by the extension staff includes information in Extension Methods, as well as practical experience in the field. Students are advised to combine their home economics and extension preparation with course work in journalism, speech, sociology, and psychology. A graduate program provides advanced courses for further preparation for supervisory and specialist positions. See also page 154.

Upper Division Courses

EM 405. **Reading and Conference.** Terms and hours to be arranged.

EM 411,412. **Extension Methods.** (G) 3 hours each, winter. 3 ①
For course description see page 154.

EM 453. **Field Work in Home Economics Extension.** (G) Terms and hours to be arranged.
Field practice in county extension work under supervision of professor of extension methods and county extension agents. Prerequisite: EM 411. MACK.

EM 505. **Reading and Conference.** Terms and hours to be arranged.

Institution Management

The curriculum in Institution Management is planned to provide professional preparation for positions in school lunch, college, industrial, and other types of food services. Students entering this field may wish to take a hospital, restaurant, or college administrative internship following graduation. The department has laboratories and facilities in large group housing and food service adequate for undergraduate and graduate work.

Upper Division Courses

IM 311. **Quantity Cookery.** 4 hours fall. 2 ① 2 ②
Use of standardized formulae and procedure; use of equipment; menu planning; preparation and service of foods in quantity. Prerequisite: FN 313 or consent of instructor. MULHERN.

IM 320. **Cafeteria Management.** 3 hours. 3 ①
For prospective teachers who will manage a school cafeteria. Menu study; cafeteria plans; accounting. At present offered alternate summer sessions only.

IM 401. **Research.** Terms and hours to be arranged. MULHERN.

IM 403. **Thesis.** Terms and hours to be arranged. MULHERN.

IM 405. **Reading and Conference.** Terms and hours to be arranged. MULHERN.

IM 407. **Seminar.** Terms and hours to be arranged. MULHERN.

IM 408. **Workshop.** Terms and hours to be arranged.

IM 430. **Institution Organization and Administration.** (g) 3 hours fall. 3 ①
Principles of organization and administration as applied to various types of institutions; discussion of employment problems and training, labor laws, office records. Prerequisite: IM 311 or permission of instructor. MULHERN.

IM 440. **Purchasing for Institutions.** (g) 3 hours. 3 ①
Selection, design and materials, cost and arrangement of equipment; sources, standards of quality, grades, methods of purchase, care and storage of food. Prerequisite: IM 311 and IM 430 or consent of instructor. CLEAVELAND.

IM 450. **Institution Experience.** (G) 4 hours spring. 1 ① 3 ②
Practice work in residence halls including daily food production and service, business office procedure, catering, and banquet service. Prerequisite: IM 311, 430, 440. MULHERN.

Graduate Courses

Courses numbered 400-499 and designated *(g)* or *(G)* may be taken for graduate credit.

IM 501. **Research.** Terms and hours to be arranged.

IM 503. **Thesis.** Terms and hours to be arranged.

IM 505. **Reading and Conference.** Terms and hours to be arranged.

IM 507. **Seminar.** Terms and hours to be arranged.

IM 508. **Workshop.** Terms and hours to be arranged.

Home Economics (General)

HEc 101. **Introduction to Home Economics.** 1 hour fall. 2 ①
Orientation of beginning students in home economics. FULMER.

The following courses are available normally only in Summer Session.

HEc 408. **Workshop.** Terms and hours to be arranged.

HEc 508. **Workshop.** Terms and hours to be arranged.

School of Pharmacy

Faculty

As of January 1961

CHARLES O. WILSON, Ph.D., Dean of the School of Pharmacy and Professor of Pharmaceutical Chemistry.

HERMAN C. FORSLUND, M.S., Head Counselor.

H. WAYNE SCHULTZ, Ph.D., State analyst for the Board of Pharmacy.

ADOLPH ZIEFLE, Phar.D., Professor Emeritus of Pharmacy. Dean of the School of Pharmacy 1914-45.

Pharmaceutical Science: Associate Professor COOPER (department head); Assistant Professors SISSON; Instructor LINDGREN.

Pharmacy administration: Professor FORSLUND (department head); Instructor HARRISON.

Pharmaceutical Chemistry: Professors DOERGE (department head), WILSON; Assistant Professor SCHULTZ.

Pharmacology: Professor MCCUTCHEON (department head); Assistant Professor KNOTT.

Pharmacognosy: Professor SCIUCHETTI (department head); Assistant Professor LEARY.

General Statement

In 1898, on petition of the pharmacists of Oregon, pharmacy was first established as a separate department of the State College. From its inception the department grew steadily, and in 1917 it was raised to the rank of a school. The School of Pharmacy is a member of the American Association of Colleges of Pharmacy and is fully accredited by the American Council on Pharmaceutical Education. Its objective is to contribute to improvement of public health and welfare through dissemination, expansion, and application of knowledge.

Applicants for admission as undergraduate students must meet the general admission requirements. See page 19.

The curriculum of the School of Pharmacy is designed to give the student a sound general education as well as to train him for all positions in the profession of pharmacy. It aims to provide a background for both pharmaceutical competence and cultured, responsible citizenship. The student is provided opportunity for selection of electives which will best qualify him for responsible citizenship and practice in the pharmacy specialty of his choice. The arrangement of the curriculum allows a student to complete one year of prepharmacy work at other accredited colleges or universities.

Completion of the prescribed curriculum and satisfaction of all institutional requirements are prerequisite to the granting of the baccalaureate degree. The undergraduate program is set up to lead to the Bachelor of Science degree, but the Bachelor of Arts may also be taken by those who meet the requirements in humanities and social sciences, including foreign language.

Graduate work leading to the degrees of Master of Science and Doctor of Philosophy is offered in the Departments of Pharmaceutical Chemistry, Pharmaceutical Science, Pharmacognosy, and Pharmacology. The Master of Science degree is offered in pharmacy administration and hospital pharmacy. Candidates for admission to study at the graduate level must hold a bachelor's degree in pharmacy from Oregon State or its equivalent from another accredited institution. In addition, they must have attained a creditable scholastic average in their undergraduate work and have determined a definite objective to be attained through the advanced study. All advanced degrees are granted through, and in accordance with, the regulations of the Graduate School.

Students of ability and promise may have part of their college expenses paid through one of the scholarship funds available in the School of Pharmacy

in addition to several general scholarships which are awarded to worthy undergraduate students. See page 43 for Scholarships and page 48 for Awards.

Awards not listed elsewhere include:

OREGON STATE PHARMACEUTICAL ASSOCIATION CONTINUING SCHOLARSHIPS
Two Oregon high school graduates awarded $50 per year for five years while registered in the School of Pharmacy at Oregon State University; based on excellent grades, leadership, and need.

PORTLAND RETAIL DRUGGISTS' ASSOCIATION PLAQUE
An appropriately engraved plaque awarded each year to the graduating senior in pharmacy who attains the highest scholastic rank in his class.

REXALL TROPHY
An engraved bronze mortar awarded annually to the graduating senior in pharmacy who presents the most outstanding record of service to the school while maintaining a high scholastic average.

OREGON BRANCH, AMERICAN PHARMACEUTICAL ASSOCIATION AWARDS
One year's membership in the Association and a scholarship certificate presented annually to each of two outstanding seniors in pharmacy.

ADOLPH ZIEFLE AWARD
A certificate is presented to the fifth-year senior who has contributed most to bringing pharmacy before all Oregon State students, and his name is engraved on a permanent plaque.

JOHNSON AND JOHNSON AWARD
A Revolutionary War mortar and pestle is presented to student who submits best paper in pharmacy administration.

In order to broaden the preparation for professional activities and civic responsibilities, students are encouraged to join professional organizations. At Oregon State you may choose among the following:

OREGON-AMERICAN PHARMACEUTICAL ASSOCIATION: This organization, which is open to all students in the School of Pharmacy, includes the student branches of both the American Pharmaceutical Association and the Oregon State Pharmaceutical Association.

RHO CHI: Eligibility for membership in Beta chapter of Rho Chi, national pharmaceutical honor society, is based on high scholastic achievement.

KAPPA PSI: Membership in Beta Zeta chapter of this national professional pharmacy fraternity is limited to qualified men who meet the scholastic requirements.

LAMBDA KAPPA SIGMA: Membership in Rho chapter of this international pharmacy sorority is limited to qualified women in pharmacy who meet the scholastic requirements.

Under the provisions of public health laws, it is required that the pharmacist be licensed before he is permitted to compound and dispense drugs and medicines on the prescriptions of doctors, dentists, and veterinarians. In order to become licensed in Oregon a person must be a citizen of the United States, not less than 21 years of age, and of good moral character, a graduate of a school or college of pharmacy that is recognized by the Board of Pharmacy, and must successfully pass an examination given by the Board.

One calendar year of at least 2,400 hours of not more than 8 hours per day of service and experience in a retail pharmacy under the supervision of a registered pharmacist is also a basic requirement. This has been defined by regulation to permit a maximum of 200 hours per month. One-half of the required experience is permitted in an approved hospital and only full-time work experience is counted. A student who works in a store concurrently with school attendance can not have the time count. No experience may count until after the student has finished the sophomore year in pharmacy. All experience may be gained after graduation if desired.

In order to function properly as a pharmacist it is necessary to acquire some competence in operating a typewriter. The ability to type 35 words or more per minute must be proved before registration as a fourth-year senior (third professional year) is permitted.

Graduates of this school are privileged to become licensed either by examination or reciprocity in all states. New York, California, Florida, and Hawaii permit licensure by examination only.

Curriculum in Pharmacy

B.A., B.S. Degrees

Prepharmacy Year

(*May be taken at any accredited college or university*)

	F		W		S	
	Lecture	*Lab*	*Lecture*	*Lab*	*Lecture*	*Lab*
English Comp (Wr 111,112,113)	3	.....	3	.....	3	.....
Intermediate Algebra	4	.....	4	.....	..	.....
Zoology 201,202,203	2	1(3)	2	1(3)	2	1(3)
[1]Intro to Pharmacy (PSc 201)	..	.....	..	.....	3	.....
General Chemistry (Ch 204,205,206)	3	2(3)	3	2(3)	3	2(3)
Pharmacy Lectures (PSc 21—no credit)	..	.....	..	.....	..	.....
Physical Education	1	.....	1	.....	1	.....
Air or Military Science	1	.....	1	.....	1	.....
Total	17		17		16	

Professional Curriculum

First Professional Year

(*Must be taken at Oregon State University*)

	F		W		S	
	Lecture	*Lab*	*Lecture*	*Lab*	*Lecture*	*Lab*
Pharmaceutical Calculations (PSc 212)	..	.....	3	.....	..	.....
Quantitative Analysis (Ch 234)	2	2(3)	..	.....	..	.....
Organic Chemistry (Ch 226,227)	..	.....	3	2(3)	3	2(3)
Physics (Ph 211,212-abridged course	..	.....	1	2(2)	1	2(2)
Inorganic Pharmaceutical Chemistry (PCh 311,312)	2	1(3)	2	.....	..	.....
Introduction to Pharmacy (PSc 202)	3	.....	..	.....	..	.....
Speech (Sp 111)	3	.....	..	.....	..	.....
Economics (Ec 212)	..	.....	..	.....	3	.....
[2]Elective	..	.....	..	.....	3	.....
Pharmacy Lectures (PSc 21-No credit)	..	.....	..	.....	..	.....
Physical Education	1	.....	1	.....	1	.....
Air or Military Science	1	.....	1	.....	1	.....
Total	15		15		16	

Second Professional Year

Biochemistry (Ch 350,351,352)	3	.....	3	.....	3	.....
Org Pharmaceutical Chem (PCh 322,323)	3	1(3)	3	1(3)	..	.....
Pharmaceutical Analytical Chem (PCh 331)	..	.....	..	.....	3	1(3)
Physiology (Z 331,332)	2	1(3)	2	1(3)	..	.....
General Bacteriology (Bac 204)	..	.....	..	2(2)	..	.....
Elem Physical Chemistry (Ch 340)	..	.....	..	.....	3	.....
Introductory Pharmacognosy (Pcg 210)	2	1(3)	..	.....	..	.....
First Aid (PE 358)	2	1(2)	..	.....	..	.....
[3]Electives	3	.....	3	.....	3	.....
Pharmacy Lectures (PSc 21)	..	.....	..	.....	..	.....
Pharmacy Field Trip (PSc 20—no credit)	..	.....	..	.....	..	.....
Total	16		16		16	

[1] Students not attending Oregon State should take Sp 111 or economics 212.
[2] Transfer students must take PSc 201.
[3] Electives must include 9 term hours of foreign language, *or* 9 term hours of social science *or* 9 term hours of literature.

Third Professional Year[1]

	F		W		S	
	Lecture	*Lab*	*Lecture*	*Lab*	*Lecture*	*Lab*
Physical Pharmacy (PSc 319,320,321)	2	1(3)	2	1(3)	2	1(3)
Pharmacology (Phc 391,392,393)	3	1(3)	3	1(3)	3	1(3)
Pharmacognosy (Pcg 331,332,333)	2	1(3)	2	1(3)	2	1(3)
Organic Pharmaceutical Chem (PCh 324,325)	2	.....	2	.....	..	.....
[2]Electives	3	.....	3	.....	6	.....
Pharmacy Lectures (PSc 21—no credit)	..	.....	..	.....	..	.....
Pharmacy Field Trip (PSc 20—no credit)	..	.....	..	.....	..	.....
Total	15		15		16	

Fourth Professional Year

Prescriptions (PSc 454,455,456)	2	2(3)	2	2(3)	2	2(3)
Seminar PAd 407)	1	.....	1	.....	1	.....
Physical Pharmacy (PSc 422)	2	1(3)	..	.....	..	.....
Biological Products (Pcg 495)	3	.....	..	.....	..	.....
Pharmacy Law (PAd 450,451)	..	.....	3	.....	3	.....
Pharmacy Administration (PAd 447,448,449)	3	.....	3	.....	3	.....
[2]Electives	3	.....	6	.....	6	.....
Pharmacy Lectures (PSc 21—no credit)	..	.....	..	.....	..	.....
Pharmacy Field Trip (PSc 20—no credit)	..	.....	..	.....	..	.....
Total	17		17		17	

Pharmaceutical Chemistry

The Department of Pharmaceutical Chemistry offers courses concerning the chemistry of inorganic and organic therapeutic and pharmaceutical agents used in correct medical practice. It also provides courses in qualitative and quantitative drug analysis.

Upper Division Courses

PCh 311,312. **Inorganic Pharmaceutical Chemistry.** 3 hours fall; 2 hours winter. 2 ① 1 ③ 2 ①

Inorganic chemicals and their preparations used in pharmacy and medicine with emphasis on those in the U.S.P. and N.F. Prerequisite Ch 206. DOERGE.

PCh 322,323. **Organic Pharmaceutical Chemistry.** 4 hours winter and spring 3 ① 1 ③

Organic chemicals and their preparations used in pharmacy and medicine; correlation between chemical and physical properties and physiological action. Prerequisite: PCh 312. DOERGE, SCHULTZ.

PCh 324,325. **Organic Pharmaceutical Chemistry.** 2 hours fall and winter. 2 ①

Organic chemicals and their preparations used in pharmacy and medicine; correlation between chemical and physical properties and physiological action. Prerequisite: PCh 323. DOERGE.

3 ① 1 ③

PCh 331. **Pharmaceutical Analytical Chemistry.** 4 hours spring.

Introduction to pharmaceutical quality control with emphasis on methods of analysis used in the U.S.P. and N.F. Prerequisite: PCh 312; Ch 234. SCHULTZ, KNOTT.

PCh 340. **Biochemorphic Agents.** 3 hours fall. 3 ①

Pharmaceutical and therapeutic properties of organic compounds used to alter a physiological function. Prerequisite: Ch 352. DOERGE.

PCh 341. **Biopharmaceutical Chemistry.** 3 hours winter. 3 ①

Biochemical principles of particular interest to pharmacists; therapeutic agents related to carbohydrates, fats, proteins, minerals, vitamins, enzymes, and hormones. Prerequisite: PCh 325. SCHULTZ.

[1] The ability to type 35 words or more per minute must be proved before registration is permitted.

[2] Electives must include 9 term hours of foreign language *or* 9 term hours of social science *or* 9 term hours of literature.

PCh 342. **Chemotherapeutic Agents.** 3 hours spring. 3 ①
Pharmaceutical and therapeutic properties of organic compounds used to control diseases common to man. Prerequisite: PCh 324. DOERGE.

PCh 401. **Research.** Terms and hours to be arranged.

PCh 403. **Thesis.** Terms and hours to be arranged.

PCh 405. **Reading and Conference.** Terms and hours to be arranged.

PCh 407. **Seminar.** Terms and hours to be arranged.
Conducted jointly with 407 in PSc, PAd, Pcg, and Phc. HARRISON.

PSc 407. **Seminar.**

INORGANIC PHARMACEUTICALS. 4 hours fall. 3 ① 1 ③
Inorganic chemicals and their preparations used in medicine. Students make samples of chemicals; test for impurities. Prerequisite: Ch 206.

PCh 441. **Toxicology.** 3 hours winter. 2 ① 1 ③
Detection of common inorganic and organic poisons; emphasis on alkaloids and synthetics. Prerequisite: Phc 393. KNOTT.

1 ① 2 ③
PCh 461,462,463. **Special Analytical Methods.** (g) 3 hours each term.
Advanced quantitative methods, both chemical and physical, as applied to drugs and their dosage forms. Prerequisite: PCh 331. Offered alternate years. Offered 1961-62. KNOTT, SCHULTZ.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

PCh 501. **Research.** Terms and hours to be arranged.

PCh 503. **Thesis.** Terms and hours to be arranged.

PCh 505. **Reading and Conference.** Terms and hours to be arranged.

PCh 507. **Seminar.** Terms and hours to be arranged.
Conducted jointly with 507 in PSc, Pcg, Phc, and PAd. FORSLUND.

PCh 530,531,532. **Pharmaceutical Chemistry.** 3 hours each term. 2 ① 1 ③
Natural and synthetic sources of medicinal agents; theoretical bases of biological responses to applied agents; correlation of molecular structure with biological activity. Prerequisite: PCh 325. Offered alternate years. Offered 1961-62. DOERGE, SCHULTZ.

2 ① 1 ③
PCh 533,534,535. **Phytopharmaceutical Chemistry.** 3 hours each term.
Steroids, terpenes, tannins, carbohydrates, glycosides, and related compounds of medicinal and pharmaceutical interest including stability problems. Prerequisite: PCh 325. Offered alternate years. Not offered 1961-62. DOERGE, SCHULTZ.

PCh 536. **Alkaloids.** 3 hours fall. 2 ① 1 ③
Isolation, purification, nomenclature, and characterization; classification and area of therapeutic use. Prerequisite: PCh 325. Offered alternate years. Not offered 1961-62. DOERGE.

Pharmaceutical Science

The Department of Pharmaceutical Science offers basic and advanced courses in physical pharmacy, hospital pharmacy, pharmaceutical processes, manufacturing pharmacy, and prescriptions.

Lower Division Courses

PSc 20. **Pharmacy Field Trip.** No credit.
Approximately two field trips each year. Required each term of juniors and seniors in pharmacy. FORSLUND.

PSc 21. **Pharmacy Lecture.** No credit.
One hour meeting for talks, class meetings, and all-pharmacy assemblies. Required of pharmacy students each term.

PSc 201,202. **Introduction to Pharmacy.** 3 hours spring and fall. 3 ①
Evolution and development of profession from remote times to present; opportunities in pharmacy; relation of curriculum to practice.

PSc 212. **Pharmaceutical Calculations.** 3 hours. 3 ①
System of weight and measures; dilution and concentration of solutions; calculation of dosages; thermometry. Prerequisite: Mth 101. SCHULTZ.

Upper Division Courses

PSc 319,320,321. **Physical Pharmacy.** 3 hours each term. 2 ① 1 ③
Physico-chemical principles of processes and preparations of the U. S. Pharmacopeia and National Formulary. Prerequisite: Ch 340; PCh 323; ability to type 35 words or more per minute. SISSON, KNOTT.

PSc 323. **Prescription Accessories.** 3 hours. 3 ①
Purpose, construction, and utilization of supplies, appliances, and equipment used in sickness and in health; types available and features of various products. Prerequisite: PCh 323. SISSON.

PSc 401. **Research.** Terms and hours to be arranged.

PSc 403. **Thesis.** Terms and hours to be arranged.

PSc 405. **Reading and Conference.** Terms and hours to be arranged.

PSc 407. **Seminar.** Terms and hours to be arranged.
Conducted jointly with 407 in PAd, PCh, Pcg, and Phc. HARRISON.

PSc 407. **Seminar.**

FUNDAMENTALS OF PHARMACY. 3 hours winter and spring. 2 ① 1 ③
Fundamental concepts, principles, and practices. Prerequisite: Ch 227.

PROPRIETARY SPECIALTY PRODUCTS. 3 hours winter and spring. 3 ①
Preparations of pharmaceutical manufacturers; composition and therapeutic use. Prerequisite: Phr 313,331.

PRESCRIPTION COMPOUNDING. 3 hours each term. 1 ① 2 ③
Supervising compounding of a wide variety of prescriptions selected from current files of practicing pharmacists. Prerequisite: Phr 313,331.

PSc 412. **Literature of Pharmacy.** (G) 2 hours. 1 ① 1 ③
Methods of literature search, pharmaceutical and related references, special bibliographical assignments. Prerequisite: Fifth-year standing.

PSc 422. **Physical Pharmacy.** 3 hours fall. 2 ① 1 ③
Physico-chemical principles and laws applied to pharmaceutical systems. Prerequisite: PSc 321; Ch 340. SISSON, KNOTT.

PSc 454,455,456. **Prescriptions.** 4 hours each term. 2 ① 2 ③
Supervised compounding and dispensing of a wide variety of prescriptions selected from current files of practicing pharmacists. Prerequisite: Phc 393.

PSc 460. **Hospital Pharmacy.** 3 hours spring. 3 ①
Concepts and principles of Hospital Pharmacy. Prerequisite: PCh 323. SCHULTZ.

1 ① 2 ③

PSc 464,465. **Manufacturing Pharmacy.** (g) 3 hours winter and spring.
Development, organization, and operation of the drug industry; formulation, production, and evaluation of tablets, ointments, emulsions, other dosage forms; skin physiology and therapeutics; cosmetic formulations, medicated cosmetics, hypo-allergenic cosmetics. Prerequisite: Fifth-year standing.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

PSc 501. **Research.** Terms and hours to be arranged.

PSc 503. **Thesis.** Terms and hours to be arranged.

PSc 505. **Reading and Conference.** Terms and hours to be arranged.

PSc 507. **Seminar.** Terms and hours to be arranged.
Conducted jointly with 507 in Phc, PCh, Pcg, and PAd. FORSLUND.

PSc 510. **Physical Pharmacy.** 3 hours fall. 2 ① 1 ③
Physico-chemical properties of pharmaceutical systems. Prerequisite: Ch 340; PSc 422.
1 ① 2 ③

PSc 512,513. **Manufacturing Pharmacy.** 3 hours winter and spring.
Detailed consideration of unit operations in manufacture of pharmaceuticals. Fifth-year standing required. Offered alternate years. Offered 1961-62.

PSc 520. **Hospital Pharmacy.** 2 hours fall. 1 ① 1 ③
Organization, administration, and operation of hospital pharmacy. Prerequisite: PSc 460. SCHULTZ.

PSc 521. **Sterile Products.** 3 hours fall. 2 ① 1 ③
Study and preparation of sterile pharmaceutical products with special reference to hospitals. Offered alternate years. Offered 1961-62.

PSc 554,555,556. **Product Development.** 3 hours each term. 1 ① 2 ③
Formulation of current and novel dosage forms; product stability; therapeutic designs. Offered alternate years. Not offered 1961-62. Prerequisite: PSc 513.

Pharmacognosy

Courses in the Department of Pharmacognosy deal with drugs of biological origin. Both basic and advanced courses are offered.

Lower Division Course

Pcg 210. **Introductory Pharmacognosy.** 3 hours spring. 2 ① 1 ③
Fundamentals of structure and function of medicinal plants. Prerequisite: Ch 206. SCIUCHETTI.

Upper Division Courses

Pcg 331,332,333. **Pharmacognosy.** 3 hours each term. 2 ① 1 ③
Official and important non-official drugs of biological origin; macroscopic, microscopic and micro-chemical identification. Prerequisite: Pcg 210; Ch 227. SCIUCHETTI.

Pcg 401. **Research.** Terms and hours to be arranged.

Pcg 403. **Thesis.** Terms and hours to be arranged.

Pcg 405. **Reading and Conference.** Terms and hours to be arranged.

Pcg 407. **Seminar.** Terms and hours to be arranged.
Conducted jointly with 407 in PSc, PAd, PCh, and Phc. HARRISON.

Pcg 407. **Seminar.**

PHARMACOGNOSY. 3 hours each term. 3 ①
Official and nonofficial botanical and animal drugs; microscopic identification. Prerequisite: Ch 227.

Pcg 454,455. **Pharmacognosy.** (g) 3 hours winter and spring. 1 ① 2 ③
Drug plant isolation, extraction, and estimation of active components. Prerequisite: Pcg 333. SCIUCHETTI.

Pcg 470. **Production of Medicinal Plants.** (G) 3 hours fall. 3 ①
Problems involved in commercial production of drugs obtained from plants with special attention to those that might be economically feasible in the Pacific Northwest. Prerequisite: Peg 333. Offered alternate years. Not offered 1961-62. SCIUCHETTI.

Pcg 471. **Microscopic Techniques.** (G) 3 hours fall. 1 ① 2 ③
Understanding and utilization of various techniques for microscopic investigation of medicinal plants. Prerequisite: Pcg 333. LEARY.

Pcg 472. **Chromatographic Methods.** (G) 3 hours winter. 2 ① 1 ③
Understanding and application of chromatographic techniques toward purification of active components of natural products. Prerequisite: Pcg 333. SCIUCHETTI.

Pcg 495. **Biological Products.** 3 hours fall. 3 ①
Official vaccines, serums, antitoxins, hormones, endocrine products, and other materials of biological origin. Prerequisite: Bac 204; Phc 393. LEARY.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

Pcg 501. **Research.** Terms and hours to be arranged.

Pcg 503. **Thesis.** Terms and hours to be arranged.

Pcg 505. **Reading and Conference.** Terms and hours to be arranged.

Pcg 507. **Seminar.** Terms and hours to be arranged.
Conducted jointly with 507 in PSc, PAd, PCh, and Phc. FORSLUND.

Pcg 540,541,542. **Natural Products.** 3 hours each term. 1 ① 2 ③
Laboratory work concerned with isolation, purification, and estimation of active components of medicinal plants: *Pcg 540;* glycosides; *Pcg 541;* alkaloids; *Pcg 542;* volatile oils, resins, related compounds. Prerequisite: Pcg 333. Offered alternate years. Offered 1961-62. SCIUCHETTI.

Pcg 544. **Biological Products.** 3 hours. 1 ① 2 ③
Problems involved in preparation and standardization of biological products. Prerequisite: Pcg 495; Bac 332. Offered alternate years. Not offered 1961-62.

Pcg 545. **Economic Pharmacognosy.** 3 hours fall. 3 ①
Production, commerce, cultivation, preparation, market conditions, and economics of drugs of biological origin. Prerequisite: Pcg 455,470. Offered alternate years. Offered 1961-62.

3 ①

Pcg 550,551,552. **Biogenesis of Medicinal Plants.** 3 hours each term.
Pcg 550: Biogenesis of Glycosides. Possible metabolic pathways. *Pcg 551: Biogenesis of Alkaloids.* Nitrogen metabolism within plants and formation of alkaloids. *Pcg 552: Biogenesis of Lipids, Resins and related compounds.* Formation within living plant. Prerequisite: Pcg 455,540,541,542. Offered alternate years. Not offered 1961-62. SCIUCHETTI.

Pharmacology

Courses in the Department of Pharmacology deal with all drugs in common use in America today. Emphasis is on therapeutic use, physiological response, and mode of action. Attention is given to the relation of chemical structure to function, to the standardization of drugs, and to drug and chemical poisoning and appropriate treatment.

Upper Division Courses

Phc 391,392,393. **Pharmacology.** 4 hours each term. 3 ① 1 ③
Pharmacological action of drugs on human organisms; toxicological aspects of poisonous drugs. Prerequisite: PCh 323. MCCUTCHEON.

Phc 401. **Research.** Terms and hours to be arranged.

Phc 403. **Thesis.** Terms and hours to be arranged.

Phc 405. **Reading and Conference.** Terms and hours to be arranged.

Phc 407. **Seminar.** Terms and hours to be arranged.
Conducted jointly with 407 in PSc, PAd, PCh, and Pcg. HARRISON.

Phc 407. **Seminar.**

PHARMACOLOGY. 3 hours each term. 2 ① 1 ③
Pharmacological action of drugs on human organisms; toxicological aspects of poisonous drugs. Prerequisite: Ch 227, Z 332.

Phc 425. **Veterinary Therapeutics.** 3 hours winter. 3 ①
Drugs commercially available to veterinarian; pharmacological properties and therapeutic application. Prerequisite: Phc 393.

Phc 454. **Commercial Poisons.** (G) 3 hours fall. 3 ①
Substances and materials used as commercial poisons; their composition, characteristics, and toxicities. Prerequisite: Phc 393. MCCUTCHEON.

Phc 466. **Health Science Terminology.** 2 hours. 2 ①
Nomenclature, terminology, and expressions commonly encountered in health sciences. Fourth or fifth-year standing required. SCHULTZ.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

Phc 501. **Research.** Terms and hours to be arranged.

Phc 503. **Thesis.** Terms and hours to be arranged.

Phc 505. **Reading and Conference.** Terms and hours to be arranged.

Phc 507. **Seminar.** Terms and hours to be arranged.
Conducted jointly with 507 in PSc, PAd, PCh, and Pcg. FORSLUND.

2 ① 1 ③

Phc 520,521,522. **Advanced Pharmacology.** 3 hours each term.
Methods of pharmacological screening in development of new drugs; determination of dose levels, tolerance, and safety by animal experimentation. *Phc 520:* Anesthetics, general and local. *Phc 521:* Sedatives, analgesics, hypnotics, convulsants, anticonvulsants. *Phc 522:* Drugs affecting autonomic nervous system. Prerequisite: Phc 393; Ch 352, or equivalent. MCCUTCHEON.

Phc 525. **Pharmacological Standardization.** 4 hours spring. 2 ① 2 ③
Biological standardization of drugs by methods representative of latest techniques; application of statistical methods to evaluation of experimental results. Prerequisite: Phc 393.

Phc 530,531. **Advanced Toxicology.** 3 hours fall and winter. 1 ① 2 ③
Classification of poisons; symptoms of poisoning; organs most commonly involved in poisonings and separation of poisons from organs; chemical and pharmacological methods of testing for poisons. Prerequisite: PCh 441; Phc 393. MCCUTCHEON.

Pharmacy Administration

The Department of Pharmacy Administration is concerned with the business aspects of pharmacy and the laws pertaining to the profession.

Upper Division Courses

PAd 401. **Research.** Terms and hours to be arranged.

PAd 403. **Thesis.** Terms and hours to be arranged.

PAd 405. **Reading and Conference.** Terms and hours to be arranged.

PAd 407. **Seminar.** Terms and hours to be arranged.
Conducted jointly with 407 in PSc, PCh, Pcg, and Phc. HARRISON.

PAd 447,448,449. **Pharmacy Administration.** 3 hours each term. 2 ① 1 ③
Establishing a store, arrangements, salesmanship, showcase and window trimming, inventory, narcotic and poison records, taking prescriptions over telephone, etc. Prerequisite: Ec 212. FORSLUND.

PAd 450,451. **Pharmacy Law.** 3 hours winter and spring. 3 ①
Federal Caustic Poison Act; viruses, serums, and toxins; patent and proprietary medicines; alcohol and alcoholic products; criminal and tort laws concerning prescription compounding; copyrights, patents, trademarks; Durham-Humphrey amendment to Federal Law. Prerequisite: Fifth-year senior standing. FORSLUND.

PAd 488. **Pharmacy Promotion and Selling Methods.** (G) 3 hours spring. 3 ①
Analysis of functions and responsibilities of detail man or medical service representative in distribution and marketing of drugs and pharmaceuticals. Fifth-year standing required. FORSLUND.

Graduate Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

PAd 501. **Research.** Terms and hours to be arranged.

PAd 503. **Thesis.** Terms and hours to be arranged.

PAd 505. **Reading and Conference.** Terms and hours to be arranged.

PAd 507. **Seminar.** Terms and hours to be arranged.
Conducted jointly with 507 in PSc, PCh, Pcg, and Phc. FORSLUND.

PAd 587. **Pharmaceutical Market Analysis.** 3 hours fall. 3 ①
Activities involved in flow of goods from manufacturer to retailer, excluding those activities that change form of goods during this time. Prerequisite: PAd 449. FORSLUND.

PAd 589. **Pharmacy Finance.** 3 hours winter. 3 ①
Relationship of costs, margins, and net profits both as to group averages and to individual averages of pharmaceutical manufacturers, wholesalers, and retailers; income and expense statements. Prerequisite: PAd 449. Offered alternate years. Offered 1961-62. FORSLUND.

PAd 599. **Regulations of Pharmacy Practices.** 3 hours winter. 3 ①
Method of control by local, State, and Federal regulations and laws; Fair Trade and other methods of price maintenance, loss leaders, FTC regulations, postal regulations, regulations of selling methods and advertising. Prerequiiste: PAd 449. Offered alternate years. Not offered 1961-62. FORSLUND.

Defense Education

Reserve Officers Training Corps

Air Science
Military Science
Naval Science

General Statement

INSTRUCTION in military tactics began at Oregon State University about 1872 in conformity with a requirement of the Federal Morrill Act of 1862 establishing the land-grant universities. Cadets trained in the early years saw service in the Spanish-American War. Another Act of Congress passed on June 3, 1916, brought about the reorganization, in 1917, of the Cadet Regiment into a Reserve Officers Training Corps unit. In World War I, World War II, and the Korean conflict, the number of former students who served with distinction in our armed forces has given proof of the high quality of their preparation and the value to the Nation of such military instruction.

Oregon State is one of the 233 colleges and universities offering ROTC (Army), one of 53 offering NROTC (Navy and Marine Corps), and one of 175 offering AFROTC (Air Force). It is one of the 33 which offer all three. The Department of Military Science and Tactics trains officers for four branches of the Army: Infantry, Field Artillery, Corps of Engineers, and Signal Corps. The Department of Naval Science, which was commissioned on September 17, 1945, includes a program of training for Marine Corps as well as Naval officers. The Department of Air Science activated on July 1, 1949, was one of the first Air Force ROTC units established; its program of study leads to flight training in a commissioned status or to a commission as a nonrated officer in the Air Force.

Mission and Objectives. The ROTC seeks to select and prepare young men, through a permanent program of instruction in civilian institutions, to serve as officers in the Regular and Reserve components of the Army, Navy, Air Force, and Marine Corps. Each of the units on this campus strives to develop in the student a capacity for leadership, to develop him morally, mentally, and physically, and to provide him with a basic knowledge of the military professions.

Requirements. Military instruction is required of all physically qualified freshman and sophomore men between the ages of 14 and 22 inclusive at the time of enrollment in the ROTC, who are citizens of the United States and who successfully complete such general survey or training tests as may be prescribed. Men who transfer from other institutions with advanced standing are required to pursue military instruction until they have completed 93 term hours of college work, except that those who are credited with 80 term hours or more of advanced standing at the time of enrollment are exempt.

Men who have served one year or more in the regular Army, Navy, Marine Corps, Air Force, or Coast Guard, and who wish to continue with advanced ROTC, may be excused from an appropriate portion of the basic course according to their length of service. This excused portion of the basic course counts toward completion of the basic course and eligibility for the advanced course.

Enrollment in ROTC does not preclude registering under the Universal Military Training and Service Act of 1951. All students enrolled and of age must register.

Uniforms, Allowances, and Summer Camps. Students in all three of the units receive uniforms to be worn at certain drill periods and on special occasions. In the third and fourth years, cadets in the Army and Air Force units and those in Naval Science called "contract students" receive in addition an allowance of approximately 90¢ a day for a period not to exceed 595 days. Between the third and fourth years, these students attend a summer camp or take a summer cruise of approximately six weeks duration. During this period they are messed and quartered at government expense and are paid at the rate of approximately $78 per month. They also receive a travel allowance of 5¢ a mile to and from camp. "Regular students" in Naval Science receive additional allowances described on a later page.

Basic students who are members of the band drill with the band rather than with the squadrons or companies.

Air Science

(Personnel detailed from United States Air Force)
As of January 1961

Professor OLIVER (Colonel, United States Air Force) Commander.

Associate Professors: Lieutenant Colonel BRAZIER; Majors DENNIS, PAIGE, RUPPERSBURG; Captains PAUL, RICHARDS.

Instructors: Master Sergeant SIMMONS; Technical Sergeants FEARON, KOZOWSKI; Staff Sergeant LAMANSKY; Airman First Class SHAW.

Students in Air Science pursue the Basic Course the first two years and receive 1 term hour of credit each term. Those who go on into the Advanced Course (the third and fourth years) receive 3 term hours of credit each term and 6 term hours for attending summer training at an Air Force base. In all, the student on graduation will have a total of 30 term hours of credit in Air Science, 24 hours of which will be upper division. He may include SSc 441,442, 443 to provide a comajor in Air Science with whatever other major he submits for a baccalaureate degree.

Enrollment in Advanced Course. Each student enrolled in the Advanced Course of the Senior Air Force ROTC must:

1. Be selected by the professor of air science and the President of Oregon State University.
2. Be eligible for commissioning prior to his 28th birthday.
3. Successfully complete such survey and general screening tests as may be prescribed.
4. Have completed the Basic Course or received credit in lieu thereof for having had previous honorable active service in the Army, Navy, Marine Corps, Coast Guard, or Air Force.
5. Be a citizen of the United States.
6. Be physically qualified under standards prescribed by the Department of the Air Force. Due allowance will be made for those defects that are correctible before the student becomes eligible for appointment as a commissioned officer.
7. Be accepted by Oregon State University as a regularly enrolled student.
8. Execute a written agreement with the Government to complete the Advanced Course, contingent upon remaining in college, and to attend the summer training unit at the time specified.
9. If physically qualified, agree to apply for flying training unless otherwise specifically exempt. Quotas for those applying are quite limited.

Commissions. A student must be 21 through 27 years of age, complete the advanced course Air Force ROTC, and receive a baccalaureate degree to be recommended for a commission as an officer in the Air Force.

Outstanding advanced course cadets are designated Distinguished Air Force ROTC Cadets, Distinguished Air Force ROTC Graduates are selected from these Distinguished Cadets. Distinguished Air Force ROTC Graduates are given the opportunity to apply for commission as a Regular Officer of the Air Force.

Flight Training. Eligible seniors are given flight training. Qualified cadets who complete this flight training, the Advanced Course in Air Force, and are awarded a commission in the Air Force are eligible to participate in the Air Force Pilot Flight Training Program as commissioned officers. Students determined eligible for other than pilot training will receive navigation or other training in the Air Force as commissioned officers.

Lower Division Courses

AS 111,112,113. **Air Science 1.** 1 hour each term. 1 ①; 1 ①; 3 ①
Foundations of Air Power—1. A survey of air power designed to provide the student with an understanding of the elements of air power and basic aeronautical science.

AS 211,212,213. **Air Science 2.** 1 hour each term. 3 ①; 3 ①; 1 ①
Foundations of Air Power—2. A survey of the development of aerial warfare, with emphasis on principles of war, concepts of employment of forces, and changing weapon systems. Treatment of aerial warfare covers targets, weapon systems, delivery vehicles, bases, and operations.

Upper Division Courses

AS 311,312,313. **Air Science 3.** 3 hours each term. 5 ①
Air Force Officer Development. An inquiry into the knowledge and skills required of a junior officer in the Air Force. Includes Air Force leadership doctrine, staff organization and functions, communicating, instructing, problem solving techniques, leadership principles and practices, and the military justice system.

AS 314. **Summer Camp.** 6 hours summer.
Junior Officer Training with emphasis on military discipline, air crew and aircraft indoctrination, a career in the Air Force, organization and functions of an Air Force base, physical training, and weapons familiarization.

AS 411,412,413. **Air Science 4.** 3 hours each term. 5 ①
Global Relations. A study of global relations of special concern to the Air Force officer with attention to such aspects as weather, navigation, geography, and international relations.

Military Science and Tactics

(Personnel detailed from United States Army)
As of January 1961

Professor LANDON (Colonel, Infantry) Commandant.

Associate Professors: Lieutenant Colonels IRVINE (Chief, Engineer Branch), DOYAL (Chief, Infantry Branch); Major CONNOLLY (Chief, Signal Branch).

Assistant Professors: Captains MOONEY (Armor), PITTS (Artillery), STEVENS (Engineers), TAKASUMI (Infantry), VOLMER (Infantry), WILLIFORD (Infantry).

Instructors: Master Sergeants BARTCHER, CARLSON, HUNNINGS, MOREHEAD, RANKINS; Sergeant First Class MACDOUGALL, MCDERMOTT, NADELL; Sergeant LOWE.

The first two years of military instruction requiring two hours a week (1 term hour credit) constitute the Basic Course. Students in the Advanced Course (third and fourth years) receive 1 credit per term for the Junior year, 2 credits per term for the Senior year, and 6 credits for summer camp. In all, students completing the course will have received 21 term hours of credit in Military

Science, 15 hours of which will be upper division. The student is also required to complete 3 credit hours of general academic work while in the Basic Course and 9 credit hours while in the Advanced Course. Courses selected to satisfy this requirement may be chosen from general academic courses in effective communications, science comprehension, general psychology, or political development and political institutions. He may include SSc 441, 442, 443 to provide a comajor in Military Science with whatever other major he submits for a baccalaureate degree.

Enrollment in the Advanced Course. Each student enrolled in the Advanced Course of the Senior ROTC must:

1. Be selected by the Professor of Military Science and the President of Oregon State University.
2. Not have reached 27 years of age.
3. Have successfully completed such survey and general screening tests as may be prescribed.
4. Have completed the Basic Course or received credit in lieu thereof for having had twelve months or more previous honorable active service in the Army, Navy, Marine Corps, Coast Guard, or Air Force.
5. Be a citizen of the United States.
6. Be physically qualified under standards prescribed by the Department of the Army. Due allowance will be made for those defects that are correctible before the student becomes eligible for appointment as a commissioned officer.
7. Be accepted by Oregon State as a regularly enrolled student.
8. Execute a written agreement with the United States to complete the Advanced Course, contingent upon remaining in college, and to attend the summer camp at the time specified unless deferred for cogent reasons.

Commissions. For a reserve commission a student must meet the following minimum requirements:

1. He must have received a baccalaureate degree.
2. In addition to his major in military science, he must have a comajor as follows:
   (a) For commission in the Corps of Engineers, he must have a comajor in any academic course of instruction leading to an engineering, technical, or scientific degree.
   (b) For commission in the Field Artillery or Infantry, he must have a comajor in any school or department at Oregon State granting an academic degree.
   (c) For commission in the Signal Corps, he must have any academic course leading to a degree in engineering, electronics, or physics. Students enrolled in courses other than these, however, may be admitted if marked ability, aptitude, or interest in technical fields of endeavor is demonstrated.

Distinguished Military Students have an opportunity to apply for appointment as commissioned officers in the Regular Army. In addition to possessing outstanding qualities of military leadership, high moral character, and definite aptitude for the military services, these men must be between the ages of 21 and 27 years and must meet certain physical standards.

Flight Training. A limited number of seniors in the advanced course will have an opportunity to take flight training leading to a private pilot's license and to an opportunity to attend the U. S. Army flight training program after graduation.

Courses for Freshman and Sophomore Years

Lower Division Courses

MS 111,112,113. **First-Year Basic Course.** 1 hour each term.
Leadership, drill, and command; organization of the Army and ROTC; individual weapons and markmanship; U. S. Army and National Security; elective subjects, totaling 3 credit hours, chosen from general academic courses in effective communication, science comprehension, psychology or political development and political institutions.

MS 211,212,213. **Second-Year Basic Course.** 1 hour each term.
Leadership, drill, and command; map and aerial photo reading; introduction to branch tactics and techniques; American Military history.

Courses for Junior and Senior Years

Courses in Infantry

MS 311,312,313. **First-Year Advanced Course.** 3 hours each term.
Leadership, drill, and command; military teaching principles; infantry organization, estimate of the situation and combat orders, platoon tactics, employment of combat support company, rifle company tactics; principles of military leadership; pre-camp orientation; elective subjects chosen from general academic course in effective communications, science comprehension, general psychology, or political development and political institutions.

MS 314. **Advanced Summer Camp.** 6 hours.
Practical and theoretical instruction for six weeks at Fort Lewis, Washington. Prerequisite: MS 311,312,313.

MS 411,412,413. **Second-Year Advanced Course.** 3 hours each term.
Leadership, drill, and command; division staff organizations and functions; principles and uses of combat intelligence; staff supervision of training; supply and evacuation; troop movements; motor transportation; Army administration; military law; service orientation; elective subjects chosen from the same areas as for MS 311, 312, 313.

Courses in Field Artillery

MS 321,322,323. **First-Year Advanced Course.** 3 hours each term.
Leadership, drill, and command; military teaching principles; organization and capabilities of artillery; artillery weapons; communications; howitzer section drill; survey; firing battery operations; observed fires; fire direction; introduction to artillery tactics; precamp orientation; elective subjects chosen from general academic courses in effective communications, science comprehension, general psychology, or political development and political institutions.

MS 324. **Advanced Summer Camp.** 6 hours.
Practical and theoretical instruction for six weeks at Fort Sill, Oklahoma. Prerequisite: MS 321,322,323.

MS 421,422,423. **Second-Year Advanced Course.** 3 hours each term.
Leadership, drill, and command; role of U. S. in world affairs; command and staff; military intelligence; employment of artillery in the combined arms team; gunnery; supply, evacuation, and troop movements; military administration; military justice; role of air defense artillery; organization and employment of missiles; service orientation; elective subjects chosen from the same areas as for MS 321, 322, 323.

Corps of Engineers Courses

MS 331,332,333. **First-Year Advanced Course.** 3 hours each term.
Leadership, drill, and command; military teaching principles; use of military explosives; mine warfare; fixed bridges; floating bridges; pipelines, tramways, floating piers and expedients; field fortifications and camouflage construction; precamp orientation; elective subjects chosen from general academic areas in effective communication, science comprehension, general psychology, or political development and political institutions.

MS 334. **Advanced Summer Camp.** 6 hours.
Practical and theoretical instruction for six weeks at Fort Leonard Wood, Missouri. Prerequisite: MS 331,332,333.

MS 431,432,433. **Second-Year Advanced Course.** 3 hours each term.
Leadership, drill, and command; military law; Army administration; role of the U. S. in world affairs; operations of Engineer units; Engineer logistics; staff procedures for Engineer battalions; service orientation; elective subjects may be chosen from the same areas as for MS 331, 332, 333.

Courses in Signal Corps

MS 351,352,353. **First-Year Advanced Course.** 3 hours each term.
Leadership, drill, and command; military teaching principles; Signal communication materiel, Signal field communications system engineering; Signal Corps pictorial activities, photography and television; pre-camp orientation. Elective subjects may be chosen from the areas of effective communication, science comprehension, general psychology, and political development and political institutions.

MS 354. **Advanced Summer Camp.** 6 hours.
Practical and theoretical instruction for six weeks at Fort Gordon, Georgia. Prerequisite: MS 351,352,353.

MS 451,452,453. **Second-Year Advanced Course.** 3 hours each term.
Leadership, drill and command; automatic data processing systems; logistics; operations; Army administration; military law, the role of the United States in World Affairs; service orientation. Elective subjects may be chosen from the same areas as for MS 351,352, and 353.

Naval Science

(Personnel detailed from United States Navy and Marine Corps)
As of January 1961

Professor SHAFER (Captain USN) Commanding Officer.

Associate Professor DONNALLY (Commander USN) Executive Officer.

Assistant Professors: STEPHENSON (Lieutenant Colonel USMC); NOLL (Lieutenant Commander USN); ANDREWS (Lieutenant USN); LOCKEMAN (Lieutenant USN); BENSON (Lieutenant junior grade USN).

Instructors: CARMICKLE (Senior Chief Gunners Mate); FINCHER (Senior Chief Quartermaster); WOELFLE (Senior Chief Yeoman); COCHRAN (Chief Fire Control Technician); FOSTER (Storekeeper First Class); FOSTER (First Sergeant USMC).

The NROTC unit is composed of two types of students: *regular students* and *contract students.* The contract students receive the same type of allowances as do the cadets in the other ROTC units. They are selected by the Department of Naval Science at Oregon State. The regular students fall under a different category, being provided for by a separate Act of Congress.

Regular students are appointed Midshipman, USNR. They have their tuition, fees, and textbooks paid for by the Navy for a period not exceeding four years, are uniformed at Government expense, and receive retainer pay at the rate of $600 per year. They obligate themselves to complete the prescribed Naval Science curriculum, to attend three summer cruises of from six to eight weeks, to accept a commission as Ensign, U.S.N., or Second Lieutenant, U.S.M.C., on graduation, and to serve on active duty for four years after receiving commission, unless earlier released by the Navy Department. At the beginning of the fourth year after receiving commissions, they have the opportunity to apply for retention in the regular Navy or Marine Corps, and will be so retained if selected under the quotas then in force.

Students in this group are selected by means of a nationwide examination, which is administered by state or regional selection boards. This examination is given each year, generally in December, for entry the following fall term. Information relative to later examinations may be obtained from the Commanding Officer of the NROTC unit.

Requirements: *Every acceptable candidate*, whether applying as a regular or contract student, must:

1. Be a male citizen of the United States.
2. Be a regularly enrolled student in good standing at a college of which the NROTC unit is a part.
3. Have attained his 17th birthday on or before July 1 of the year in which enrolled, but must not attain his 25th birthday before July 1 of the year in which he would normally receive his first baccalaureate degree and be commissioned.
4. Be unmarried and agree to remain unmarried until commissioned or otherwise separated from the NROTC program.
5. Agree, with the consent of his parent or legal guardian, to undergo whatever period of training may be necessary to complete all requirements of the NROTC curriculum.
6. Agree to participate in required summer training courses and cruises.
7. Agree to accept the appropriate commission in the Navy, Marine Corps, Naval Reserve, or Marine Corps Reserve, when offered.
8. Meet general physical requirements as follows: *Height*, minimum 5 feet 6 inches, maximum 6 feet 4 inches. *Vision*, 20/20 each eye; color perception normal. Contract applicants may request waiver of the vision requirement if vision is not less than 20/40 each eye and can be corrected to 20/20 with glasses. *Weight*, in proportion to height. *Teeth*, a minimum of 16 vital, of which 8 must be in each arch. Other physical requirements as prescribed by the Manual of Medical Department for candidates for commissions.
9. Be morally qualified and possess potential officer qualities as evidenced, for example, by appearance, scholarship, and extracurricular activities.
10. Agree, with consent of parents or guardian, to serve on active duty in the Navy or Marine Corps, after receiving his commission for a period of four years (for regular student) or two years (for Navy contract student) or three years (for Marine Corps contract student).

Status and Curriculum. Students enrolled in the program are not on active duty. They wear the uniform only for drills, on special occasions, and during the summer training cruises.

The program of study covers four years and fits into curricula leading to first baccalaureate degrees. It includes the following requirements:

1. 33 term hours of Naval Science.
2. One year of college physics to be completed by the end of the sophomore year for regular students only. This course is a necessary background for the courses in naval engineering (NS 311,312).
3. One year of college mathematics to be completed by end of sophomore year for regular students only. Contract students must have completed mathematics through trigonometry or take one term of college mathematics by the end of the sophomore year. This is required as background for navigation courses (NS 312,313).
4. One term of general psychology (Psy 201 or 212) ordinarily taken in spring term of sophomore year.
5. Proficiency in written and oral expression. (One year of English is considered adequate.)
6. Two years of physical education. Each student must qualify as a swimmer and should be instructed in lifesaving and resuscitation.

Naval science (including summer cruise) pursued for four years in one of the undergraduate curricula constitutes a comajor with many of the majors offered in degree-granting divisions of schools. In addition, the Department of Naval Science offers a 4-year curriculum with a major in naval science; in this curriculum the student may take considerable amounts of work in any of the schools but needs to complete a major only in naval science. The curriculum leading to a B.A. or B.S. degree in Naval Science is open only to those students enrolled in either the regular or contract programs. Interested students should confer with the Department of Naval Science.

Description of Courses

NS 111,112,113. **Orientation and History of Sea Power.** 3 hours each term. 5 ①

Organization; customs and traditions of the Navy; highlights of Naval history from Salamis to Jutland; Naval history of World War II; leadership; discipline; introduction to Marine Corps; naval aviation, amphibious warfare, submarines, etc.; seamanship; maneuvers and tactics; rules of the nautical road.

NS 211,212. **Naval Weapons.** 3 hours each term fall and winter. 5 ①

Introduction to weapon delivery, basic gunnery, principles of typical fire control system, anti-submarine warfare, missiles, nuclear weapons, employment of naval weapons, space technology.

5 ①

NS 311,312,313. **Naval Machinery and Navigation.** 3 hours each term.

Elements of a typical marine engineering plant; boilers, turbines, condensate system, feed water system, auxiliary equipment, diesel engines; ship stability; nuclear propulsion; introduction to navigation: piloting, nautical astronomy, celestial navigation.

NS 321,322,323. **Evolution of Art of War and Modern Basic Strategy and Tactics.** 3 hours each term. 5 ①

Evolution of the art of war from Alexander to the present time; basic strategy and tactics; small unit tactics; world strategy in World War II. For candidates for U. S. Marine Corps or U. S. Marine Corps Reserve.

NS 411,412,413. **Naval Operations and Naval Administration.** 3 hours each term. 5 ①

Study of relative movement problems, rules of the nautical road; fleet tactics and maneuvers; fleet communications; administration; military justice; weather; and naval leadership.

NS 421,422,423. **Amphibious Warfare and Administration.** 3 hours each term. 5 ①

Theory of amphibious warfare; analysis of amphibious operations in World War II and Korean conflict; administration; and naval justice. For candidates for U. S. Marine Corps or U. S. Marine Corps Reserve.

Division of Physical Education

Faculty

As of January 1961

CLAIR VAN NORMAN LANGTON, Dr. P.H., Ed.D., Director of the Division of Physical Education.

Physical Education for Women: Professor SEEN (department head); Associate Professors P. GILL, HUPPRICH, MASILIONIS, MILLIKEN, THOMPSON, WEIR; Assistant Professors J. A. DIXON, MCALLESTER (emeritus), OCKER, SEYMOUR; Senior Instructor POLING; Instructors PYE, WINKLER.

Physical Education for Men: Professors ADRION, ALLMAN, ANDERSON (chairman of hygiene and environmental sanitation), BERGSTROM (chairman of professional physical education), COLEMAN (chairman of service programs for men), J. V. DIXON, A. T. GILL, KEENE, PROTHRO; Associate Professors COX, DAILEY, DRLICA, FLOOD, FOSTER, KOSKI, MAYSHARK, MCKALIP, MOE, SWAN; Assistant Professors BEEGLE, MARTINSON, MEGALE, THOMAS, WINKLER; Instructor CRAMER.

Intercollegiate Athletics: Director R. S. KEENE, Athletic Business Manager BARRATT. COACHES: BELL (track), BRADLEY (assistant football), COLEMAN (baseball), GIBBS (assistant football), GILL (basketball), HARRIS (tennis), MARTIN (golf), PROTHRO (football), ROBERTSON (trainer), ROCHA (assistant basketball), SIEGRIST (assistant football), THOMAS (wrestling), VALENTI (assistant basketball), WATSON (assistant football), ZELINKA (assistant football).

General Statement

ALL INSTRUCTION and related activities in the fields of physical education and hygiene are administered by the Division of Physical Education. Close cooperation is maintained with the Student Health Service and other student-welfare agencies.

In addition to its service courses, the Division of Physical Education offers professional courses for students enrolled in certain curricula in the Schools of Education and Science. The major in physical education offered through the School of Education provides preparation for teaching and coaching and leads to the baccalaureate degree in education. Major work in hygiene and sanitation in the School of Science and health education in the School of Education provides professional training for specialists in these fields. The student's basic program may be varied with options in recreation, youth agency leadership, prephysical therapy, and preoccupational therapy which prepare graduates for these rapidly developing fields. Many opportunities exist for combining professional courses in physical education with courses in the Schools of Science, Agriculture, Business and Technology, Engineering, Forestry, and Home Economics.

Students majoring in other teaching fields or schools may take a minor in physical education, health education, recreation, camp education, or the dance by completing at least 27 term hours of professional courses in the respective fields. See curricula under SCHOOL OF EDUCATION.

Requirements for the Oregon teachers' certificates are listed under SCHOOL OF EDUCATION. Students who complete either the health education major or the physical education major include courses in these fields during their fifth year of preparation along with other courses according to their special objectives. Students who devote their fifth year to graduate work for a master's

degree may major in education, science education, health education, hygiene, or other fields and include a graduate minor in physical education. Requirements for the master's degree can be completed with or without thesis. Advanced degrees are granted through the School of Education or the School of Science.

A comprehensive intramural sports program offers sports for all students. Living organizations, clubs, individuals, classes, and institutional departments compete with friendly rivalry in many sports activities. The intramural sports program is separate and apart from intercollegiate athletics.

Clubs and societies for women include Parthenia, an honor society sponsored by the Women's Physical Education Department; Women's Recreation Association, which offers competitive and noncompetitive physical activities for women; and Orange "O," the honorary club for the Women's Recreation Association. Athletic organizations for men include the Minor "O" and Varsity "O" associations and the honor society, Sigma Delta Psi. The Varsity "O" Managers Association includes varsity team managers and the senior intramural sports manager.

A medical examination is required of all entering students. The Student Health Service advises with the Division of Physical Education in the assignment of students to activities in accord with their physical needs. The following activity classification is made, based upon the medical examinations: (a) unlimited activity, (b) unlimited activity with observation, (c) restricted activity, (d) corrective gymnastics, (e) no activity.

Regular registration fees entitle every student to use of gymnasium, pool, and showers, use of gymnasium suits and swimming suits and towels, and laundry service. Every student has a basket or locker in the gymnasium for his or her exclusive use and is urged to use gymnasium facilities to the utmost.

A broad program of physical fitness and recreation is emphasized. All undergraduate men and women are expected to enroll in and complete physical activity courses during the freshman and sophomore years and until physical education requirements have been met. Entering students are required to enroll in swimming unless they pass the divisional swimming test. Students must complete the following:

Freshman year: PE 180 or 190, Physical Education, 1 term hour each for two terms; *and* PE 160, General Hygiene, 2 term hours for women; PE 150 or PE 160, 1 or 2 term hours for men.

Sophomore year: PE 180 or 190, Physical Education, 1 term hour each term for three terms.

Only one of the courses listed above may be taken in any one term.

The professional activities courses for students taking a major or minor in physical education may be considered as fulfilling the physical education requirement for any term.

Required activity courses are regularly scheduled classes planned as instructional hours leading to a knowledge and appreciation of the technique involved and not merely to give opportunity for recreation or exercise. Ample opportunity for exercise and recreation is provided.

Courses PE 380 or 390 may be taken to the amount of one hour per term for juniors and seniors. A total of six hours in addition to the regular physical-education requirement may be elected.

Curriculum in Physical Education

Students preparing for physical education teaching and coaching or related fields pursue the basic program of required courses listed below.

Basic Program

Freshman Year

	Hours
Human Biology (Z 114,115,116)	9
English Composition (Wr 111,112,113)	9
General Chemistry (Ch 101,102,103)	9
Introduction to Physical Education (PE 131)	3
General Hygiene (PE 170)	3
Introduction to Health Education (SEd 123)	3
Professional Activities (PE 194)	6
Air, Military, or Naval Science (men)	3–9

Sophomore Year

	Hours
Elementary Human Anat (Z 321,322)	6
Applied Human Anatomy (Z 323)	3
Professional Activities (PE 294)	6
Social Sci (Ec 212, PS 201, Soc 212)	9
Literature	9
General Psychology (Psy 201,202)	6
Field Experience (Ed 200)	2
Speech	3
Org & Admin of Intramural Sports (PE 340)	2
Air, Military, or Naval Science (men)	3–9

Junior Year

	Hours
Physiology (Z 331,332)	6
Applied Human Physiology (Z 336)	3
School in American Life (Ed 310)	3
Educational Psych: Learning (Ed 312)	3
Special Secondary Methods (Ed 408h)	3
Human Development (Psy 311)	3
Methods in Reading (Ed 350)	3
Phys Ed Technique (PE 333,334,335)	6
Football Coaching (PE 365) (men)	2
Basketball Coaching (PE 366) (men)	2
Baseball or Track and Field Coaching (men) (PE 367 or 368)	2
Professional Activities (PE 394)	6
Sports Officiating (PE 362) (women)	3
Recr Courses (women) (PE 240, Ed 263 or 426)	3

Senior Year

	Hours
School Health Education (SEd 321)	3
School Health Services (SEd 322)	3
First Aid (PE 358)	3
School Programs and Organization (PE 442)	5
Evaluation of Physical Education (PE 443)	3
Conditioning and Care of Injuries (PE 359) (men)	2
Adaptive and Corrective Physical Education (PE 444)	3
Student Teaching: Secondary (Ed 416)	9–12
Seminar (Ed 407)	1–3
Community Health Problems (Bac 424 or 425 or 426) or Nutrition (FN 225)	3

Options

For options in recreation and prephysical therapy, consult with advisers in the Division.

Service Courses

Lower Division Courses

PE 150. **General Hygiene.** 1 hour any term. 2 ①
Principles and practices of health promotion; individual and physiological hygiene; disease prevention and control; community hygiene and public health. Satisfies hygiene requirement for men.

PE 160. **General Hygiene.** 2 hours any term. 2 ①
Principles and practices of health promotion; individual and physiological hygiene; disease prevention and control; community hygiene and public health. Satisfies hygiene requirement; may be elected by both men and women.

PE 170. **General Hygiene.** 3 hours. 3 ①
Personal health, exercise, weight control, prevention of infection, social hygiene, diet, stimulants, injurious popular remedies and fads, sunlight, air and ventilation, choosing a doctor, and life-extension problems. A more extensive general hygiene course. Satisfies hygiene requirement; may be elected by both men and women.

PE 180. **Physical Education.** 1 hour each term, five terms.

PE 190. **Physical Education.** 1 hour each term, five terms.
Physical activities taught for acquisition of skill and for adaptation in social life of the student.

Upper Division Courses

PE 380. **Physical Education.** 1 hour each term, six terms. 3 ①

PE 390. **Physical Education.** 1 hour each term, six terms. 3 ①

Professional Courses

Lower Division Courses

Ed 121. **Introduction to Recreation.** 3 hours. 3 ①
Concept of community recreation; growth and development of public recreation movement; types of recreation; role of organized recreation in present social order.

SEd 123. **Introduction to Health Education.** 3 hours. 3 ①
Historical background and underlying philosophy of health education; statistical facts that indicate need for health education; survey of modern practice in and organization for health education; opportunity for professional work in field.

PE 131. **Introduction to Physical Education.** 3 hours. 3 ①
Personal and professional qualifications for teaching and coaching; place of physical education and athletics in education; values of physical education to development of children and youth; general purposes of physical education program.

PE 132. **Introduction to Therapy.** 2 hours. 2 ①
Personal and professional qualification to become registered physical therapist or occupational therapist. Relationship of physical therapy and occupational therapy to field of medicine; values of physical therapy and occupational therapy.

PE 194. **Professional Activities.** 2 hours each term, three terms. 2 ②
Methods, techniques, skills in activities commonly found in physical education programs.
Fall: team sports (men); basketball, vollyball, field sports (women).
Winter: gymnastics or aquatics (men); basic rhythms (women).
Spring: gymnastics or aquatics (men); softball, track and field, badminton, tennis (women).

PE 240. **Recreation Leadership.** 3 hours. 3 ①
Study and practice of games for family recreation, parties, picnics, clubs, and community centers. Lecture and laboratory.

PE 253. **Introduction to Dance Education.** 3 hours. 3 ①
Modern developments of dance in relation to general education; aims and objectives; history of dance in education; survey of modern practices; opportunities in field.

Ed 263. **Camp Counseling.** 3 hours. 3 ①
Counselor training, responsibility in camp, camper problems, camp relationships. Three-day practical camping field trip.

PE 294. **Professional Activities.** 2 hours each term, three terms. 2 ②
Methods, techniques, and skills in activities found in physical education programs.
Fall: body mechanics, track and field (men); archery, bowling, golf (women).
Winter: boxing, wrestling (men); modern dance, folk, square, and social dance.
Spring: individual and dual sports (men); aquatics, advanced modern dance (women).

Upper Division Courses

Bac 321. **Sanitation.** 3 hours. 1 ② 1 ①
Sanitation in home, school, city; control of communicable diseases and their relation to foods, rodents, swimming pools, eating establishments, insects, ventilation, industrial hygiene, etc. Prerequisite: one term of general bacteriology or equivalent.

PE 321. **Games and Relays for the Elementary School.** 1 hour. 2 ①
Progressive activity skills for all grades, including games, relays, team activities; practical instruction; opportunity to analyze performance of children of various ages.

SEd 321. **School Health Education.** 3 hours. 3 ①
Procedures and techniques in developing ability of school student to understand and guide own health and to contribute to health of community. Prerequisite: SEd 123.

PE 322. **Rhythms for the Elementary School.** 1 hour. 2 ①
Progressive activity skills for all grades, including rhythms and dance; practical instruction; opportunity to analyze performance of children of various ages.

SEd 322. **School Health Services.** 3 hours. 3 ①
School procedures which contribute to development, maintenance, and protection of health of students; organization of services, examinations, screening, special services, communicable disease control, emergency care, school environment, forms and records. Prerequisite: SEd 123.

2 ①

PE 323. **Posture and Conditioning for the Elementary School.** 1 hour.
Progressive activity skills for all grades; fundamentals of body movement and conditioning exercises, stunts, and tumbling; practical instruction; opportunity to analyze performance of children of various ages.

PE 333,334,335. **Physical Education Technique.** 2 hours each term. 4 ①
Technique of teaching physical activities; problems of directed teaching. Prerequisite: PE 194,294.

2 ①

PE 340. **Organization and Administration of Intramural Sports.** 2 hours.
Intramural program for high schools and colleges; aims and objectives; organizing a program; units of competition; program of sports; methods of competition; scoring plans; administrative problems. Prerequisite: PE 131.

Ed 347,348,349. **Field Work.** 2 hours each term. 2 ①
Observation and participation in planning, operation, and administration of variety of recreation, youth-organization, and therapy programs under direction and supervision of trained leaders. Prerequisite: Ed 121 or PE 132.

PE 358. **First Aid.** 3 hours. 2 ① 1 ②
Emergency treatment for various types of injuries; control of bleeding, artificial respiration, transportation, splinting, and bandaging. Students are required to teach first-aid projects. Course leads to Red Cross Standard, Advanced, and Instructor's Certificates. Open as a service course to all departments.

PE 359. **Conditioning and Care of Injuries (Men).** 2 hours. 1 ① 1 ②
Prevention and treatment of athletic injuries; practical and theoretical aspects of massage, taping, and bandaging; diet and conditioning; various physical therapeutic procedures. Prerequisite: Z 323.

Ed 360. **Safety Education.** 3 hours. 3 ①
Background and knowledge of all phases of safety; home, fire, industrial, water, rural, school, and traffic safety; elementary, secondary, and adult levels. Prerequisite: Ed 310,312.

PE 360. **Sports Officiating (Men).** 3 hours. 3 ①
Rules, mechanics, and procedures of officiating in competitive sports; enforcement of rules, use of signals; personal appearance and conduct, public relations, duties of officials; suggestions for coaches and administrators, code of ethics, and qualifications for national official's rating.

PE 362. **Sports Officiating (Women).** 1 hour each term, three terms. 1 ①
Rules, mechanics, and procedures of officiating in competitive sports; enforcement of rules, use of signals; personal appearance and conduct, public relations, duties of officials; suggestions for coaches and administrators, code of ethics, and qualifications for national official's rating. Prerequisite: PE 194.

Ed 364. **Laboratory Practice in Camping Skills.** 3 hours. 3 ①
Practical experience and development of skills in a variety of camping activities. Prerequisite: Ed 263.

Ed 365. **Camp Management.** 3 hours. 3 ①
Directed toward preparation for camp administration. Prerequisite: Ed 263,364, or camp counseling experience.

PE 365. **Football Coaching.** 2 hours. 2 ① 1 ②
Theory and practice, details of each position, training and managing, complete techniques of developing offensive and defensive tactics, comparison of various systems in football. Prerequisite: PE 294.

Ed 366. **Public School Camping.** 3 hours. 3 ①
Role of camping in education; school camp and its organization, administration, and leadership. Prerequisite: Ed 365 .

PE 366. **Basketball Coaching.** 2 hours. 2 ① 1 ②
Coaching and training of basketball teams beginning with fundamentals, passing, dribbling, and pivoting; psychology of the game; various methods of defense and offense. Prerequisite: PE 294.

PE 367. **Baseball Coaching.** 2 hours. 2 ① 1 ②
Technique of batting, pitching, baseball strategy, how to play various positions; promoting the game; making schedules; points of inside baseball; care and construction of field; management. Prerequisite: PE 294.

PE 368. **Track and Field Coaching.** 2 hours. 2 ① 1 ②
How to train for track and field events; form and technique; conduct of meets; construction, use, and assembling of equipment; development of certain types of individuals for certain events. Prerequisite: PE 294.

PE 394. **Professional Activities.** 2 hours each term, three terms. 2 ②
Methods, techniques, and basic skills in activities in physical education programs. *Fall:* rhythms (men); recreation games, tumbling and apparatus (women). *Winter:* fundamentals of body movement (women). *Spring:* games, stunts, and relays; marching and drill (women). Prerequisite: PE 294.

PE 405. **Reading and Conference.** (g) Terms and hours to be arranged.[1]

PE 407. **Seminar.** (g) Terms and hours to be arranged.[1]
EQUIPMENT AND SUPPLIES.
FACILITIES.
CURRICULUM.
PROBLEMS IN INTRAMURAL SPORTS.
SUPERVISION.
CURRENT STUDIES IN ATHLETICS.
RESEARCH SURVEY.
HISTORY

PE 420. **Elementary School Physical Education.** 3 hours. 3 ①
Purposes in elementary school physical education; planning progressive programs for grades 1-8; methods of obtaining objectives; evaluation.

Ed 421. **Principles and Philosophy of Recreation.** (g) 3 hours. 3 ①

Ed 422. **Recreation Programs.** (g) 3 hours. 3 ①

3 ①

Ed 423. **Organization and Administration of Recreation.** (g) 3 hours.
(For descriptions of Ed 421,422,423 see page 202.)

2 ① 2 ②

Bac 424,425,426. **Community Health Problems.** (g) 3 hours each term.
Application of the principles of hygiene to sanitary, statistical, governmental, epidemiological, sociological problems. Prerequisite: one year of upper division biological science.

Ed 425. **Youth Agencies.** (G) 3 hours. 3 ①
Survey of youth-serving organizations; organization and leadership. Prerequisite: senior or graduate standing.

Ed 426. **Community Recreation.** (G) 3 hours. 3 ①
Developing philosophy of recreation, trends; organization and administration of recreation program in large, small, and rural communities. Prerequisite: senior standing.

SEd 431,432,433. **School Health Problems.** (G) 3 hours each term. 3 ①
Maintenance of health of school children; communicable diseases; school sanitation; planning of school buildings; health of school child; hygiene of instruction. Prerequisite: one year of upper division biological science.

PE 435. **Playground Leadership.** 3 hours spring. 3 ①
Nature and function of play; adaptation of activities; program making. Playground instruction, management, and supervision.

SEd 441,442,443. **Health Education.** (G) 3 hours each term. 3 ①
Philosophy and principles of health education; organization and administration; health education curriculum; coordination of school health activities with other health resources. Prerequisite: one year of upper division biological science and SEd 321 and 322 or equivalent.

[1] Credit for PE 405 plus 407 must not exceed 9 term hours.

PE 442. **School Programs and Organization.** 5 hours. 5 ①
Aims and objectives; selecting activities; typical programs and variations; athletics; standards; State and local requirements; administrative organization; policies and procedures; history and philosophy. Prerequisite: Ed 408.

PE 443. **Evaluation of Physical Education.** 3 hours. 3 ①
Techniques for evaluating knowledge, skill, attitudes, appreciations, and organic vigor through physical education instruction. Prerequisite: PE 335.

PE 444. **Adaptive and Corrective Physical Education.** 3 hours. 3 ①
Reconstructive health and physical education, including scoliosis, kyphosis, lordosis; methods of posture screen, orthopedic conditioning affecting posture, preventive measures, evaluation of visual aid materials in posture. Prerequisite: Z 323.

3 ①

PE 446. **Tests and Measurements in Physical Education.** (g) 3 hours.
Survey of field: special study of typical tests, methods of scoring, principles of test construction. Prerequisite: PE 442.

PE 447. **Principles of Physical Education.** (g) 3 hours. 3 ①
General philosophy and principles of physical education and their relation to general education. Prerequisite: PE 442.

PE 448. **Administration of Physical Education.** (g) 3 hours. 3 ①
Administrative problems; organization of departments and of instructional and recreational programs; supervision of physical plant. Prerequisite: PE 442.

PE 449. **Current Trends and Problems.** (g) 3 hours. 3 ①
Trends and underlying forces in health, physical education, and recreation; implications of recent developments for administrative responsibility and planning for programs in schools and colleges. Prerequisite: PE 442.

Bac 453. **Epidemiology.** 3 hours spring. 1 ② 1 ①
Causes and behavior of communicable diseases in general population; factors influencing occurrences of epidemics; basic principles underlying control. Prerequisite: Bac 205.

PE 480. **Driver Education and Training.** (G) 3 hours. 2 ① 1 ②
Preparation of teachers for driver-training classes in high schools; behind-the-wheel instruction in dual-control training cars sponsored by American Automobile Association and the Department of Motor Vehicles. Limited number of drivers-learners (non-drivers) will be admitted with whom driver-teachers will work. Prerequisite: Ed 310, 312.

Graduate Service Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

SEd 501. **Research.** Terms and hours to be arranged.

SEd 503. **Thesis.** Terms and hours to be arranged.

SEd 505. **Reading and Conference.** Terms and hours to be arranged.

SEd 507. **Seminar.** Terms and hours to be arranged.

*Ed 523. **School Activities.** 3 hours. 3 ①

* For course description see SCHOOL OF EDUCATION.

Graduate School

HENRY P. HANSEN, Ph.D., Dean of the Graduate School.
WENDELL H. SLABAUGH, Ph.D., Assistant Dean of the Graduate School.

Graduate Council

H. P. HANSEN (chairman), RALPH COLBY, W. T. COONEY, J. R. DILWORTH, E. J. DORNFELD, MARGARET FINCKE, J. G. KNUDSEN, R. S. MCCUTCHEON, J. W. SHERBURNE, E. A. YUNKER, F. R. ZERAN.

Graduate Committees

Science: E. J. DORNFELD (chairman), W. B. BOLLEN, H. FREUND, J. G. JENSEN, A. T. LONSETH, P. O. RITCHER, W. D. WILKINSON, S. E. WILLIAMSON, R. A. YOUNG, E. A. YUNKER.

Agriculture: W. T. COONEY (chairman), R. BOGART, E. N. CASTLE, J. R. COWAN.

Education: F. R. ZERAN (chairman), R. B. D. BARON, G. B. COX, MAY DUBOIS, H. A. TEN PAS, S. E. WILLIAMSON.

Engineering: G. W. GLEESON (chairman), G. B. COX, G. W. HOLCOMB, J. G. KNUDSEN, L. SLEGEL, L. N. STONE, J. S. WALTON.

Forestry: J. R. DILWORTH (chairman), G. H. BARNES, W. A. DAVIES, W. I. WEST.

Home Economics: MARGARET FINCKE (chairman), MAY DUBOIS, BETTY HAWTHORNE, HELEN MULHERN, FLORENCE PETZEL, KATHERINE READ, CLARA A. STORVICK.

Pharmacy: R. S. MCCUTCHEON (chairman), H. C. FORSLUND, L. A. SCIUCHETTI.

General Studies: E. A. YUNKER (chairman), R. F. FUQUAY, H. H. PLAMBECK, W. D. WILKINSON.

Graduate Minors in Nonmajor Fields: RALPH COLBY (chairman), G. A. BAKKUM, J. L. LEMASTER, M. N. NELSON, J. A. PFANNER, K. R. SWYGARD.

Graduate Faculty

As of January 1961

Departments Offering Majors for Master's and Doctoral Degrees

Agricultural Economics: Professors WOOD (head), BLANCH, CASTLE, DAVIS, HOLLANDS, KORZAN, MUMFORD; Associate Professors BECKER, BROWN, HALTER, PLATH, SITTON; Assistant Professor LANGMO.

Microbiology and Hygiene: Professors ELLIKER (chairman), C. L. ANDERSON, BOLLEN, GILMOUR, LANGTON, PILCHER; Associate Professor A. W. ANDERSON; Assistant Professors PARKS, SANDINE.

Botany: Professors YOUNG (chairman), DIETZ (emeritus), MCWHORTER, MILBRATH, ROTH, SMITH, VAUGHAN; Associate Professors BELKENGREN, CHAMBERS, CHILCOTE, HARDISON, HORNER, JENSEN, JONES, PHINNEY; Assistant Professors BRANDT, CORDEN, DEEP, LEACH, RAYMER.

Chemical Engineering: Professors WALTON (head), GLEESON, KNUDSEN; Associate Professor WICKS; Assistant Professors MEREDITH, MOEN, MRAZEK.

Chemistry: Professors CHRISTENSEN (chairman), BUTTS, CALDWELL, CHELDELIN, CLARK, DECIUS, GILBERT (emeritus), HAAG, KING, KURTH, LOGAN, MEHLIG (emeritus), NORRIS, PEASE, REMMERT, RICHARDSON, SCOTT, SLABAUGH, WANG, WESWIG, WILLIAMS; Associate Professors FANG, FREED, FREUND, HEDBERG, KICE, MARVELL, NEWBURGH, PARSONS, REESE, TERRIERE; Assistant Professors HEISLER, KALMAN, LOOMIS.

Civil Engineering: Professors HOLCOMB (head), COOPEY, MCCLELLAN, MERRYFIELD, PAN; Associate Professors BEHLKE, BURGESS, KOFOID, SHOEMAKER; Assistant Professors BEECROFT, BELL, DRACUP, NORTHCRAFT.*

Dairy and Animal Husbandry: Professors MILLER (head), BOGART, HAAG, JONES, KRUEGER, OLDFIELD, POULTON, WESWIG; Associate Professors ENGLAND, FOX, HEDRICK, OLIVER, WOLBERG; Assistant Professors CHURCH, HUETER, KENNICK, RALSTON, WU.

Education: Professors ZERAN (dean), CLINTON, GOODE, MUNFORD, ORDEMAN,* REICHART, REID, TEN PAS, VAN LOAN, WILLIAMSON; Associate Professors BARON, GILL, HALL, LEELAND, MARKSHEFFEL, MILLIKEN, PARKS; Assistant Professors CANNON, FOX, REES, SABAROFF, SEVEREIDE.*

Electrical Engineering: Professors STONE (head), ALBERT, COCKERLINE (emeritus), FEIKERT, MAGNUSSON; Associate Professors ENGLE, MICHAEL, OORTHUYS, WEBER; Assistant Professors JENSEN, LOONEY, STONE.

* Member of graduate faculty on a limited basis.

Entomology: Professors RITCHER (chairman), MARTIN, SWENSON; Associate Professors CROWELL, ROSENSTIEL, RUDINSKY, STEPHEN, TERRIERE; Assistant Professors BROOKES, DICKASON, GOULDING, KRANTZ, LATTIN.

Family Life and Home Administration: Professors READ (head), KIRKENDALL; Associate Professors SCHALOCK, VAN HORN; Assistant Professors AIKIN, PLONK; Instructor OLESON.*

Farm Crops: Professors COWAN (head), FOOTE, FORE, HILL (emeritus), POULTON; Associate Professors FURTICK, HEDRICK, MCGUIRE, METZGER; Assistant Professors CHING, FRAKES.*

Fish and Game Management: Professors DIMICK (head) DOUDOROFF, RAYNER; Associate Professors BOND, KUHN, LONG, WALES, WARREN.

Food and Dairy Technology: Professors SCHULTZ (head), CAIN, LITWILLER, RICHARDSON; Associate Professors HARVEY, ONSDORFF, SAMUELS, SINNHUBER, STEIN, WILDER, WORTHINGTON, YANG; Assistant Professors ANGLEMIER,* DAY, DIETZ, YOUNG.*

Foods and Nutrition: Professors FINCKE (head), MACKEY, STORVICK; Associate Professors CHARLEY, HAWTHORNE, MCLEAN; Assistant Professors HARRIS,* WARE.

Forest Management: Professors DILWORTH (head), BARNES, JEFFERS, MCCULLOCH, ROBINSON; Associate Professors FERRELL, KENISTON, NETTLETON, WHEELER, YODER; Assistant Professors BELL, IRGENS-MOLLER, KRYGIER,* RANDALL, SUTHERLAND.

General Science: Professors HANSEN (chairman), GILFILLAN, WILLIAMSON; Associate Professors BEER, HUMPHREY; Assistant Professors ANTON,* STAHL.

Geology: Professors WILKINSON (chairman), ALLISON, HANSEN; Associate Professor TAUBENECK; Assistant Professors BOSTWICK, CUMMINGS, KOCH; Instructors BOND,* SNOOK.*

Horticulture: Professors APPLE (head), COMPTON, FRAZIER, HANSEN, ROBERTS; Associate Professors BLANEY, ZIELINSKI; Assistant Professors BAGGETT, MACK.

Industrial Engineering: Professors Cox (head), ENGESSER.

Mathematics: Professors LONSETH (chairman) ARNOLD, FULKS, GASKELL, GOHEEN, OBERHETTINGER, POOLE; Associate Professors KIRKHAM, SAUNDERS, STONE; Assistant Professors BUSCHMAN, GODARD,* GROEMER, MCLEOD, REYNOLDS,* STALLEY.

Mechanical Engineering: Professors SLEGEL (head), HEATH, HUGHES, PAASCHE, PAUL, POPOVICH; Associate Professors LARSON, OLLEMAN, SMITH, THORNBURGH; Assistant Professors BOUBEL, DALY, GELLER, LEVINSON, MINGLE, ZAWORSKI.

Oceanography: Professor BURT (chairman); Associate Professors BYRNE, FROLANDER, PATTULLO; Instructor MCALISTER.*

Pharmacy Administration, Pharmaceutical Chemistry, Pharmaceutical Science, Pharmacognosy, Pharmacology: Professors WILSON (dean), COOPER, DOERGE, FORSLUND, MCCUTCHEON, SCIUCHETTI; Assistant Professor SCHULTZ.

Physics: Professors YUNKER (chairman), BRADY, DEMPSTER, VARNER (emeritus); Associate Professors DECKER, GARMAN, NICODEMUS, SCHECTER, TRIGG, VINYARD; Assistant Professors BURCH, CHURCH,* EASTERDAY, FORREST.

Poultry Husbandry: Professors PARKER (head), BERNIER, HARPER; Associate Professor ARSCOTT.

Soils: Professors CHENEY (head), YOUNGBERG; Associate Professors ALBAN, DAWSON, EVANS, HARWOOD, JACKSON, KNOX, YOUNG; Assistant Professors BOERSMA, MOORE.*

Zoology: Professors DORNFELD (chairman), ALLMAN, GORDON, HILLEMANN, KRUEGER, PRATT; Associate Professors MOHLER, PRITCHARD, STORM; Assistant Professors HISAW, OWCZARZAK; Instructor NEWSTEAD.*

Departments Offering Majors for Master's Degrees Only

Agricultural Education: Professor TEN PAS (head); Assistant Professor DAVIS.

Agricultural Engineering: Professors RODGERS (head), CROPSEY, LUNDE, SINNARD; Associate Professors BONNICKSEN,* KIRK, WOLFE; Assistant Professors BOOSTER,* CHRISTENSEN.*

Business Education: Professors YERIAN (head), LARSE, WINGER; Assistant Professor BARBER.*

Clothing, Textiles, and Related Arts: Professors PETZEL (head), PATTERSON; Associate Professors DIEDESCH, EDABURN, INGALLS, LEDBETTER, MOSER; Assistant Professors CARLSON, GRANT, WASSON.

Forest Engineering: Professor DAVIES (head); Associate Professors O'LEARY, WILSON.

Forest Products: Professor WEST (head); Associate Professor MCKIMMY; Assistant Professor VAN VLIET.

Home Economics Education: Professor DUBOIS (head); Associate Professor MCQUESTEN; Instructor MOE.*

Industrial Education, Industrial Arts Education: Professors Cox (head), SHEELY; Associate Professors AINSWORTH, FRAZIER,* ROBLEY, WILLIAMSON; Assistant Professors HOEYE, JOHNSON (emeritus), SMITH, WILSON*; Instructor LABAUN.*

* Member of graduate faculty on a limited basis.

Institution Management: Associate Professor MULHERN (chairman); Assistant Professor CLEAVELAND.*

Natural Resources: Professors JENSEN (chairman), HIGHSMITH; Associate Professors HEINTZELMAN, MYATT, RUDD.

Science Education: Professors WILLIAMSON (chairman), ANDERSON, LANGTON; Associate Professors FOSTER, KOSKI, MAYSHARK; Assistant Professor FOX.

Statistics: Professors LI (chairman), CALVIN; Associate Professors LINK, PETERSEN.

Veterinary Medicine: Professors DICKINSON (head), MUTH, SHAW (emeritus), VAWTER; Associate Professors BONE, PETERSON; Assistant Professor KNAPP.

Departments Offering Courses Applicable Toward Graduate Minors Only

Business Administration: Professors LEMASTER (chairman), CAMPBELL, CRAIG, GODDARD, MASER, NEWTON, PFANNER, SEATON; Associate Professors EASTON, MENGLER, STRICKLER; Assistant Professor ALLAN.*

Economics: Professors FRIDAY (chairman), NELSON; Assistant Professors HARTER, ORZECH,* PATTERSON.

English: Professors NELSON (head), CHILDS; Associate Professor GROSHONG; Assistant Professor NORRIS.

Extension Methods: Professors MACK, SMITH.

History: Professors ELLISON (head), SMITH; Associate Professor CARLIN; Assistant Professor SHAW.

Industrial Education, Trade and Industrial Education: Professor COX (head); Associate Professor AINSWORTH; Assistant Professor CANNON.

Physical Education: Professors LANGTON (head), ALLMAN, ANDERSON, BERGSTROM, COLEMAN, SEEN; Associate Professors GILL, MILLIKEN, WEIR.*

Political Science: Professors WALTER (chairman), SWYGARD; Associate Professors FUQUAY, MADDOX; Assistant Professor GREEN.

Psychology: Professor CROOKS (chairman); Associate Professors MILLS, ROHDE; Assistant Professors LEWIS, MADDEN,* SIMPSON, VAN LOAN.

Sociology: Professors PLAMBECK (chairman), BAKKUM; Associate Professor PARKS; Assistant Professors CANTRELL, FOSTER.*

Speech: Professor WELLS (chairman); Associate Professors HARRIS, LIVINGSTON; Assistant Professor HILDEBRANDT.

General Statement

ALL STUDY beyond the bachelor's degree at Oregon State University is conducted through the Graduate School. The formulation of departmental graduate programs and the working out and direction of the programs of individual students are responsibilities of the departments, under the general rules or requirements of the Graduate School.

The Graduate School also administers the institutional program for the encouragement of research by members of the faculty through the provision of necessary facilities and through grants-in-aid.

Organization and Administration. The Graduate Faculty consists of the President of OSU, the academic deans, the chairmen of the several departments in which advanced degrees are offered, and other members of the faculty who have been elected to the Graduate Faculty. Formulation and administration of graduate school policies are carried out by the Graduate Council, which is composed of the chairmen of the several School Graduate Committees. Members of the Graduate Faculty are represented through their respective School Graduate Committees, which are made up of representatives from each of the several departments in the school. Members of the Graduate Faculty offer graduate courses, conduct seminars, serve on graduate committees, advise with students on their theses, and serve on preliminary and final examination com-

* Member of graduate faculty on a limited basis.

mittees. The Graduate Council meets on the first and third Thursdays of each month. The dean of the Graduate School is chairman of the Graduate Council and ex-officio member of all graduate committees.

Oregon State University granted its first advanced degree (A.M.) in 1876. In 1897 definite residence requirements for the master's degree were announced. In 1910 graduate study was placed under a standing committee of the faculty. In 1933 all graduate work in the State System of Higher Education was placed in an interinstitutional Graduate Division; graduate work at Oregon State University was placed under immediate charge of an associate dean and an institutional graduate council. The first degrees of Doctor of Philosophy were conferred by Oregon State in 1935. In October 1946, the State Board of Higher Education returned to the institutions direct responsibility for their programs of graduate study, and assigned graduate work at Oregon State to the Graduate School.

The Doctor of Philosophy degree is offered in about 70 fields of study, distributed through 30 departments of instruction. The Doctor of Education degree is offered in General Education and Guidance. Various types of Master's degrees are offered in the same fields as the doctoral and in 18 additional fields in 13 departments of instruction. Minors only on graduate degrees are offered in 7 departments. The departments of instruction are in 9 schools: Science, Agriculture, Business and Technology, Education, Engineering and Industrial Arts, Forestry, Home Economics, Pharmacy, and Humanities and Social Sciences.

Advanced Degrees

Degrees granted, and fields in which programs of study leading to the respective degrees are offered, are listed below:

Doctor of Philosophy: SCIENCE—microbiology and hygiene, botany, chemistry, entomology, general science, genetics, geology, mathematics, oceanography, physics, zoology. AGRICULTURE—agricultural economics, dairy and animal husbandry, farm crops, fisheries, food and dairy technology, genetics, horticulture, poultry husbandry, soils, wildlife management. ENGINEERING—chemical engineering, civil engineering, electrical engineering, industrial engineering, mechanical engineering. FORESTRY—forest management. HOME ECONOMICS—family life and home administration, foods and nutrition. PHARMACY—pharmaceutical chemistry, pharmaceutical science, pharmacognosy, pharmacology.

Doctor of Education: EDUCATION—education, guidance.

Master of Arts (departmental): SCIENCE—microbiology and hygiene, botany, chemistry, entomology, general science, genetics, geology, mathematics, meteorology, natural resources, oceanography, physics, statistics, zoology. EDUCATION—education, guidance, agricultural education, business education, health education, home economics education, industrial arts education, science education. ENGINEERING—agricultural engineering, chemical engineering, civil engineering, electrical engineering, industrial engineering, mechanical engineering, nuclear engineering. HOME ECONOMICS—clothing, textiles, and related arts, family life and home administration, foods and nutrition, institutional management. PHARMACY—pharmaceutical chemistry, pharmaceutical science, pharmacognosy, pharmacology, pharmacy administration.

Master of Agriculture: AGRICULTURE.

Master of Arts in General Studies: see page 308.

Master of Science: SCIENCE—microbiology and hygiene, botany, chemistry, entomology, general science, genetics, geology, mathematics, meteorology, natural resources, oceanography, physics, statistics, zoology. AGRICULTURE—agricultural economics, agricultural engineering, dairy and animal husbandry, farm crops, fisheries, food and dairy technology, genetics, horticulture, poultry husbandry, range management, soils, veterinary medicine, wildlife management. EDUCATION—agricultural education, business education, education, guidance, health education, home economics education, industrial arts education, science education—ENGINEERING—agricultural engineering, chemical engineering, civil engineering, electrical engineering, industrial engineering, mechanical engineering, nuclear engineering. FORESTRY—forest engineering, forest management, forest products. HOME ECONOMICS—clothing, textiles, and related arts, family life and home administration, foods and nutrition, institution management. PHARMACY—pharmaceutical chemistry, pharmaceutical science, pharmacognosy, pharmacology, pharmacy administration.

Master of Education: education, guidance, agricultural education, business education, health education, home economics education, industrial arts education.

Master of Forestry: forest engineering, forest management, forest products.

Master of Home Economics: clothing, textiles, and related arts, family life and home administration, foods and nutrition, general home economics, home economics education, institution management. A major may be selected from among several fields within a department or may involve two or more related departments.

Engineer:

Degree	*Department*
Agricultural Engineer (A.E.)	Agricultural Engineering
Chemical Engineer (Ch.E.)	Chemical Engineering
Civil Engineer (C.E.)	Civil Engineering
Electrical Engineer (E.E.)	Electrical Engineering
Industrial Engineer (I.E.)	Industrial Engineering
Mechanical Engineer (M.E.)	Mechanical Engineering
Metallurgical Engineer (Met.E.)	Mechanical Enginnering
Mining Engineer (Min.E.)	Chemical Engineering

General Regulations

Admission. A student desiring to enter the Graduate School will send (or arrange to have sent) to the Office of Admissions: (1) two completed admission forms; (2) a transcript of all his previous college or university work; (3) a letter indicating the special fields in which he is particularly interested or a statement that he does not wish to become a candidate for a degree; and (4) a small, fairly recent photograph. A grade-point average of 2.50 is required for entrance to the Graduate School. The Admissions Office will determine whether the general conditions for admission have been met. The major and minor departments indicated by the student will examine the material submitted to determine adequacy of scholastic background and to decide whether departmental facilities are adequate for the expressed aims of the student. The recommendations of the departments are reviewed by the graduate office. The student is then notified by the Office of Admissions as to the action taken.

Admission Status. Students may be admitted to the Graduate School under the following categories:

1. REGULAR GRADUATE STUDENTS. Those who have met the academic requirements.
   a. *Classified.* Those who have been accepted by a major department to work toward an advanced degree.
   b. *Unclassified.* Those who have graduated from an accredited institution but have not declared a major, or those who want to work toward certification for teaching or other professional work. These students may become degree candidates later, if accepted by a department.

2. CONDITIONALLY ACCEPTED GRADUATE STUDENTS.
   a. *Provisional graduate students.*
      (1) Students from nonaccredited institutions must complete at least one term of satisfactory work at Oregon State, after which they may be admitted with full standing in the Graduate School and allowed graduate credit for courses they have completed acceptably while registered as provisional students.
      (2) Students whose preparation does not warrant full admission to the Graduate School but who may prove acceptable later. These students may have less than 2.50 GPA as undergraduates but have improved during the course of their work and have done acceptable work in their major field. If at the end of two quarters of work they fail to show promise as graduate students they will be asked to terminate their work.
   b. *Nondegree students.* Students rejected as full graduate students because of poor undergraduate records and a lack of promise for graduate work. Students who are working toward teacher certification but who have less than 2.50 GPA may be admitted to this category. As a condition to admission the student shall sign a statement that he understands that while work completed under this category may not be used for a graduate degree, it may be used as a basis for reapplication for admission to the Graduate School.

Reserving Credits. Graduate credit is not granted for undergraduate courses taken in excess of the requirements for a baccalaureate degree, but undergraduate students, taking graduate courses in excess of baccalaureate requirements may have such credits reserved for possible future use under the following conditions: (a) Only credits with A or B grades, earned within 45 hours of graduation, may be reserved for graduate credit. (b) Request for reservation must be made early in the term in which the student completes baccalaureate requirements. (c) A maximum of 18 hours may be reserved for graduate credit. (d) Before more than 15 term hours of credit are earned, the student must select a graduate major and minor, pass qualifying examinations, be assigned a major professor, and formulate an approved graduate program. (e) A minimum of two terms of residence in the Graduate School is required regardless of the number of credits reserved.

Qualifying Examinations. Graduate students working for advanced degrees are required to take an examination in their major and minor fields designed to determine their weaknesses, deficiencies, and overall preparation and background. This examination is in effect a guidance examination, the results of which are used in setting up the graduate study program. Poor show-

ing in any of the areas tested may result in the student's taking undergraduate courses without graduate credit in order to give him the necessary background to go on with his graduate program. The examination may be oral or written, or both, and must be taken during the first term of his graduate enrollment, preferably during New Student Week, but not later than one month after the beginning of the term. In lieu of their own qualifying examination, departments may accept a satisfactory showing in the Graduate Record Examination or some other standard test.

A graduate of OSU who has maintained a grade-point average in major and minor fields of at least 3.25 throughout his undergraduate work may be exempted from taking the qualifying examination.

A student working toward the doctoral degree who has received his master's degree at Oregon State not more than three years before beginning doctoral work is not required to take the qualifying examinations unless his major has been changed. He is required, however, to take examinations in additional minors.

Preparation Required. Preparation for a graduate major must be an undergraduate major in the same subject, or a fair equivalent. Preparation for a graduate minor must be at least a one-year sequence of upper division work in addition to foundational courses in the subject. Graduate credit may not be earned in courses for which the student does not show proper preparation by previous record or special examination.

Term Credit Load. The normal load for a graduate student devoting all of his time to graduate study is 15 term hours (including course work and thesis.) The maximum load is 16 term hours (17 term hours on petition). For assistants and fellows the maximum load is 12 term hours; for part-time assistants and fellows the maximum load is 15 term hours. A graduate student using campus space and facilities and/or under supervision of a major professor must register for a minimum of two hours.

Grade Requirement. A 3.00 (B) grade-point average is required in both major and minor (s). Grades below C are not acceptable.

Graduate Courses. All courses numbered in the 500s carry graduate credit, as do those in the 400s which have been approved by the Graduate Council. Approved courses in the 400s are designated in the catalog by (G) or (g) following the course title. Courses designated (G) may form a part of either a major or minor; courses designated (g) may be taken toward a minor only. Blanket numbers 501, 503, 505, and 507 may be used repeatedly. Number 503 covers the thesis, both the research and the writing. Although thesis credit may be registered each term, the thesis grade is not given until the dissertation is presented at the final oral examination. 501 is for research which is not part of the thesis, and data obtained from such research should not be incorporated in the thesis. Reading and Conference 505 is used for special work not given under a formal course number. It may include specified reading, laboratory work, field work, or compilation of information essential in the student's program. The work done under this number may be reported either in writing or orally to the instructor concerned. Seminar 507 is used both for departmental seminars and for special work not given in a formal course where several students are concerned.

Petitions. A student who wishes to deviate from the normal graduate school regulations and procedures may present his problem in a letter addressed to the Graduate Council signed by himself and his major professor. The Grad-

uate Council will consider the petition at its next meeting and the student will be advised of the Council's decision. Action taken on petitions will not be considered as a precedent for any future action.

Application for Degree. Students expecting to complete requirements for advanced degrees should apply for graduation at the Registrar's Office not later than the first week of the winter term preceding Commencement. Students in residence spring term are required to attend Commencement. Students completing requirements previous to the spring term, who cannot attend Commencement, must petition the Academic Requirements Committee to receive their degrees in absentia.

Graduate Fees. Graduate students registered for 7 term hours of work or more pay tuition and fees of $90 a term. Graduate students do not pay the nonresident fee. Students holding graduate or research assistantships or fellowships pay fees totaling $34 per term. Graduate students registering for 6 hours of work or less pay the regular part-time fee. Payment of the fee entitles the student to all services maintained by OSU for the benefit of students.

Deposits. Persons who enroll for academic credit (except staff members) must make a deposit of $10 payable once each year at the time of first registration. This is required as a protection against loss or damage of institutional property such as dormitory equipment, laboratory equipment, military uniforms, library books, locker keys. If at any time charges against this deposit become excessive, the student may be called upon to reestablish the original amount.

Microfilming. All doctoral candidates pay a fee of $20 for microfilming of the doctoral dissertation.

Graduate Work by Staff Members. Staff members of Oregon State University holding rank above that of instructor cannot receive advanced degrees from Oregon State. Full-time staff members may register normally for not more than 3 hours per term. As many as 5 hours may be permitted provided registration is not for more than one course. Approval for registration must be obtained from the Executive Office.

Degree Programs

Master of Arts and Master of Science

Credit Requirement. For the departmental Master of Arts or Master of Science degree, the student must complete a program of study totaling not less than 45 term hours in courses approved for graduate credit. Approximately two-thirds of the work (30 term hours) must be in the major and one-third (15 term hours) in the minor. No correspondence credits may be included. A maximum of 6 of the 45 term hours may be earned under "in absentia" registration, but no thesis credit may be thus registered.

Residence Requirements. The residence requirement for the M.A. and M.S. degrees is one academic year or fair equivalent. A maximum of 15 term hours earned in graduate courses in the General Extension Division of the Oregon State System of Higher Education or at the University of Oregon may be counted as credit earned in residence toward the departmental master's degree. If adequate course offerings are available, all the work toward the Master of Arts (General Studies) degree may be earned at the Portland Center.

Transferred Credit. A maximum of 15 term hours of graduate work done at another accredited institution, or in the General Extension Division of

the Oregon State System of Higher Education, may be transferred, provided that: (1) the work fits into a logical program for the degree; (2) the transfer is approved by the department and by the Graduate Council; (3) grades of A or B have been earned. Credit granted for work done at another institution is tentative until validated by work in residence.

Language Requirements. For the Master of Arts degree, the student must show by examination or by adequate undergraduate courses (not less than two years), a reading knowledge of one foreign language, preferably French or German. By petition to the Graduate Council, *before* any language examination is taken, a student may be permitted to substitute another language, if it is equally relevant to his program of graduate studies. A candidate for a master's degree who passes the regular reading-knowledge examination need not repeat such examination if he proceeds toward his doctorate within a reasonable time. For a Master of Science degree there is no foreign-language requirement, unless a language is needed in the individual student's program.

Graduate Study Program. As soon as feasible a study program for the master's degree should be filed in the Graduate Office. The program is worked out under the guidance of the major and minor professors, entered on the card for that purpose, and signed by the major and minor professors and the chairman of the school graduate committee before filing in the Graduate Office. The master's degree program should be filed during first term of student's residence.

Time Limit. All work counted toward the master's degree (including work for which credit is transferred from another institution, the thesis, and the final examination) should be completed within a period of seven years, but work taken between seven and ten years before the program is completed may be validated under the supervision of the department, usually by assigned readings or examination or both.

Thesis. A copy of the thesis in final form must be presented to the Graduate Office for collating at least one week prior to the final examination. Copies of the thesis and abstract are then distributed to members of the examining committee. After the examination the original and the first carbon copy (Library copies) and three copies of the abstract are deposited unbound in the Graduate Office, and the second carbon copy and an abstract with the major department. The student must obtain on the thesis approval page the signatures of major professor, head of major department, chairman of school graduate committee, and dean of Graduate School. Information on prescribed style for thesis may be obtained at the Graduate School office.

Credit allowed for the thesis, including research and preparation of the manuscript, varies from 6 to 12 term hours. A Master of Science degree with a major in General Science is offered either with or without thesis.

Final Examination. A final oral examination of not less than two hours is required of every candidate for the master's degree; when deemed desirable a written examination may also be required. (For the master's degree, the examining committee consists of at least four members of the faculty, two in the student's major field, one in the minor field, and one in a field not directly connected with the candidate's studies.)

The examining committee is nominated by the student's adviser, subject to the approval of the dean of the Graduate School, who is ex officio a member of all examining committees.

Other Master's Degrees

Master of Agriculture. The program for the Master of Agriculture degree provides a broader training in several fields for high school agriculture teachers, veterans' instructors, extension workers, and other professional agricultural workers who do not desire the specialized training of the departmental degree and the thesis based on research. Forty-five hours are required, with a minimum of 9 hours in each of at least three agricultural fields. From these departments an advisory committee is chosen which will select the major professor from the department of the student's major interest. The program must be approved by the committee within three weeks after registration under this program. No thesis is required, but a paper requiring from 3 to 5 term hours of work must be submitted. The general requirements, except for those relating to the thesis and written report, are the same as for the Master of Science degree.

Master of Arts (General Studies). In addition to the regular Master of Arts (departmental) degree, Oregon State offers the degree of Master of Arts (General Studies) in the fields in which graduate work is allocated to the institution. This degree is granted for achievement in cultural scholarship, not for specialized work in one of the traditional fields of learning. The student pursues a program of study selected from the offerings of several departments. The requirements are flexible, but the work must be integrated and organic. The student's thesis provides the focus which determines the selection of courses.

The credit requirement for this degree is 45 term hours, including credit for thesis. The thesis shall be the equivalent, in point of performance, of 9 term hours of course work. A committee may, on recommendation of the student's adviser, waive the foreign-language requirement.

Master of Education. The Master of Education is a professional degree, and satisfactory teaching experience is required. For the degree a minimum of 45 term hours in graduate courses must be completed; additional hours may be required depending on the needs and the undergraduate preparation of the candidate. Liberal provision is made for the earning of credits through the General Extension Division, but a minimum of 12 term hours of academic work (not thesis or field studies) must be earned on the Corvallis campus in one Summer Session.

The candidate must qualify under one of the following plans: (a) He submits a thesis, which meets all standards for a master's thesis, on some applied or professional aspect of education. For the thesis he receives 6 term hours of credit. (b) He majors in guidance and completes 30 hours in this area, including 18 hours in prescribed courses. The other 12 hours are set up with a choice between two or three subjects. A minor of 15 hours in psychology is required with at least 6 hours in the field of psychological tests and testing. (c) He completes 45 term hours with 24 term hours in specific courses. No thesis or field studies are required. The remaining 21 hours are elective under the direction of the adviser. In addition to the final oral examination, a written comprehensive examination is required in the candidate's major field.

Under Plan C are offered Industrial Arts Education, Business Education, and Health Education majors which deviate from the requirements above in that they consist of a minimum of 30 hours in the respective fields with a minor of 15 hours in general education integrated around Research Procedures in Education and a sequence of not less than 9 hours in administration, guidance and counseling, or curriculum construction. In each case a minimum of 45 hours is required.

Master of Forestry. The professional Master of Forestry degree is intended for potential administrators and technologists in public and private organizations where men of broad ability are demanded. A minimum of 45 hours is required. Two optional plans of study are as follows: (a) Thirty hours, including 6 to 12 for a thesis, are to be within a chosen field in the School of Forestry. The remaining 15 hours may be a minor in forestry or in other related departments. The thesis may be based on findings of a research investigation, or on the application of technical knowledge for solution of a practical problem. (b) This is intended to provide a broader technical training. At least 21 hours are to be selected within a major field of forestry, and as many as 24 hours may be elected from other departments in the School of Forestry or from other related fields outside of forestry. The electives must contribute to a unified program which will meet the specific objective of the student. A thesis is not required under this plan, but at least two technical reports, correlated with courses in the major fields or assigned or approved topics, must be submitted.

Master of Home Economics. The Master of Home Economics is a professional degree which may be of interest primarily to high school teachers and extension personnel. A major is offered in general home economics and also in each of the departments of the School of Home Economics. A minor is required, to be selected from offerings in the School of Home Economics or from other schools and departments according to the student's needs.

A thesis is not required but at least one written report requiring reading, analysis, criticism, and organization of material shall be prepared and submitted to the Graduate Council and then filed with the department concerned.

The general requirements, except for those relating to the thesis and written report, are the same as for the Master of Science degree.

Engineer

For the degrees of Agricultural Engineer, Chemical Engineer, Civil Engineer, Electrical Engineer, Industrial Engineer, Mechanical Engineer, Metallurgical Engineer, and Mining Engineer, the candidate must meet one of the following sets of requirements:

(1) Those who hold a baccalaureate or master's degree from Oregon State University must have at least five years of successful professional practice following graduation. Graduate study, by Extension or otherwise, may be substituted for professional practice to a maximum of three years, and at the approximate rate of 12 term hours of graduate credit in lieu of each year of professional practice. No thesis credit will be permitted in such substitution, but the candidate must present a satisfactory thesis upon a subject of his professional experience and compatible with the designation of the degree.

(2) Those who do not hold baccalaureate or master's degrees from Oregon State University are subject to the same requirements as (1) with the additional stipulation that at least 12 term hours of graduate work must be completed in residence upon the Oregon State campus.

In both cases, on or before January 1 of the academic year in which the degree is desired, the candidate submits to the chairman of the appropriate department a complete statement of his professional experience and graduate academic credit since receipt of his last degree. Accompanying the statement should be a thesis title and sufficient description or outline of thesis content to provide a basis of evaluation. After the statement has been approved by the chairman of the department, the School Graduate Committee, and the Graduate Council, the candidate is instructed to prepare and submit his thesis. The

thesis must be of high order and is subject to the same scrutiny and regulations as other graduate theses. Upon acceptance of the thesis, the candidate is recommended for the degree in the usual manner. The candidate registers for the degree with the Registrar, either in person or by mail, not later than March 1.

Doctor of Philosophy

General Requirements. The degree of Doctor of Philosophy is granted primarily for attainments and proved ability. There is no rigid credit requirement. It is the policy of the institution not to accept as a candidate for the Ph.D. degree any student whose academic training, both undergraduate and graduate, has been exclusively at Oregon State University.

Graduate Study Program. The study program should be filed in the Graduate Office during the first term of residence after the student completes a master's degree at Oregon State, or during the second term if he enters from another school with a master's degree. A minimum of 45 hours of course work must be completed after approval of the Ph.D. program. The doctoral program consists of a major and two minors. If the major department offers several distinct areas of study, one minor may be in that department, subject to approval of the graduate dean. The study program is formulated under the guidance of the student's doctoral committee, composed of two advisers from the major, one from each of the minors, and the graduate dean or his representative. The committee is approved by the graduate dean. Approximately sixty percent of the program is devoted to the major including the thesis, and forty percent to the minors. After the program has been accepted by the committee it is submitted to the Graduate Council and, if approved, it becomes the obligation of the student to complete the requirements as set up. In order to change the program in any way, approval of such changes must be obtained from the major and minor departments, the chairman of the School Graduate Committee, and the graduate dean. For College Teaching Minor see page 312.

Residence. For the doctor's degree, at least three years of full-time work beyond the bachelor's degree or two beyond the master's degree are required, of which at least one year (usually the last) must be spent in residence at OSU.

Language Requirements. For the Doctor of Philosophy degree, a reading knowledge of French and German must be demonstrated by a formal examination in each language. These examinations should be taken as early as possible after the beginning of graduate work, and must be passed before the preliminary examinations may be taken. By petition to the Graduate Council, *before* any language examination is taken, a student may be permitted to substitute another language if it is equally relevant to his program of graduate studies. If a foreign student is permitted to use his native language, he must take a written examination to demonstrate his ability in translating it into English.

Preliminary Examinations. The student working toward the doctor's degree must pass a group of comprehensive preliminary examinations (at least partly oral) in his major and minor subjects not less than two terms before he takes the final examination. Advancement to candidacy is contingent on passing these preliminary examinations.

Thesis. Every candidate for the degree of Doctor of Philosophy must submit a thesis embodying the results of research, and giving evidence of

originality and ability in independent investigation. The thesis must be a real contribution to knowledge, based on the candidate's own investigation. It must show a mastery of the literature of the subject, and be written in creditable literary form. It is expected that the preparation of an acceptable thesis will require at least the greater part of an academic year.

An abstract of the doctoral thesis of not more than 600 words will be published by University Microfilms in *Dissertation Abstracts.*

Regulations concerning the doctoral dissertation are the same as those for the master's degree, as outlined on a previous page, except that final draft must be presented to Graduate Office at least **two weeks prior** to final examination.

Microfilming Fee. Candidates for the Doctor of Philosophy and Doctor of Education degrees pay a fee of $20 for microfilming of the thesis in its entirety by University Microfilms. This includes publication of the doctoral abstract in *Dissertation Abstracts* by the same agency.

Final Examination. The final examination for the degree of Doctor of Philosophy may be written in part, but must include an oral examination of at least two hours' duration. The oral examination is open to all members of the faculty and to advanced graduate students. Date of the oral examination is publicly announced at least one week before it is held. The examining committee consists of the candidate's advisory committee, including at least one not directly connected with the major and minor departments. Additional members may be appointed by the major professor, with the approval of the graduate dean. Unanimous vote is necessary for approval of the thesis.

In the oral examination the candidate is expected to defend his thesis and to show a satisfactory knowledge of his major and minor fields. The written examination, if given, is expected to cover aspects of the major and minor fields with which the thesis is not directly concerned.

The final oral examination must be taken within five years after the preliminary examination, or the candidate will be required to take another preliminary examination.

Doctor of Education

For the degree of Doctor of Education, procedures and requirements in respect to residence, preliminary and final examinations, and thesis are similar to those for the Doctor of Philosophy degree. Successful teaching experience is essential. A minimum of two years of teaching at either the elementary or secondary level is a requirement. The credit requirement is flexible, but the total number of term hours of graduate credit including thesis must approximate 135.

Along with the educational major, one minor in the field of education and one minor in a field of study outside the School of Education are required. The College Teaching Minor will not be accepted if the other minor is in education. Foreign languages are required if necessary in the dissertation problem.

Genetics

A program for a major or minor in genetics is offered for the master's and doctor's degrees. Opportunity for specialization in pure and applied genetics is offered in the Schools of Science and Agriculture. The course work is drawn from the biological departments of these schools. The genetics program is designed to acquaint the student in all the principal phases of genetics, and at

the same time permit him to emphasize his research interests in this field. All graduate study in genetics is coordinated through a special committee nominated by the deans of Science and Agriculture and approved by the dean of the Graduate School. The seminar listed below helps unify all genetic studies.

Graduate Courses

Gen 503. **Thesis.** Terms and hours to be arranged.

Gen 507. **Seminar.** Terms and hours to be arranged.

General Studies

The General-Studies program at Oregon State University is supervised by a special committee of which Dr. E. A. Yunker is chairman. In addition to courses chosen from the offerings of the several schools and departments, the following courses are available for the general-studies student.

GSt 501. **Research.** Terms and hours to be arranged.

GSt 503. **Thesis.** Terms and hours to be arranged.

GSt 505. **Reading and Conference.** Terms and hours to be arranged.

Studies in College and University Teaching and Curriculum

Most persons who qualify for master's and doctor's degrees engage in college and university teaching as part of their professional work. The Graduate School prepares students for college and university teaching as well as for research. It offers a group of courses dealing with the philosophy, functions, and structure of higher education and problems of teaching, curriculum development, and student-faculty relationships. In all these courses, students have opportunity to delve into topics of special interest.

Maturity, background, and sincerity of purpose are the principal requisites. There are no course prerequisites in professional education. The program is not planned to fulfill requirements for a teaching credential in any state, although it may be supplemented with additional work to serve this purpose. The coordinator for studies in College and University Teaching and Curriculum is Professor Delmer M. Goode, Curriculum Consultant.

Graduate Minor in College Teaching. A minor in college and university teaching (15-18 term hours for a master's degree, 21-24 term hours for a doctor's degree) may be taken in conjunction with a subject-matter major. The core program, all of which is required for the teaching minor for a master's degree, consists of the following courses:

Ed 556. The College Student. 3 hours.
Ed 557. College and University Teaching. 3 hours.
Ed 558. American Higher Education. 3 hours.
..... 507. Seminar (Teaching Procedures). 3 hours.
(Registration in major departments. By special arrangement, registration may be in CC 507. Ed 557 and either Ed 556 or Ed 558 are prerequisite.)
CC 506. College Teaching Studies. 3 hours.

For doctoral candidates, additional electives are chosen in appropriate areas to form an integrated program in college teaching.

Studies in Teaching and Curriculum. Studies or projects in curriculum development and improvement of teaching may be engaged in by individuals or faculty groups. Graduate students are encouraged to join these studies since the association of college teachers with students interested in curriculum and teaching is of mutual advantage.

Credit may be earned in the courses listed below. Whenever the nature of the work warrants, credit so earned may be applied toward a graduate major or minor in a department.

Graduate Courses

CC 505. **Reading and Conference.** Terms and hours to be arranged.

CC 506. **College Teaching Studies.** 3 hours any term.
Reading, conference, and preparation of written reports related to, but distinct from, a teaching assignment at college level. Ordinarily no credit is given for the teaching itself. Open to graduate students who have teaching assignments concurrent with the course. Special arrangements may be made for those who have already taught in college or university. Prerequisite: Ed 556,557,558.

CC 507. **Seminar.** Terms and hours to be arranged.

CC 508. **Workshop.** Terms and hours to be arranged.

CC 509. **College Curriculum Studies.** Terms and hours to be arranged.
Joint study with staff assistance in any aspect of college curriculum, including problems of teaching, guidance, and coordination. Seminar or workshop procedures are used according to aims of group.

Graduate Appointments and Fellowships

A varying number of graduate and research assistantships and fellowships are awarded annually to graduates of accredited universities and colleges who have superior records in their undergraduate work. All persons holding these appointments are expected to register in the Graduate School and to become candidates for advanced degrees. Assistants and fellows who render service to the institution through teaching duties or research pay fees amounting to $34 per term, which admit them to all services maintained by the college for the benefit of students. Assistants and fellows in this category may carry a maximum of 12 hours per term. Other types of fellows who render no service to the institution pay the full fee of $90 and are permitted to carry a full graduate load of 16 hours.

Graduate Assistantships. A graduate assistant renders services amounting to not more than 15 hours a week—reading papers, handling laboratory and quiz sections, etc. He is permitted to enroll for a maximum of 12 term hours of course work. A graduate assistant commonly completes the work for a master's degree in four terms. The stipend varies from $1,600 to $2,000.

Research Assistantships. A research assistant aids a faculty member in carrying on a research project. Compensation and enrollment limitations are the same as for a graduate assistant.

Teaching and Research Fellowships. A fellow is normally a person proceeding toward the doctorate, with at least one year of markedly superior work toward that degree completed. The teaching fellow gives instructional assistance in his department. The duties of a research fellow are similar to the duties of a research assistant; a fellow is, however, expected to assume

greater responsibility in connection with the research project to which he is assigned. Fellows are allowed to enroll for a maximum of 12 term hours of course work. The stipend varies from $2,000 to $2,200.

Agricultural Experiment Station Graduate Research Assistantships and Fellowships. Appointees are usually required to devote the equivalent of one-half time on approved Experiment Station projects; they normally spend two years on the Master of Science degree. The stipend, based on training, ability, and experience, varies from $2,000 to $3,240 for 12 months.

State Scholarships. A limited number of scholarships covering tuition and laboratory and course fees are available to graduate students. All applicants, to be eligible, must be in need of financial assistance, and must show evidence of superior scholarship. Application should be made to the Registrar of Oregon State University, on official blanks furnished by his office, and must be filed before March 1.

Other Fellowships. The following fellowships are open to Oregon State graduate students:

CROWN ZELLERBACH FOUNDATION FELLOWSHIP: $2,000 for a student in chemistry, with $500 to department to cover research expenses.

DOW CHEMICAL COMPANY FELLOWSHIP: $1,800 to $2,500 provided by the Dow Chemical Company for graduate fellowships in chemical engineering; a senior may be selected.

DU PONT POSTGRADUATE TEACHING ASSISTANTSHIP IN CHEMISTRY: $1,200 plus fees, provided by the E. I. du Pont de Nemours Company for a graduate student in chemistry.

EVANS PRODUCTS COMPANY: $1,500 for a fellowship in forest products.

GREELEY FELLOWSHIP: $1,000 a year provided by the Industrial Forestry Association for a fellowship or lectureship in forestry in memory of the late Colonel W. B. Greeley.

HYSLOP AGRICULTURAL RESEARCH FELLOWSHIP: $1,000 a year for research in farm crops in memory of Professor George R. Hyslop.

JOHNSON RESEARCH FELLOWSHIP: Income from a trust fund left by the late Robert Johnson, placed with First National Bank of Portland, to graduate student for study, research, and investigation in agricultural economics and allied fields. Current income about $3,000 annually.

MARY J. L. MCDONALD FELLOWSHIPS IN FORESTRY: Annual grants of $700 to $1,000 each to assist graduate students in forestry.

SHELL OIL COMPANY FELLOWSHIP: $1,800 plus fees provided by Fellowship Committee of the Shell Oil Company Foundation for student in mechanical engineering.

SOUTH SANTIAM EDUCATIONAL AND RESEARCH PROJECT FELLOWSHIPS: Two $2,000 fellowships for students in forest management provided by the Lewis W. and Maud Hill Foundation.

STANDARD OIL COMPANY OF CALIFORNIA GRADUATE FELLOWSHIP: A minimum of $1,800 plus fees provided by the Standard Oil Company of California, for a graduate student in mechanical engineering.

STAUFFER FELLOWSHIP: $1,800 for the recipient plus laboratory fees of $200 provided by the Stauffer Chemical Company in support of research in chemistry.

THE TEXACO INC. FELLOWSHIP IN CHEMICAL ENGINEERING: $2,700 to $3,000 provided by Texaco Inc. for a graduate research fellowship established during the 1959-60 school year.

U. S. BUREAU OF MINES RESEARCH FELLOWSHIPS: Stipends in chemistry, physics, geology, and engineering for research at the Albany, Oregon, plant. Master's degree candidates devote one year to research, doctoral candidates two years. Compensation based on up to 50% of GS-5 and GS-7 pay categories. Fellows may carry the normal fellowship load of classwork.

UNITED STATES PLYWOOD CORPORATION: $1,000 for a fellowship in forestry.

WEYERHAEUSER FELLOWSHIPS IN FOREST MANAGEMENT: Two $2,000 fellowships provided by The Weyerhaeuser Timber Foundation, for graduate study and research in forest management.

WILDLIFE FELLOWSHIPS: Grants of $1,500 per year plus quarters and travel expenses for two-year periods provided by Oregon Cooperative Wildlife Research Unit and other wildlife agencies for graduate students who show aptitude for careers in wildlife conservation and management.

RESEARCH GRANTS: Various departments of the School of Science and other reesarch organizations on the campus, including the Engineering Experiment Station and Agricultural Experiment Station, annually receive grants from Federal and State agencies, foundations, and private companies for research projects. Many of these grants include stipends for graduate students. Application should be made through the department concerned.

THE SCIENCE RESEARCH INSTITUTE has available a number of fellowships and grants ranging in value from $2,200 to $3,600 for research in biochemistry. Funds for these grants come from such companies and organizations as the National Science Foundation, Atomic Energy Commission, Office of Naval Research, U. S. Public Health Service, Army Chemical Corps, Army Signal Corps, U. S. Department of Agriculture, American Heart Association, Nutrition Foundation, Life Insurance Medical Research Fund, and American Cancer Society.

Graduate Work at the Portland Extension Center

If adequate course offerings are available for an integrated program in the fields in which the student wishes to work, he may complete all the requirements for the Master of Arts (General Studies) degree at Portland Extension Center. Of the 45 term hours of work required for the Master of Education degree, 33 hours may be earned in Portland. In a number of fields, one-third of the work for the Master of Arts (departmental) or the Master of Science degree may be earned in Portland. Graduate work beyond the master's degree is not offered at the Portland Center. Graduate degrees, earned at the Portland Center are awarded by Oregon State or the University of Oregon according to major subject, in harmony with the allocation of curricula and degrees.

Graduate Work at Los Alamos and Richland

Arrangements have been made whereby a very restricted number of students may complete theses for the Ph.D. degree at Los Alamos, New Mexico.

Oregon State University is one of four northwestern universities cooperating with the University of Washington Center for Graduate Study at Hanford, which is located in Richland, Washington. Employees of the General Electric Company at the Hanford Atomic Products Operation, who are qualified, may earn graduate credits toward advanced degrees at Richland.

In addition to the departmental majors, a major in nuclear engineering will be offered. The minimum residence requirement at Corvallis is one term for a master's degree and two terms for a doctor's degree.

The studies pursued at Richland vary for different students and fields but are subject to approval in each case by the Graduate Council. A plan is followed whereby the course number 509 is used, preceded by the appropriate departmental designation, followed by the name "Richland Studies" with the title of the particular study placed in parentheses.

Graduate Courses

Ch 509. **Richland Studies.** Terms and hours to be arranged.

ChE 509. **Richland Studies.** Terms and hours to be arranged.

EE 509. **Richland Studies.** Terms and hours to be arranged.

ME 509. **Richland Studies.** Terms and hours to be arranged.

Mth 509. **Richland Studies.** Terms and hours to be arranged.

Ph 509. **Richland Studies.** Terms and hours to be arranged.

Research

ADVANCEMENT of human knowledge and technical and technological service to the commonwealth are recognized functions of institutions of higher learning. Advancement of knowledge through research at Oregon State University is encouraged and assisted by several institutional agencies, including the General Research Fund and the institutes and stations listed in this section.

General Research

General Research includes faculty research, especially of a fundamental nature, that does not fall into the organized and directed programs of other research agencies. The Graduate Council prepares and submits annually a budget for the support of general research and is authorized to receive, examine, and act upon requests for grants-in-aid from the funds allowed. The school graduate committees are advisory bodies, assisting in the examination and evaluation of projects for which funds are requested. Applications are received from individual staff members, or groups, of the rank of instructor or higher. Grants-in-aid are awarded for problems that give promise of results of general significance to learning. Grants supply apparatus, equipment, certain supplies, wages for some types of assistance, and if the project has advanced sufficiently, a part-time or full-time research assistantship or fellowship. Grants are not intended to provide data for theses leading to advanced degrees, or subject matter for a specific course, or information of restricted though useful nature for administrative functions. Each recipient of a grant is required to present a written progress report to the Dean of the Graduate School on June 1 each year. Projects may be renewed for several years.

Agricultural Experiment Station

FREDERICK EARL PRICE, B.S., Director of the Agricultural Experiment Station.
WALTER F. MCCULLOCH, Ed.D., Associate Director in Charge, Forest Research Division.
GEORGE H. BARNES, Ph.D., Assistant Director, Forest Research Division.
ROBERT W. HENDERSON, Ph.D., Assistant Director in Charge, Agricultural Research Division.
ROBERT M. ALEXANDER, M.A., Assistant Director.
RALPH A. SOLUM, Fiscal Officer.

The Oregon Agricultural Experiment Station was organized July 1, 1888, in accordance with the Hatch Act of 1887. It now includes a central station at Corvallis and thirteen branch stations so located as to cover the varying agricultural conditions of Oregon. It investigates problems in agriculture, home economics, and forestry; its general objectives follow: (1) Conservation and efficient use of the State's natural resources including soil, water, fish, wildlife, forest, and ranges and their integrated management to provide the greatest public good. (2) Increasing efficiency of agricultural and forest production. (3) Improving the processing, distribution, and marketing of products of agriculture and forestry. (4) Testing and developing new crops and new uses for old crops as a means of reducing crop surpluses. (5) Collecting and analyzing basic information needed in development of comprehensive agricultural and forestry programs and policies. (6) Advancement of human well-being through research in selection, preparation, and preservation of food,

determination of human nutrition requirements, and role of food in maintaining optimal health and selection, construction, and care of clothing and household fabrics.

Central Station: The Agricultural Research Division of the Station includes the following research departments: Agricultural Chemistry; Agricultural Economics; Agricultural Engineering; Agricultural Information; Microbiology; Botany and Plant Pathology; Dairy and Animal Husbandry; Entomology; Farm Crops; Fish and Game Management; Food and Dairy Technology; Home Economics; Horticulture; Poultry Husbandry; Soils; Statistics; and Veterinary Medicine. In the Forest Research Division work is underway in various phases of forest production and management.

The Station cooperates with the U. S. Department of Agriculture, the U. S. Department of the Interior, other Federal and State agencies, and the counties in which the branch stations are located. A number of Federal scientists are located in Oregon working on problems of a regional nature.

The John Jacob Astor Branch Experiment Station at Astoria has as its major problems of investigation: dairy and beef cattle production in the Coastal Area; the improvement of forage crops through variety testing; pasture management; soil fertility and management for Coast conditions; testing of small fruits and specialty horticultural crops.

The Central Oregon Branch Experiment Station located at Redmond conducts research on general farming problems in Crook, Deschutes, and Jefferson Counties. Current emphasis is on problems related to production of potatoes, seed crops, cereals, and hay. All research is conducted on privately owned land under cooperative agreements with the owners.

The Eastern Oregon Branch Experiment Station at Union has research projects with both farm flock sheep and commercial beef cattle production, conservation and improvement of timbered and open ranges in the higher rainfall areas in eastern Oregon, and soil fertility and crop varietal testing in northeastern Oregon. The Station has a section of valley floor land and a 2,000-acre tract of summer range.

The Klamath Branch Experiment Station consists of two experimental tracts, one located southeast of Klamath Falls on mineral soil and the other located south of Klamath Falls on muck soil. In addition to research in reclamation of problem soils in this irrigated district this experimental area is engaged in research on production problems with potatoes, cereals, and forage crops in the Klamath Basin.

The Malheur Branch Experiment Station research program near Ontario is aimed at finding the best methods of crop production and the crops and crop varieties best suited to the areas of the Vale-Owyhee irrigation project. Major emphasis is given to studies of production and utilization of forage crops for livestock. The U. S. Department of Agriculture cooperates actively with the State in certain phases of the program.

The Mid-Columbia Branch Experiment Station, with facilities at Hood River and The Dalles, deals with orchard pests, diseases, irrigation, soil management, plant nutrition, post-harvest investigations, and other problems relating to commercial fruit production in the important orchard section of Hood River and Wasco Counties.

The North Willamette Branch Experiment Station is near Aurora in Clackamas County. Research is directed toward horticultural problems in Clackamas, Multnomah, Columbia, and Washington Counties. Problems of vegetable, small fruit, bulb, florist, and nursery crop production receive major emphasis.

The Pendleton Branch Experiment Station is situated in the heart of an important wheat and pea production area. In cooperation with the U. S. Department of Agriculture it has concentrated on the development of improved wheat varieties and crop practices, including crop rotation, weed eradication, and control of soil erosion.

The Red Soils Branch Experiment Station near Oregon City is centering attention on rebuilding depleted red hill soils, of which there are approximately 800,000 acres in the Willamette Valley. Utilization of grasses and legumes for seed production and forage has been emphasized in the station's research program.

The Sherman Branch Experiment Station at Moro is conducting investigations on the major problems of cereal production under eastern Oregon dryland conditions with special reference to the development of new and improved varieties, rates and dates of seeding, summer fallow, fertility, and soil conservation.

The Southern Oregon Branch Station at Medford is centering attention on problems of horticultural and field production for the southern Oregon area. Research is underway on nutrition and fertilizer responses, irrigation, weed control, disease and insect control for the important field and horticultural crops of the area. Breeding and varietal testing of new pear and stone fruits selections and varieties are in progress.

The Squaw Butte-Harney Branch Experiment Station near Burns consists of 16,000 acres of sagebrush-bunchgrass and semiarid rangeland and 661 acres of native flood meadowland. Research is under way in range improvement and management, increasing yield and quality of native meadows for winter feed, and improving livestock production through better nutrition, breeding, and management. The station's combination of range and meadowland makes a typical southeastern Oregon livestock unit and provides feed resources for the station-owned herd for the entire year. The research program is conducted jointly with the United States Department of Agriculture.

The Umatilla Branch Experiment Station at Hermiston is studying production problems of crops under irrigation on the Umatilla Reclamation Project, and similar lands of the Columbia River Basin. The station is cooperating with the Central Station in a swine testing program.

Engineering Experiment Station

Administrative Officers

JOHN REESE RICHARDS, Ph.D., Chancellor, Oregon State System of Higher Education.
AUGUST LEROY STRAND, Ph.D., President, Oregon State University.
GEORGE WALTER GLEESON, Ch.E., Dean, School of Engineering, and Director, Engineering Experiment Station.
JAMES GEORGE KNUDSEN, Ph.D., Assistant Dean, School of Engineering, in charge, Engineering Experiment Station.
JAMES KENNETH MUNFORD, Ed.D., Director of Publications.

Station Staff

ARTHUR LEMUEL ALBERT, M.S., E.E., Communication Engineering.
CHARLES EDWARD BEHLKE, Ph.D., Hydraulics.
FREDRICK JOSEPH BURGESS, M.S., Sanitary Engineering.
MARTIN PORTMAN COOPEY, B.S., Highway Engineering.
EDWARD ARCHIE DALY, M.S., Nuclear Engineering.
WILLIAM FREDERICK ENGESSER, M.S., Industrial Engineering.
GRANT STEPHEN FEIKERT, M.S., E.E., Radio Engineering.
CHARLES OSWALD HEATH, M.S., Engineering Materials.
GLENN WILLIS HOLCOMB, M.S., Structural Engineering.
ARTHUR DOUGLAS HUGHES, M.S., Heat, Power, and Air Conditioning.
JOHN GRANVILLE JENSEN, Ph.D., Industrial Resources.
PHILIP COOPER MAGNUSSON, Ph.D., Electrical Engineering Analysis.
FRED MERRYFIELD, M.S., Sanitary Engineering.
ROBERT RAY MICHAEL, M.S., Electrical Materials.
OLAF GUSTAV PAASCHE, M.S., Metallurgical Engineering.
WILLIAM HOWARD PAUL, M.S., Automotive Engineering.
JEFFERSON BELTON RODGERS, A.E., Agricultural Engineering.
MILTON CONWELL SHEELY, B.S., Manufacturing Processes.
ROY HOPKINS SHOEMAKER, Ph.D., Hydraulics.
LOUIS SLEGEL, Ph.D., Mechanical Engineering.
LOUIS NELSON STONE, B.S., Servomechanisms and Controls.
JESSE SEBURN WALTON, B.S., Chemical and Metallurgical Engineering.

By act of the Board of Regents of Oregon State College on May 4, 1927, the Engineering Experiment Station was established at Corvallis to serve the State in a manner broadly outlined by the following policy:

- To serve the industries, utilities, professional engineers, public departments, and engineering teachers by making investigations of significance and interest to them.
- To stimulate and elevate engineering education by developing the research spirit in faculty and students.
- To publish and distribute through bulletins, circulars, and technical articles in periodicals the results of such studies, surveys, tests, investigations,

and research as will be of greatest benefit to the people of Oregon, and particularly to the State's industries, utilities, and professional engineers.

The Engineering Experiment Station is an integral part of the School of Engineering. All staff members and laboratory facilities of the Engineering School are available for the investigative work of the station to the extent of funds allocated or contributed for this purpose. Much of the work of the station has been made possible by the assistance of industries and state and national associations. Inquiries concerning cooperative projects are welcomed.

The dean of engineering is the director of the Engineering Experiment Station and guides the operation of the station to conform with state and institutional policies. The assistant dean of engineering acts as the administrator in charge, technical editor of publications, and as chairman of the station executive council composed of senior station staff representing the various departments of the School of Engineering. The active staff is composed of members of the instructional staff who may be interested in various specific research projects, or of research fellows who are pursuing graduate study and are assigned to part-time work in the station. Experts who are especially qualified by training and experience to advise on the investigations in certain fields have been appointed to the staff as special technical counselors. Among these are executives and engineers representing major industries of Oregon and the Northwest, prominent consulting engineers, and leading engineers of Federal agencies and State departments. Some technical assistants have been supported by manufacturers and industrial associations interested in working out specific problems.

Science Research Institute

VERNON H. CHELDELIN, Ph.D., Director.

Professors: T. E. KING, Ph.D.; E. F. KURTH, Ph.D.; C. H. WANG, Ph.D.

Associate Professors: F. W. DECKER, Ph.D.; R. W. NEWBURGH,[1] Ph.D.

Assistant Professors: V. J. BROOKES, Ph.D.; M. ISONO, Ph.D.; A. C. LIETZE, Ph.D.; W. D. LOOMIS, Ph.D.; C. E. REED, M.D. (Research Associate); E. J. TRIONE, Ph.D; GORDON A. WHITE, Ph.D.; A. C. ZACALLO, Ph.D.

Research Associates (Instructors): H. AGARWAL, Ph.D.; C. P. LEE, Ph.D.; C. A. RYAN, Ph.D.

Research Associates (Acting Instructors): ANNETTE S. BAICH, Ph.D.; L. F. HARRIS, B.S.; R. L. HOWARD, B.S.; H. KERSHAW, B.S.; L.N. POTTER, B.A.

Research Fellows: R. R. ALLEN, M.S.; J. A. ANDERSON, M.S.; W. W. BAKER, B.S.; A. L. BIEBER, M.S.; L. L. BIEBER, M.S.; A. BURBOTT, B.S.; G. HOLMES, M.S.; S. S. KERWAR, M.S.; R. B. MELVIN, M.S.; R. L. SEEFELD, M.S.

Research Assistants: R. G. COFFEY, B.S.; C. S. CHUNG, B.S.; J. F. KARINEN, B.S.; O. S. KIM, B.S.; A. MALLEY, B.S.; L. D. MENDENHALL, B.S.; E. A. POSSEHL, B.A.; J. C. RAMSEY, B.S.; K. A. SMITH, B.S.; G. G. STILL, B.S.; N. SUZUKAWA, B.S.; D. L. VANFLEET, B.A.; D. F. WILSON, B.S.

The growth of scientific research on this campus during the past twenty-five years, coupled with a steady increase in support of research by outside agencies, resulted in the establishment in 1952 of the Science Research Institute. The Institute, operating within the framework of the School of Science, has three functions: first, to assist scientists at Oregon State in obtaining support for research projects; second, to aid in expediting their research programs and to promote interdepartmental research; and third, to pursue an active research program fitted to the interest and competence of the Institute staff.

[1] On leave of absence 1960-61.

The Institute is housed in the new Physics-Chemistry Building. Current studies by the Institute staff include fundamental projects in biochemistry, organic chemistry, microbiology, entomology, plant pathology, forest products, and atmospheric science, which derive their support from Oregon State University, government research agencies, research foundations, and industrial concerns.

Staff members of the Science Research Institute receive joint appointments in the Institute and the appropriate teaching departments. Research Assistants and Research Fellows employed by the Institute also receive appointments in the departments in which their advanced degrees are sought.

Transportation Research Institute

The Transporation Research Institute brings together the resources of the institution for research on transportation of agricultural commodities, maintenance and operation problems in the trucking industry, traffic problems, and other problems related to the transportation industry.

Water Resources Research Institute

The importance of water for the economic and social development of Oregon resulted in the establishment in 1960 of the Water Resources Research Institute. The function of the Institute is to encourage, facilitate, and coordinate research at Oregon State University on the factors that affect the quantity and quality of water available for use by mankind. The Institute is administered by the Agricultural and Engineering Experiment Stations and is staffed by scientists of the various departments at Oregon State engaged in water resources research.

Extensive facilities are available for Institute scientists including watershed lands, a soils laboratory, water and waste treatment plants, experimental waste treatment facilities, bacteriological and water quality laboratories, freshwater and marine biological laboratories, an experimental stream and computing equipment for economic research. These facilities afford a unique opportunity for graduate and advanced undergraduate research and instruction. Graduate assistantships are available. Staff members provide both classroom and research instruction, and a graduate minor in water resources may be pursued by students majoring in departments participating in the Institute.

Oregon Forest Research Center

R. M. Kallander, B.S., M.F., Administrator (Professor).

The Oregon Forest Research Center, located on Philomath Road and the Mall, was established in 1957 to bring together the Oregon Forest Products Laboratory and the former Forest Lands Research Division of the State Forestry Department under the supervision of the Forest Protection and Conservation Committee. The aim of Forest Products Research is to obtain maximum employment and product value in utilizing the State's forest resources. The objective of Forest Lands Research is to provide the information necessary to maintain maximum productivity of our forest lands within the State. Research activities are financed by a Forest Products Harvest Tax.

FOREST PRODUCTS RESEARCH

Staff

LEIF DEDRICK ESPENAS, M.S., Director (Professor).
B.S. (1938), New York College of Forestry, M.S. (1940), California. At Oregon State since 1947.

DOUGLAS WILLIAM GLENNIE, Ph.D., Chief, Chemical Research (Associate Professor).
B.A. (1949), M.A. (1951), University of British Columbia; Ph.D. (1955), Washington. At Oregon State since 1956.

JAMES DODD SNODGRASS, M.W.T., Chief, Physical Research (Professor).
B.S. (W.T.) (1943), M.W.T. (1951), Michigan. At Oregon State since 1946.

HARVEY AFT, M.S., Research Chemist (Assistant Professor).
A.B. (1950), Southern California; M.S. (1952), Puget Sound. At Oregon State since 1957.

THOMAS J. ALBERT, B.S., Research Assistant (Instructor).
B.S. (1959), Michigan; M.W.T. (1960), Michigan. At Oregon State since 1960.

GEORGE H. ATHERTON, B.S., In Charge, Milling and Engineering (Assistant Professor).
B.S. (1950), Oregon State. At Oregon State since 1950.

STANLEY EUGENE CORDER, B.S., Research Engineer (Assistant Professor).
B.S. (1950), Oregon State. At Oregon State since 1951.

RAYMOND ALAN CURRIER, M.S., In Charge, Manufactured Products (Assistant Professor).
B.S. (1950), Massachusetts; M.S. (1952), New York State College of Forestry. At Oregon State since 1952.

ROBERT DOUGLAS GRAHAM, M.S., In Charge, Wood Preservation (Associate Professor).
B.S. (1941), Pennsylvania State; M.S. (1947), Oregon State. At Oregon State since 1947.

CHARLES JAMES KOZLIK, M.F., In charge, Seasoning (Instructor).
A.B. (1952), Doane; M.F. (1957), Duke. At Oregon State since 1957.

JAMES WENDELL JOHNSON, M.S., In Charge, Timber Mechanics (Assistant Professor).
B.S. (1949), Idaho; M.S. (1951), Oregon State. At Oregon State since 1950.

WILLIAM FREDRICK LEHMANN, M.S., Research Assistant (Instructor) B.S. (1958), Washington State; M.S. (1960), North Carolina State. At Oregon State since 1960.

DONALD JAMES MILLER, M.F., Wood Technologist (Assistant Professor).
B.S. (1951), Connecticut; M.F. (1954), Yale. At Oregon State since 1955.

JOHN STANLEY MOTHERSHEAD, B.S., Research Chemist (Instructor).
B.S. (1959), Oregon State. At Oregon State since 1959.

JAMES LAFAYETTE OVERHOLSER, B.S., Editor (Associate Professor).
B.S. (1950), Oregon State. At Oregon State since 1952.

ROBERT MARTIN SAMUELS, B.S., In Charge, Pulp and Paper (Associate Professor).
B.S., Ch.E. (1951), Washington. At Oregon State since 1955.

Cooperating Departments and Divisions

Agricultural Engineering Department
Agricultural Experiment Station
Botany Department
Chemical Engineering Department
Chemistry Department
Engineering Experiment Station
Forest Engineering Department
Forest Management Department
Forest Products Department
Mechanical Engineering Department

Oregon's program of forest products research, initially authorized by the 1941 State Legislature, gained impetus in 1947, with Legislative enactment of a Forest Products Harvest Tax to finance research. The year 1957 marked another step forward when permanent, enlarged quarters were provided in the new Forest Research Center. These improved facilities, together with the valued cooperation of Oregon State University, other research agencies, and industry enable the staff to contribute even more to Oregon's economic growth.

The Forest Products Research program benefits from advice and council of an advisory committee composed of representatives of the following agencies: Douglas Fir Plywood Association, Oregon Pulp and Paper Industry, Pacific Northwest Forest and Range Experiment Station, School of Forestry, Southern Oregon Conservation and Tree Farm Association, West Coast Lumbermen's Association, Western Forest Industries Association, Western Pine Association, and Willamette Valley Lumbermen's Association. The Governor is chairman, State Forester, a member, and Director of Forest Products Research, secretary.

FOREST LANDS RESEARCH

Staff

DALE NESTRUD BEVER, M.F., Director (Professor).
B.S. (1942), M.F. (1954), Oregon State. At Oregon State since 1957.

DONALD G. ALLEN, M.S., Research Entomologist (Assistant Professor).
B.S. (1940), M.S. (1950), Wisconsin. At Oregon State since 1957.

ALAN BEN BERG, M.S., Associate Director (Associate Professor).
B.S. (1941), Oregon State; M.S. (1955), Washington. At Oregon State since 1957.

RALPH L CARMICHAEL, B.S., Research Assistant (Instructor).
B.S. (1951), Idaho. At Oregon State Since 1959.

KIM K. CHING, Ph.D., Forest Geneticist (Associate Professor).
B.S. (1942)), Central University, China; M.F. (1948), Ph.D. (1954), Michigan State. At Oregon State since 1957.

JAMES J. FISHER, B.S., Associate Editor (Instructor).
B.S. (1956), Oregon State. At Oregon State since 1956.

MAX HALBER, B.S., Research Assistant (Instructor).
B.S. (1953), North Carolina State. At Oregon State since 1957.

RICHARD K. HERMANN, M.F., Forest Ecologist (Assistant Professor).
B.S. (1951), University of Munich; M.F. (1956), Yale University. At Oregon State since 1959.

EDWARD F. HOOVEN, B.S., Forest Mammalogist (Assistant Professor).
B.S. (1948), Washington; M.S. (1958), Oregon State. At Oregon State since 1957.

RUDOLPH KANGUR, M.F., Research Silviculturist (Assistant Professor).
B.S. (1931), M.F. (1932), Estonia State University of Tartu. At Oregon State since 1958.

FEDOR KUDRJAVCEV, M.S., Research Assistant (Instructor).
M.S. (1928), University of Prague. At Oregon State since 1958.

DENIS PETER LAVENDER, B.S., Forest Physiologist (Assistant Professor).
B.S. (1949), Washington; M.S. (1958), Oregon State. At Oregon State since 1957.

WILLIAM PRESCOTT LOWRY, M.S., Research Meteorologist (Assistant Professor).
A.B. (1950), Cincinnati; M.S. (1955), Wisconsin. At Oregon State since 1957.

ERNEST WRIGHT, Ph.D., Research Pathologist (Associate Professor).
B.S.A. (1923), Oregon State; M.S. (1928), California; Ph.D. (1941), Nebraska. At Oregon State since 1957.

Cooperating Departments and Divisions

Agricultural Experiment Station
Botany Department
Chemistry Department
School of Forestry
Microbiology Department
Entomology Department
Department of Farm Crops
Soils Department
Fish and Game Management Department
Cooperative Seed Testing Laboratory

The Forest Lands Research program was initiated in 1947 by the State Forestry Department after the passage of the Forest Products Harvest Tax Act. The program remained under the direction of the State Forester until September 1, 1957, when it was transferred to Corvallis. Close relationship to Oregon State University, expanded facilities, a well integrated staff, and the fine support of industry and public agencies enable the organization to be of great service to all forest land owners and to the public in general.

The Forest Lands Research program benefits from an advisory committee representing Western Forest Industries Association, Pacific Northwest Forest and Range Experiment Station, Willamette Valley Lumbermen's Association, Southern Oregon Conservation and Tree Farm Association, Western Pine Association, School of Forestry, Bureau of Land Management, and State Forestry Department.

Extension

THROUGH extension services the benefits of all the Oregon state institutions of higher education are brought to the people of the State in their own communities. All divisions of the Oregon State System of Higher Education seek through every means possible, so far as resources and facilities permit, to serve the entire State. All extension activities are administered through the General Extension Division and the Federal Cooperative Extension Service.

General Extension Division

JAMES W. SHERBURNE, Ph.D., Dean, General Extension Division.
RALPH W. STEETLE, M.A., Associate Dean, General Extension Division; Director, Department of Educational Media.
VIRON A. MOORE, Ed.D., Assistant Dean, General Extension Division; Director, Department of State-Wide Services.
DANIEL W. FULLMER, Ph.D., Director, Portland Center.
DONALD R. LARSON, B.A., Assistant to the Dean, General Extension Division; Director, Office of General Services.
PAUL E. WATSON, Ed. D., Assistant Director, Portland Center and Portland Summer Session.
JAMES M. MORRIS, Ed.D., Director, Office of Educational Radio and Television; Program Manager.
W. CURTIS REID, Ph.D., Director, Office of Visual Instruction.
HOWARD IMPECOVEN, Ed.D., Registrar, General Extension Division.
W. T. LEMMAN, JR., B.S., Business Manager, General Extension Division.
JEAN P. BLACK, Ph.D., Librarian, General Extension Division.
CHARLES R. WENSTROM, B.S., Coordinator, Information Services, General Extension Division.

The General Extension Divison is the extension arm of all state-supported campuses within the State System of Higher Education. Its full effectiveness is dependent on resources of not only one institution, but on many. Financially, however, the Division is considerably self-sufficient, earning much of its own way through collection of authorized fees for the services it provides.

The dean's office is at 1633 S.W. Park Avenue, Portland 1, Oregon.

State-Wide Services. These services consist of state-wide evening classes, correspondence study, conferences, workshops, and consultant service to business, industry, education, and other activities including the Institute of International Affairs. Any community in Oregon may become a meeting place for state-wide evening classes if a satisfactory facility is provided and sufficient enrollment is guaranteed to cover actual operating costs. Offices are maintained on campuses in Eugene, Corvallis, Monmouth, Ashland, La Grande, and in Salem.

Department of Educational Media. The Department of Educational Media combines the services of the Office of Educational Radio and Television and the Office of Visual Instruction. In addition, the new department is responsible for KOAP-TV, Channel 10, in Portland and the state-wide educational television network exchanges.

Educational Radio and Television. KOAC-Radio, KOAC-TV, and KOAP-TV are educational stations owned by the State of Oregon and operated by the State Department of Higher Education with General Extension Division in charge of program and other administration. KOAC-TV broadcasts on channel 7 with its transmitter located on Vineyard Hill near Corvallis, KOAP-TV

on channel 10 is located at Healy Heights in Portland. Programs originating in Portland, Corvallis, and Eugene reach the transmitters by microwave relay. Programing for KOAC-TV is 9 a.m. to 9 p.m. and for KOAP-TV, 5:30 p.m. to 9 p.m. KOAC radio transmission on 550 kc is received throughout the State Monday through Saturday from 10 a.m. until 10 p.m. Studios are located in Eugene, Corvallis, Salem, and Portland. The department also is responsible for development of the Tapes for Teaching library, which assists teachers in classrooms throughout the State.

Office of Audio-Visual Instruction. The Office of Audio-Visual Instruction provides 16 mm. motion picture films, glass and film slides, and microscopic slides suitable for use by schools, community groups, and other organizations. A catalog is published which lists materials available and procedures for ordering. Located on the campus of Oregon State University at Corvallis, the department is maintained jointly by General Extension Division and Federal Cooperative Extension Service.

Portland Center. An evening class activity, Portland Center, uses facilities of Portland State College for both undergraduate and graduate study and enrolls about 12,000 students annually. Courses taken for college credit originate at one or another of the state system campus institutions and instructors are in most instances members of a campus faculty. No degrees are granted by the Center.

Portland Summer Session. Under the same administration as the evening center, Portland Summer Session is a daytime program operating from June through August. Enrollments in recent sessions exceed 3,700 and statistics show it is the State's best-attended Summer Session. Both undergraduate and graduate courses are offered and special workshops for teachers and education administrators are provided.

Federal Cooperative Extension Service

Administration

FREDERICK EARL PRICE, B.S., Director.
FRANK LLEWELLYN BALLARD, B.S., Associate Director.
CHARLES WESLEY SMITH, B.S., Assistant Director.
JEAN WILLARD SCHEEL, M.A., Assistant Director.
MABEL CLAIR MACK, M.S., Assistant Director.

State Leaders and State Agents

ESTHER ADELIA TASKERUD, M.A., Coordinator, Home Economics Extension Programs.
*BURTON SEYMOUR HUTTON, B.S., State 4-H Club Leader.
RUTH ELIZABETH BRASHER, M.A., State Extension Agent (4-H Club).
CAL GRAHAM MONROE, M.S., Acting State 4-H Club Leader.
ALICE LOIS REDMAN, M.S., State Extension Agent (4-H Club).
MARY EUNICE ABBOTT, M.A., State Extension Agent.
EVELYN AMANDA FUNK, M.Ed., State Extension Agent.
JOHN GORDON HOOD, M.S., State Extension Agent.
GENE M. LEAR, M.P.A., State Extension Agent.
*WILLIAM GERALD NIBLER, B.S., State Extension Agent.
JACKSON ROSS, M.S., State Extension Agent.
MURLE SCALES, M.S., State Extension Agent.
CLIFFORD LOVEJOY SMITH, Ph.D., State Extension Agent.

* On sabbatical leave 1960-61.

Federal Cooperative Extension performs one of the three major functions of Oregon State University, which are: resident teaching, research, and extension teaching. It extends the available information of Oregon State University, the United States Department of Agriculture, and other appropriate State and Federal agencies to every portion of the State. A staff of men and women resident in the counties, cooperatively supported by Oregon State, the United States Department of Agriculture, and the counties, and a resident staff of subject-matter specialists in agriculture and home economics work on approved projects.

The work of the Extension Service includes all forms of off-campus instruction and assistance in those phases of agriculture, home economics, and related subjects that can be practically adapted to the needs of the people of the State. Unique teaching methods have been developed through the years, important among which is organization for self-help to bring wide-spread application of the principles presented. All counties of the State cooperate in the program, which is available in every community.

Extension Projects. In order to assure maximum efficiency, extension work is conducted on the basis of definitely planned projects. These require approval by the proper Oregon State University authority and the U. S. Secretary of Agriculture before Federal and State funds appropriated for the work may be expended. The several distinct lines of work now covered by written projects, from which citizens of the State are receiving benefit, include:

General—general administration and organization of the Extension Service; county agent work; home demonstration work; 4-H Club work; preparation, printing, and distribution of bulletins; information; radio; and visual instruction supported jointly with General Extension Divison.

Agriculture—soils, irrigation and drainage; soil conservation; horticulture; animal husbandry; dairying; poultry husbandry; farm crops; agricultural economics, including marketing and the collection and dissemination of statistical and outlook information; agricultural engineering; wildlife; land use planning; entomology; farm forestry; seed certification; plant pathology; and farm management.

Home Economics—nutrition; home management; clothing and textiles; home furnishings; community social organization; consumer education; family life.

4-H Club Work—for boys and girls between 9 and 21 years of age; instruction in subject matter in agriculture and home economics; special attention to group skills, human relations, and good citizenship generally.

These projects are not assumed to cover all 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 and home welfare, or to material rural development.

Oregon State University Staff*

AUGUST LEROY STRAND, Ph.D., LL.D., President.
B.S. (1917), Montana State; M.S. (1925), Ph.D. (1928), Minnesota; LL.D. (honorary 1957), Montana State. At Oregon State (President and Professor) since 1942.

CHARLES RICHARD ABBEY, B.S. in E.E., Instructor in Electrical Engineering.
B.S. in E.E. (1957), Oregon State. At Oregon State since 1960.

MARY EUNICE ABBOTT, M.A., State Extension Agent (Associate Professor).
B.A. (1932), Oklahoma Baptist University; M.A. (1956), Oklahoma State. At Oregon State since 1950.

ALLEN E ABRAHAMS, Ph.D., Assistant Professor of Business Administration.
B.S. (Chem. Engrg.) (1949), Maryland; M.S. (Ind. Engrg.) (1954), Stevens Institute of Technology; Ph.D. (1960), New York University. At Oregon State since 1960.

JOHN ADAIR, B.S., Junior Biologist (Instructor) Dairy and Animal Husbandry, Agricultural Experiment Station.
B.S. (1950), Oregon State. At Oregon State since 1953.

FRANK WILLIAM ADAMS, M.S., Junior Chemist (Instructor) Agricultural Experiment Station.
B.S. (1948), Montana State; M.S. (1950), Oregon State. At Oregon State since 1953.

RICHARD ALTON ADAMS, Director of Physical Plant (Professor).
At Oregon State since 1947.

THOMAS FRANCIS ADAMS, B.S., Director of Dormitories (Professor).
B.S. (1930), Oregon State. At Oregon State since 1946.

LEONARD ALLEN ADOLF, Ph.D., Assistant Professor of History.
B.A. Ed. (1943), Central Washington College; B.A. (1946), Ph.D. (1953), Washington. At Oregon State since 1955.

WALTER MILO ADRION, M.A., Professor of Physical Education.
B.S. (1924), Michigan State Normal; M.A. (1939), Michigan. At Oregon State since 1939.

MARIAN CUSHING AIKIN, M.Sc., Assistant Professor of Family Life.
B.Sc. (1939), Nebraska; M.Sc. (1943), Iowa State. At Oregon State since 1954.

CHESTER BOYD AINSWORTH, Ed.D., Associate Professor of Education and Industrial Education.
B.S. (1942), John Brown University; M.S. (1947), Oklahoma State; Ed.D. (1956), Missouri. At Oregon State since 1959.

LAWRENCE ARTHUR ALBAN, Ph.D., Associate Professor of Soils; Associate Soil Scientist, Agricultural Experiment Station.
B.S. (1943), M.S. (1948), Washington State; Ph.D. (1950), Oregon State. At Oregon State since 1952.

ARTHUR LEMUEL ALBERT, M.S., E.E., Professor of Communication Engineering.
B.S. (1923), M.S. (1926), E.E. (1939), Oregon State. At Oregon State since 1923.

GERALD CORWIN ALEXANDER, B.S., Assistant Professor of Electrical Engineering.
B.S. (1951), Oregon State. At Oregon State since 1955. Leave of absence 1960-61.

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* Oregon State University officers of administration, instruction, research and extension —at Corvallis, in the counties, and at branch experiment stations, U. S. Department of Agriculture scientists on the campus; staff members of the Oregon State System of Higher Education at Corvallis. Includes only those with rank of instructor or above. Members of the Oregon Forest Research Center staff who hold courtesy rank are listed on pages 322-23.
page.

ROBERT M ALEXANDER, M.A., Assistant Director (Professor), Agricultural Experiment Station.
B.S. (1942), Oregon State; M.A. (1949), Harvard. At Oregon State since 1946.

HARRY THAIN ALLAN, J.D., Assistant Professor of Business Administration.
B.A. (1953), Washington and Jefferson College; B.S. (1953), Massachusetts Institute of Technology; J.D. (1956), Chicago. At Oregon State since 1956.

ETHEL E ALLEN, B.S., Assistant Editor of Publications. (Retired.)
B.S. (1916), Oregon State. At Oregon State 1917-48.

LEONARD JOHN ALLEN, M.S., State 4-H Club Leader. (Retired.)
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CAROLINE HELENA BLOMBERG, B.A., Yamhill County Extension Agent (Instructor).
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A.B. (1925), Smith; M.A. (1935), Stanford. At Oregon State 1926-28, and since 1954. On sabbatical leave March 1 to July 1, 1961.

CHARLES EDWARD MOREHEAD, Master Sergeant, Instructor in Military Science.
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B.Ped. (1910), Kirksville State Normal (Missouri); A.B., B.S. (1915), Missouri; M.S. (1930), Pittsburgh. At Oregon State 1920-32, and since 1934.

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A.B. (1910), Minnesota; Ph.D. (1931), Washington. At Oregon State since 1911.

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Ph.B. (1931), A.M. (1934), Chicago; Ph.D. (1954), Minnesota. At Oregon State since 1954.

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B.S. (1957), New Mexico A and M; M.S. (1959), Texas A and M. At Oregon State since 1958.

MARY SUSANNE WALLACE, M.S., Instructor in Foods and Nutrition.
B.S. (1955), New York State University Teacher's College (Plattsburgh); M.S. (1957), Rhode Island. At Oregon State since 1958.

ROBERT BOEN WALLS, M.S., Professor of Music; Director of Music; Head of Department.
B.E. (1932), Minnesota State Teachers (Moorhead); M.S. (1936), North Dakota. At Oregon State since 1947.

DON COIN WALROD, M.S., Columbia County Extension Agent (Associate Professor).
B.S. (1942), Colorado State University; M.S. (1960), Michigan State. At Oregon State since 1948.

ANN LOUISE WALSH, B.A., Instructor in Family Life and Home Administration.
B.A. (1944), California (Santa Barbara). At Oregon State since 1959.

AUSTIN FREDERIC WALTER, Ph.D., Professor of Political Science; Chairman of Department.
B.A. (1940), Carleton; M.A. (1942), Fletcher School of Law and Diplomacy; Ph.D. (1954), Michigan. At Oregon State since 1950.

JESSE SEBURN WALTON, B.S., Professor of Chemical Engineering; Head of Department.
B.S. (1928), Iowa. At Oregon State since 1945.

CHIH HSING WANG, Ph.D., Professor of Chemistry; Professor (Chemistry), Science Research Institute.
B.S. (1937), University of Shantung, China; M.S. (1947), Ph.D. (1950), Oregon State. At Oregon State since 1950.

MARGARET CHRISTIAN WARE, M.S., Assistant Professor of Foods and Nutrition.
B.S. (1941), M.S. (1944), Oregon State. At Oregon State since 1945.

HARRIET JANET WARNER, A.B., Assistant Reference Librarian (Assistant Professor), Library.
A.B. (1919), Certificate of Librarianship (1930), California. At Oregon State since 1930.

CHARLES EDWARD WARREN, Ph.D., Associate Professor of Fish and Game Management; Associate Fishery Biologist, Agricultural Experiment Station.
B.S. (1949), M.S. (1951), Oregon State; Ph.D. (1961), California. At Oregon State since 1953.

REX WARREN, M.S., Extension Farm Crops Specialist (Professor).
B.S. (1931), Utah State; M.S. (1933), Oregon State. At Oregon State 1934-45, and since 1947.

JOSEPHINE WASSON, M.A., Associate Professor of Art and Architecture.
B.A. (1925), Washington State; M.A. (1933), Columbia. At Oregon State since 1943.

JOHN LOWE WATSON, B.A., C.P.A., Assistant Comptroller, Oregon State System of Higher Education (Professor).
B.A. (1939), Washington; C.P.A. (1939), Washington, (1952), Oregon. At Oregon State since 1947.

ROBERT STUART WATSON, B.S., Assistant Football Coach (Assistant Professor).
B.S. (1951), California (Los Angeles). At Oregon State since 1955.

FRANCES MARGARET WATTS, B.S., Lane County Extension Agent (Home Economics) (Assistant Professor).
B.S. (1949), Minnesota. At Oregon State since 1958.

JACK LLOYD WAUD, B.S., Extension Certification Specialist (Instructor).
B.S. (1955), Oregon State. At Oregon State since 1955.

LEONARD JOSEPH WEBER, B.S., Associate Professor of Electrical Engineering.
B.S. (1952), Oregon State. At Oregon State since 1954. On leave 1960-61.

EMMA LOUISE WEBSTER, B.S., Multnomah County Extension Agent, Home Economics (Associate Professor).
B.S. (1930), Washington State. At Oregon State since 1953.

ERMA MARION WEIR, M.S., Associate Professor of Physical Education for Women.
B.E. (1936), Minnesota State Teachers (Bemidji); M.S. (1941), Washington. At Oregon State since 1945.

EARL WILLIAM WELLS, J.D., Professor of Speech; Chairman of Department.
A.B. (1921), Iowa; M.A. (1927), Wisconsin; J.D. (1928), Iowa. At Oregon State since 1921.

VERA LUCILE WELLS, M.S., Assistant Professor of Clothing, Textiles, and Related Arts.
B.S. (1948), M.S. (1953), Oregon State. At Oregon State since 1948.

JAMES RICHARD WELTY, M.S., Instructor in Mechanical Engineering.
B.S. (1954), M.S. (1959), Oregon State. At Oregon State since 1958.

HAROLD ELDON WERTH, B.S., Benton County Extension Agent (Assistant Professor).
B.S. (1948), Oregon State. At Oregon State 1949-51, and since 1956.

WILLIAM IRVIN WEST, M.F., Professor of Forest Products; Head of Department.
B.S.F. (1939), M.F. (1941), Washington. At Oregon State since 1946.

HAZEL KELSEY WESTCOTT, B.S., Administrative Assistant (Assistant Professor), President's Office. (Retired.)
B.S. (1920), Oregon State. At Oregon State 1919-21, and since 1926.

MELVIN NEIL WESTWOOD, Ph.D., Associate Professor of Horticulture; Associate Horticulturist, Agricultural Experiment Station.
B.S. (1952), Utah State; Ph.D. (1956), Washington State. At Oregon State since 1960.

PAUL HENRY WESWIG, Ph.D., Chemist (Professor), Agricultural Experiment Station.
B.A. (1935), St. Olaf College; M.S. (1939), Ph.D. (1941), Minnesota. At Oregon State since 1941.

BOB LEE WHALEY, B.S., (Ag. Eng.), Junior Irrigation Engineer, Irrigation Water Forecasting.
A.A. (1955), Boise Junior College; B.S. (Ag. Eng.) (1958), Idaho. At Oregon State since 1959.

CHARLES WHEELER, M.A., Instructor in English.
A.B. (1951), U.C.L.A.; M.A. (1958), Highlands University. At Oregon State since 1959.

WILLIAM PERRY WHEELER, M.F., Associate Professor of Forest Management; Personnel Director, School of Forestry.
B.S. (1948), M.F. (1949), Minnesota. At Oregon State since 1949.

GORDON ALLAN WHITE, Ph.D., Assistant Professor, Science Research Institute.
B.A. (1954), M.A. (1955), University of British Columbia; Ph.D. (1959), Iowa State. At Oregon State since 1960.

HAROLD H WHITE, M.S., Superintendent, Agronomist (Professor), Southern Oregon Branch Experiment Station.
B.S. (1920), M.S. (1937), Oregon State. At Oregon State since 1931.

SIDNEY DOUGLAS WHITE, M.S., Associate Professor of Art.
B.A. (1951), New Mexico; M.S. (1952), Wisconsin. At Oregon State since 1958.

WILLIAM QUENTIN WICK, M.S., Tillamook County Extension Agent (Assistant Professor).
B.S. (1950), M.S. (1952), Oregon State. At Oregon State since 1960.

CHARLES EDWARD WICKS, Ph.D., Professor of Chemical Engineering.
B.S. (1950), Oregon State; M.S. (1952), Ph.D. (1954), Carnegie Institute of Technology. At Oregon State since 1954.

ERNEST HERMAN WIEGAND, B.S.A., Professor Emeritus of Food Technology.
B.S.A. (1914), Missouri. At Oregon State since 1919.

MIRIAM AUGUSTA WIGGENHORN, M.A., Associate Professor of Family Life.
B.A. (1931), Nebraska; M.A. (1936), Columbia. At Oregon State since 1946.

CURTIS J WILDER, M.S., Associate Professor of Food Technology; Associate Food Technologist, Agricultural Experiment Station.
B.S. (1940), M.S. (1941), Montana State. At Oregon State since 1944.

WILLIAM DONALD WILKINSON, Ph.D., Professor of Geology; Chairman of Department.
B.A. (1923), Ph.D. (1932), Oregon. At Oregon State since 1932.

DALE HERBERT WILLEY, M.A., Instructor in English.
B.A. (1950), Linfield; M.A. (1952), Washington State. At Oregon State since 1959.

EARL CLARK WILLEY, M.S., Professor Emeritus of General Engineering.
B.S. (1921), M.S. (1941), Oregon State. At Oregon State since 1921.

JESSAMINE CHAPMAN WILLIAMS, M.A., Professor Emeritus of Foods and Nutrition.
B.S. (1906), M.A. (1921), Columbia. At Oregon State since 1923.

MAX BULLOCK WILLIAMS, Ph.D., Professor of Chemistry.
B.S. (1936), M.S. (1938), Utah; Ph.D. (1941), Cornell. At Oregon State since 1941.

RUSSELL WILLARD WILLIAMSON, M.A., Associate Professor of Industrial Engineering and Industrial Arts.
B.S. (1935), Oregon State; M.A. (1948), Minnesota. At Oregon State since 1946.

STANLEY ELLSWORTH WILLIAMSON, Ed.D., Professor of Science Education; Chairman of Department.
B.A. (1931), Nebraska Wesleyan; M.A. (1936), Columbia; Ed.D. (1956), Oregon. At Oregon State since 1946.

OLIVER JOSEPH WILLIFORD III, B.S., Captain, Assistant Professor of Military Science.
B.S. (1951), Virginia Military Institute. At Oregon State since 1959.

CLAYTON STANLEY WILLS, M.Ed., Clackamas County Extension Agent (Assistant Professor), Federal Cooperative Extension.
B.S. (1950), M.Ed. (1957), Oregon State. At Oregon State since 1958.

CHARLES OWENS WILSON, Ph.D., Dean of the School of Pharmacy, Professor of Pharmaceutical Chemistry.
Ph.C. (1932), B.S. (1934), M.S. (1935), Ph.D. (1938), Washington. At Oregon State since 1959.

MAUD MATHES WILSON, A.M., Professor Emeritus of Home Economics Research.
B.S. (1913), Nebraska; A.M. (1931), Chicago. At Oregon State since 1925.

NORMAN WILLIAM WILSON, M.A., Assistant Professor of English.
A.B. (1930), Linfield; M.A. (1940), Oregon State. At Oregon State since 1947.

ODELIA JUNGERS WILSON, M.S., Assistant Professor of Music.
A.B. (1930), College of St. Teresa; M.S. (1954), Oregon. At Oregon State since 1958.

ROBERT CLAUDE WILSON, Ed.M., Assistant Professor of Industrial Engineering and Industrial Arts.
B.S. (1949), Ed.M. (1955), Oregon State. At Oregon State since 1949.

ROBERT ELLIOT WILSON, M.S., Instructor in Mechanical Engineering.
B.S. (1955), Oregon State; M.S. (1956), Illinois. At Oregon State since 1957.

ROBERT LEE WILSON, M.F., Associate Professor of Forest Engineering.
B.A. (1942), Iowa; M.F. (1947), Colorado State University. At Oregon State since 1952.

SHERWOOD ANN WILSON, M.A., Instructor in Psychology.
B.S. (Ed.) (1954), M.A. (1956), Kansas. At Oregon State since 1959.

GUSTAV HANS WILSTER, Ph.D., Professor Emeritus of Dairy Technology; Dairy Technologist, Agricultural Experiment Station.
B.S. (1920), M.S. (1921), Ph.D. (1928), Iowa State. At Oregon State since 1929.

EDNA MAE WIMSATT, B.S., Malheur County Extension Agent, Home Economics (Assistant Professor).
B.S. (1950), Drexel Institute of Technology. At Oregon State since 1951.

CARLYN REO WINGER, M.A., Associate Professor of Speech.
B.A. (1928), Washington State; M.A. (1932), Wisconsin. At Oregon State since 1938.

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B.S. (1934), Nebraska; M.A. (1938), Iowa; D.Ed. (1951), Oregon. At Oregon State since 1947.

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B.S. (Ed.) (1957), Michigan. At Oregon State since 1957.

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B.S. (Ed.) (1955). Michigan. At Oregon State since 1957.

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B.S. (1950). Oregon State. At Oregon State since 1954.

ROBERT ELLIS WIPER, M.Ed., Instructor in Secretarial Science and Business Education.
B.A. (1951), M.Ed. (1953), Willamette. At Oregon State since 1957.

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B.S. (1958), Oregon State. At Oregon State since 1958.

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FLOYD BYRON WOLBERG, M.S., Associate Professor of Dairy and Animal Husbandry; Associate Dairy Husbandman, Agricultural Experiment Station.
B.S. (1928), M.S. (1932), Wisconsin. At Oregon State since 1945.

JOHN WILLIAM WOLFE, Ph.D., Associate Professor of Agricultural Engineering; Associate Agricultural Engineer, Agricultural Experiment Station.
B.S. (1939), South Dakota State; M.S. (1940), Idaho; Ph.D. (1959), Utah State. At Oregon State since 1947.

GREGORY BURTON WOOD, Ph.D., Professor of Agricultural Economics, Head of Department; Agricultural Economist in Charge, Agricultural Experiment Station.
B.S. (1938), Oregon; M.S. (1940) Oregon State; Ph.D. (1945), Wisconsin. At Oregon State since 1951.

JACK HENRY WOOD, M.A., Clatsop County Extension Agent (Associate Professor).
B.S. (1947), Washington State; M.A. (1958). Columbia (Extension Education). At Oregon State since 1948.

ETHAN LINDEN WOODS, B.S., Crook County Extension Agent (Associate Professor).
B.S. (1934), Oregon State. At Oregon State since 1934.

ROBERT A WORK, B.S., Head, Water Supply Forecasting Section (Professor), U. S. Department of Agriculture (Portland).
B.S. (1927), California. At Oregon State since 1929.

CLYTIE MAE WORKINGER, Assistant Professor Emeritus of Education.
At Oregon State since 1910.

GRACE IRENE WORKMAN, B.S., Portland City Extension Agent (4-H Club) Assistant Professor).
B.S. (1936), Oregon State. At Oregon State since 1957.

OLIVER JACKSON WORTHINGTON, Ph.D., Associate Professor of Food Technology; Associate Food Technologist, Agricultural Experiment Station.
B.S. (1924), Rhode Island; M.S. (1926), Ph.D. (1936), Wisconsin. At Oregon State since 1946. On leave 1960-61, 1961-62.

LEROY CLINTON WRIGHT, B.S., Baker County Extension Agent (Associate Professor).
B.S. (1929), Oregon State. At Oregon State since 1929.

SZU HSIAO WU, Ph.D., Assistant Professor of Dairy and Animal Husbandry; Assistant Animal Husbandman, Agricultural Experiment Station.
B.S. (1941), National Central (China); M.S. (1949), Ph.D. (1952), Oregon State. At Oregon State since 1952.

ROSALIND WULZEN, Ph.D., Sc.D., Professor Emeritus of Zoology.
B.S. (1904), M.S. (1910), Ph.D. (1914), California; Sc.D. (1943), Oregon. At Oregon State since 1933.

BRUCE WYATT, M.S., Research Associate (Instructor) in Oceanography.
B.S. (1956), Humboldt State; M.S. (1959), Oregon State. At Oregon State since 1959.

CAROLYN JANE WYATT, B.S., Assistant (Instructor) in Food Technology, Agricultural Experiment Station.
B.S. (1959), Arizona. At Oregon State since 1960.

FRANK OLIVER WYSE, M.A., Instructor in Mathematics.
A.B. (1952), Harvard; M.A. (1955), Princeton. At Oregon State since 1958.

RICHARD YAMAMOTO, Ph.D., Assistant Professor of Veterinary Medicine; Assistant Veterinary Serologist, Agricultural Experiment Station.
B.S. (1952), Washington; M.A. (1955), Ph.D. (1957), California (Davis). At Oregon State since 1959.

HOYA Y YANG, Ph.D., Associate Professor of Food Technology; Associate Food Technologist, Agricultural Experiment Station.
B.S. (1936), Nanking; M.S. (1940), Ph.D. (1943), Oregon State. At Oregon State since 1943.

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B.S. (1932), Oregon State; M.S. (1936), Ph.D. (1938), Iowa. At Oregon State since 1937.

ELMON EUGENE YODER, B.S., Instructor in Civil Engineering.
B.S. (C.Eng.) (1947), B.S. (Agr.Eng.) (1952), Oregon State. At Oregon State since 1958.

RAY ARNOLD YODER, M.F., Associate Professor of Forest Management.
B.S. (1941), Oregon State; M.F. (1942), Harvard. At Oregon State since 1949.

DELOSS PALMER YOUNG, B.S., Professor of Speech.
B.S. (1926), Oregon State. At Oregon State since 1927.

J LOWELL YOUNG, Ph.D., Chemist (Assistant Professor) United States Department of Agriculture.
B.S. (1953), Brigham Young; Ph.D. (1956), Ohio State. Postdoctoral fellow, Department of Agricultural Biochemistry (1956-57), Ohio State. At Oregon State since 1957.

JAMES ORVILLE YOUNG, Ph.D., Assistant Professor of Dairy Technology; Assistant Dairy Technologist, Agricultural Experiment Station.
B.S. (1949), M.S. (1951), Oregon State; Ph.D. (1960), Washington State. At Oregon State since 1950.

MARVIN MILES YOUNG, B.S., Josephine County Extension Agent (Instructor).
B.S. (1954), Oregon State. At Oregon State since 1958.

ROY ALTON YOUNG, Ph.D., Professor, Chairman of Department of Botany; Head Botany and Plant Pathology, Agricultural Experiment Station.
B.S. (1941), New Mexico A and M; M.S. (1942), Ph.D. (1948), Iowa State. At Oregon State since 1948.

CHESTER THEODORE YOUNGBERG, Ph.D., Professor of Soils; Soil Scientist, Agricultural Experiment Station.
B.S. (1941), Wheaton College; M.F. (1947), Michigan; Ph.D. (1951), Wisconsin. At Oregon State 1952-57, and since 1958.

HAROLD WAYNE YOUNGBERG, B.S., Washington County Extension Agent (Instructor).
B.S. (1951), Oregon State. At Oregon State since 1960.

TEH CHU YU, M.S., Assistant Food Technologist (Assistant Professor), Agricultural Experiment Station.
B.S. (1940), Fukien Christian University; M.S. (1951), Oregon State. At Oregon State since 1951.

JOHN ALFRED YUNGEN, M.S., Assistant Agronomist (Assistant Professor), Southern Oregon Branch Experiment Station.
B.S. (1950), M.S. (1959), Oregon State. At Oregon State since 1950.

EDWIN ARTHUR YUNKER, Ph.D., Professor of Physics; Chairman of Department; Director, Engineering Physics.
A.B. (1924), California; Ph.M. (1930), Wisconsin; Ph.D. (1940), Stanford. At Oregon State since 1925.

ROBERT JOSEPH ZAWORSKI, S.M., Assistant Professor of Mechanical Engineering.
S.B. (Mech.Eng.) (1947); S.M. (Mech.Eng.) (1958), MIT. At Oregon State since 1958.

LESLIE ZEIGLER, Th.D., Instructor in Religion.
B.S. (1936), M L.S. (1959), California; B.D. (1954) Th.D. (1957), Pacific School of Religion. At Oregon State since 1959.

ROBERT ZELINKA, B.S., Assistant Football Coach (Instructor).
B.S. (1952), California (Los Angeles). At Oregon State since 1955.

FRANKLIN ROYALTON ZERAN, Ph.D., Dean, School of Education; Director of Summer Session; Professor of Education, Head of Department.
A.B. (1930), M.A. (1932), Ph.D. (1937), Wisconsin. At Oregon State since 1947.

ADOLPH ZIEFLE, M.S., Phar.D., Professor Emeritus of Pharmacy.
Ph.C. (1904), B.S. (1907), M.S. (1919), Michigan; Phar.D. (1928), Pittsburgh. At Oregon State since 1914. Dean of the School of Pharmacy 1914-45.

QUENTIN BLISS ZIELINSKI, Ph.D., Associate Professor of Horticulture; Associate Horticulturist, Agricultural Experiment Station.
B.S. (1941), Oregon State; M.S. (1942), Ohio State; Ph.D. (1947), Virginia. At Oregon State since 1947.

MARTIN JOSEPH ZIMMERMAN, B.S., Sherman County Extension Agent (Instructor).
B.S. (1953), Oregon State. At Oregon State since 1960.

AFTON ZUNDEL, B.S., Lincoln County Extension Agent (Associate Professor).
B.S. (1929), Oregon State. At Oregon State 1934-44, and since 1957.

FRED CASPER ZWAHLEN JR., A.M., Assistant Professor of Journalism; News Bureau Assistant.
B.A. (1949), Oregon State; A.M. (1952), Stanford. At Oregon State since 1950.

ASSISTANTS

RICHARD WILLIAM BALDWIN, M.S.A., Assistant in Farm Crops, Agricultural Experiment Station.

CAROLYN JANE BLAIR, B.S., Assistant in Food Technology, Agricultural Experiment Station.

GEORGE EDWARD CARTER, M.S., Assistant in Farm Crops, Klamath Branch Experiment Station.

JANET ELAINE DAVIS, B.S., Assistant in Biochemistry, Agricultural Experiment Station.

GUNARDS ROBERT DRUSTS, B.S., Assistant in Agricultural Chemistry, Agricultural Experiment Station.

VERA EVENSON, B.S., Assistant in Bacteriology.

LUTHER AARON FITCH, M.S.(Agr.), Assistant in Farm Crops, Malheur Branch Experiment Station.

ROBERT LEON GARRISON, B.S., Assistant in Fisheries, Agricultural Experiment Station.

WALTER LEONARD GOULD, M.S., Assistant in Farm Crops, Agricultural Experiment Station.

DOROTHEA JOYCE GREGORY-ALLEN, M.S., Assistant in Biochemistry, Agricultural Chemistry.

FREDERICK C HALL, M.S., Assistant in Range Management, Farm Crops, Dairy and Animal Husbandry.

ROBERT S HALLIWELL, M.S., Assistant in Plant Pathology, Agricultural Experiment Station.

MABEL MARGUERITE KIEF, B.S., Assistant in Biochemistry, Agricultural Experiment Station.

RAY HENRY KLIEWER, M.S., Assistant in Dairy Husbandry, Agricultural Experiment Station.

ELMER GEORGE KUHLMAN, B.S., Assistant in Botany.

LORUS LEE PURKERSON, B.S., Assistant in Veterinary Medicine, Agricultural Experiment Station.

FRED DONALD RAUCH, B.S., Assistant in Horticulture, Mid-Columbia Branch Experiment Station.

JAMES E REYNOLDS, B.S., Assistant in Plant Pathology, Agricultural Experiment Station.

DEAN LEE SHUMWAY, M.S., Assistant in Fisheries, Agricultural Experiment Station.

WILBERT FRANCIS STEELE, M.S., Assistant in Biochemistry, Agricultural Experiment Station.

LUCY CAROL STOUT, B.S., Assistant in Biochemistry, Agricultural Experiment Station.

GEORGE ROBERT TAYLOR, B.S., Assistant in Farm Crops.

WILLIAM CAMPBELL VAN ARSDEL III, Ph.D., Assistant in Animal Physiology, Agricultural Experiment Station.

JACK BLAIR VERNETTI, B.S., Assistant in Biochemistry, Agricultural Experiment Station.

MURIEL JOSEPHA WOODRING, A.B., Assistant in Nutrition Research.

Oregon State System of Higher Education

JOHN REESE RICHARDS, Ph.D., Chancellor, State System of Higher Education; Professor.
B.A. (1929), M.S. (1931), Pennsylvania State; Ph.D. (1936), Chicago. With System since 1953, chancellor since 1955.

DAVID W. E. BAIRD, M.D., LL.D., Dean of Medical School; Professor of Medicine.
M.D. (1926), Oregon; LL.D. (1946), Portland. With System since 1927; dean, Medical School, since 1943.

FRANK BROWN BENNETT, Ed.D., President, Eastern Oregon College; Professor.
B.A. (1921), Willamette; M.A. (1933), Oregon; Ed.D. (1948), Willamette. With System since 1952; president, Eastern Oregon College, since 1952.

HERBERT ARNOLD BORK, M.S., C.P.A., Comptroller and Bursar, State System of Higher Education; Dean; Professor.
B.A. (1924), Wisconsin; C.P.A. (1926); M.S. (1940), Oregon State. With System since 1934; comptroller since 1934.

WILLIAM HUGH CARLSON, M.A. (Lib.Sc.), Director of Libraries; Professor.
A.B. (1924), Nebraska; certificate (1926), New York State Library School; M.A. (Lib.Sc.) (1937), California. With System since 1945.

RICHARD LYLE COLLINS, M.A., C.P.A., Budget Director, State System of Higher Education; Professor.
B.B.A. (1927), Oregon; C.P.A. (1931); M.A. (1940), Columbia. With System 1927-29 and since 1932; budget director since 1948.

ROY ELWAYNE LIEUALLEN, Ed.D., President, Oregon College of Education; Professor.
B.S. (1940), Pacific; M.S. (1947), Oregon; Ed.D. (1955), Stanford. With System since 1946; president, Oregon College of Education, since 1955.

WILLIAM C. JONES, Ph.D., Acting President, University of Oregon; Professor.
A.B. (1926), Whittier; M.B.A. (1929), Southern California; Ph.D. (1940), Minnesota. At Oregon 1941-44, 1951-53, and since 1954.

BRANFORD P. MILLAR, Ph.D., President, Portland State College, Professor.
A.B. (1935), A.M. (1938), Ph.D. (1946), Harvard. With System since 1959; president, Portland State, since 1959.

HAROLD J. NOYES, D.D.S., M.D., Dean of Dental School; Professor of Dentistry.
Ph.B. (1923), M.D. (1933), Chicago; B.S. (1928), D.D.S. (1928), Illinois. With System since 1946; dean, Dental School, since 1946.

EARL M. PALLETT, Ph.D., Secretary of Board and Chairman, High School-College Relations Committee; Professor.
B.S. (1921), M.S. (1922), Wisconsin; Ph.D. (1931), Oregon. With System since 1927; secretary of Board since 1955.

WINSTON D. PURVINE, LL.D., Director, Oregon Technical Institute.
A.B. (1933), Albany College; LL.D. (1960), Lewis and Clark. With System since 1960, director, Oregon Technical Institute, since 1947.

JAMES WILSON SHERBURNE, Ph.D., Dean, General Extension Division; Professor.
A.B. (1927), Greenville College; M.A. (1928), Michigan; Ph.D. (1938), Ohio State. With System since 1938; dean, Extension Division, since 1956.

ELMO NALL STEVENSON, Ed.D., President, Southern Oregon College; Professor.
A.B. (1927), San Jose State; A.M. (1929), Ed.D. (1938), Stanford. With System since 1929; president, Southern Oregon, since 1945.

Summary of Enrollment—1959-60

ENROLLMENT BY CURRICULUM AND CLASS, REGULAR SESSION, 1959-60

Curriculum	Freshman year	Sophomore year	Junior year	Senior year	Graduate	Special	Subtotal	Total
Liberal Arts and Sciences								
Lower Division	409	333	5	1	.....	1	749	.....
School of Science	283	319	265	219	410	1	1,497	
Total, Liberal Arts and Sciences, excluding duplicates	692	652	270	220	410	2	.....	2,246
Professional Curricula								
School of Agriculture	171	174	171	164	168	2	850	
School of Business and Technology	259	268	266	265	.....	.....	1,058	
School of Education	243	286	295	294	90	.....	1,208	
School of Engineering	451	329	419	382	66	.....	1,647	
School of Forestry	68	82	113	106	30	.....	399	
School of Home Economics	179	130	119	102	38	.....	568	
School of Pharmacy	61	55	68	98	9	.....	291	
Unclassified	.....	.....	.....	.....	88	.....	88	
Total, Professional Schools	1,432	1,324	1,451	1,411	489	2	6,109	6,109
Totals, (excluding duplicates)	2,124	1,976	1,721	1,631	899	4	.....	8,355
Total Students, Regular Session								8,355

ENROLLMENT BY SEX, ALL SESSIONS, 1959-60

Session	Men	Women	Total
Summer Session 1959	997	614	1,611
Fall Term 1959-60	5,517	2,212	7,729
Winter Term 1959-60	5,363	2,085	7,448
Spring Term 1959-60	4,935	1,988	6,923
Net Total, Regular Sessions	5,984	2,371	8,355
Net total, All Sessions, Oregon State College	6,981	2,985	9,966

ENROLLMENT IN SUMMER SESSION, 1959

	Men	Women	Total
Eight-Week Summer Session	997	614	1,611
Second Session (excluding duplicates)	.....	.....	.....
4-H Club Short Course	571	1,281	1,852
Totals	1,568	1,895	3,463

ENROLLMENT IN GENERAL EXTENSION DIVISION

(July 1, 1959-June 30, 1960)

Classes	Under-graduate	Graduate	Total
Extension Classes:			
Portland Center	7,185	2,493	9,678
State-Wide Classes (69 centers)	3,534	2,780	6,314
Total, Extension Classes	10,719	5,273	15,992
Correspondence Study:			
New Registrations	2,358		2,358
Old Registrations	3,049		3,049
Total, Correspondence Study	5,407		5,407
Total, General Extension Division	16,126	5,273	21.399

SUMMARY OF DEGREES CONFERRED 1959-60

Advanced Degrees:		
Honorary	2	.....
Doctor of Philosophy	41	.....
Doctor of Education	5	.....
Master of Arts	5	.....
Master of Science	171	.....
Master of Agriculture	5	.....
Master of Education	125	.....
Master of Forestry	2	.....
Master of Home Economics	7	.....
Professional Degrees	2	.....
Total Advanced Degrees	.....	365
Bachelor's Degrees:		
Bachelor of Arts:		
Science	12	.....
Business and Technology	6	.....
Education	9	.....
Engineering	2	.....
Home Economics	2	.....
Pharmacy	2	.....
Bachelor of Science:		
Science	208	.....
Agriculture	149	.....
Business and Technology	247	.....
Education	266	.....
Engineering	311	.....
Forestry	79	.....
Home Economics	87	.....
Pharmacy	39	.....
Bachelor of Agriculture	1	.....
Bachelor of Education	1	.....
Bachelor of Forestry	1	.....
Total Bachelor's Degrees	.....	1,422
Total Degrees Conferred 1959-60	.....	1,787

Index

Oregon State University welcomes your inquiries and will be happy to help in any way. Please address inquiries to:

Director of Admissions
Oregon State University
Corvallis, Oregon