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OREGON STATE UNIVERSITY

BULLETIN

CATALOG ISSUE 1970-71

CORVALLIS, OREGON 97330

A member of the
Oregon State System of Higher Education

OREGON STATE UNIVERSITY
Corvallis, Oregon 97331

Telephone: Area Code 503-754-0123
Postal zip code for campus residences: 97332

For a more complete directory of campus offices and departments, see inside back cover

Where to obtain Catalogs

General Catalog ..... Office of the Registrar
Graduate Catalog ..... Graduate School Office
General Information Bulletin ..... Office of Admissions
Summer Term Catalog ..... Summer Term Office

THE COVER:
THE LATE Assistant Professor Martin Johnson carved the Oregon State University seal that hangs in the President's Office. Using this carving as a pattern, Associate Professor Lloyd M. Frazier, Department of Manufacturing Engineering Technology, made the bronze casting inlaid in concrete in the Memorial Union quadrangle. Mr. William M. Reasons, supervisor of the OSU Photo Service, made and retouched the photograph of the carved wooden pattern which is reproduced on the cover of this catalog. Cover design by Karen K. Kleinschuster.

OREGON STATE UNIVERSITY BULLETIN

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Oregon State University

CATALOG

1970/1971

Corvallis / Oregon

Calendar

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Summer Term 1970

June 22, *Monday* ..... Registration
June 23, *Tuesday* ..... Classes begin
July 4, *Saturday* ..... Independence Day holiday
August 14, *Friday* ..... End of eight-week courses
September 4, *Friday* ..... End of eleven-week courses

Fall Term 1970

September 22-23, *Tuesday-Wednesday* ..... New Student Orientation-Advising Programs (see p. 12)
September 24-25, *Thursday-Friday* ..... Registration
September 28, *Monday* ..... Classes begin
October 9, *Friday* ..... Latest day for registering or adding courses
October 23, *Friday* ..... End of fourth week (reports of unsatisfactory progress)
November 6, *Friday* ..... Latest day to drop a course
November 20, *Friday* ..... Latest day to withdraw from college without responsibility for grades
November 26-29, *Thursday-Sunday* ..... Thanksgiving vacation
December 14-19, *Monday-Saturday* ..... Final Week
December 19, *Saturday* ..... End of fall term

Winter Term 1971

January 4, *Monday* ..... Registration
January 5, *Tuesday* ..... Classes begin
January 18, *Monday* ..... Latest day for registering or adding courses
February 1, *Monday* ..... End of fourth week (reports of unsatisfactory progress)
February 15, *Monday* ..... Latest day to drop a course
February 19, *Friday* ..... Latest day to withdraw from college without responsibility for grades
March 15-20, *Monday-Saturday* ..... Final Week
March 20, *Saturday* ..... End of winter term

Spring Term 1971

March 29, *Monday* ..... Registration
March 30, *Tuesday* ..... Classes begin
April 12, *Monday* ..... Latest day for registering or adding courses
April 26, *Monday* ..... End of fourth week (reports of unsatisfactory progress)
May 10, *Monday* ..... Latest day to drop a course
May 14, *Friday* ..... Latest day to withdraw from college without responsibility for grades
May 31, *Monday* ..... Memorial Day holiday
June 12, *Saturday* ..... Commencement
June 7-12, *Monday-Saturday* ..... Final Week
June 12, *Saturday* ..... End of spring term

Summer Term 1971

June 21, *Monday* ..... Registration
June 22, *Tuesday* ..... Classes begin
July 5, *Monday* ..... Independence Day holiday
August 13, *Friday* ..... End of eight-week courses
September 3, *Friday* ..... End of eleven-week courses

Fall Term 1971

September 20-26, *Monday-Sunday* ..... New Student Program
September 23-24, *Thursday-Friday* ..... Registration
September 27, *Monday* ..... Classes begin
November 25-28, *Thursday-Sunday* ..... Thanksgiving vacation
December 18, *Saturday* ..... End of fall term

Any changes in the Calendar will be announced in the *Schedule of Classes*.

FEBRUARY 1971

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MAY 1971

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JUNE 1971

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JULY 1971

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AUGUST 1971

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SEPTEMBER 1971

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32 whs of inst.
3 whs. exam
35

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Agricultural Utilities	B-2	Horse Barn	A-1
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Apperson Hall	D-1	Kerr Library	C-2
Armory (Army ROTC)	D-3	Kidder Hall	C-2
Avery Lodge	D-2	Library (Kerr)	C-2
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Batcheller Hall	D-1	Meats Laboratory	A-2
Benton Hall	D-2	Memorial Union	C-2
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Buxton Hall	B-3	Naval ROTC Armory	C-3
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Cauthorn Hall	B-3	Orchard Street Nursery School	B-1
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Greenhouses	A-1, B-1	Withycombe Hall	B-1
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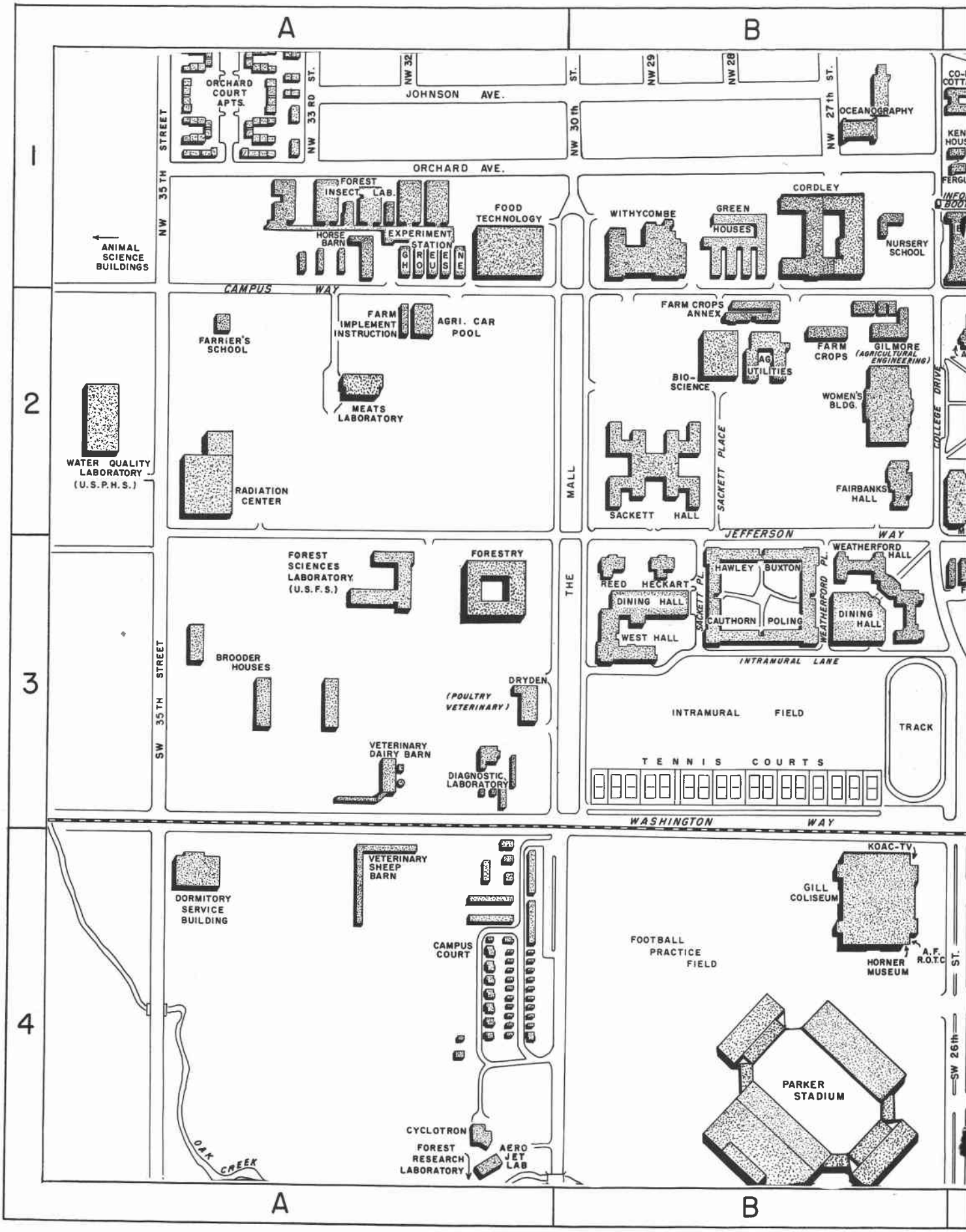
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B
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ORCHARD COURT APTS.
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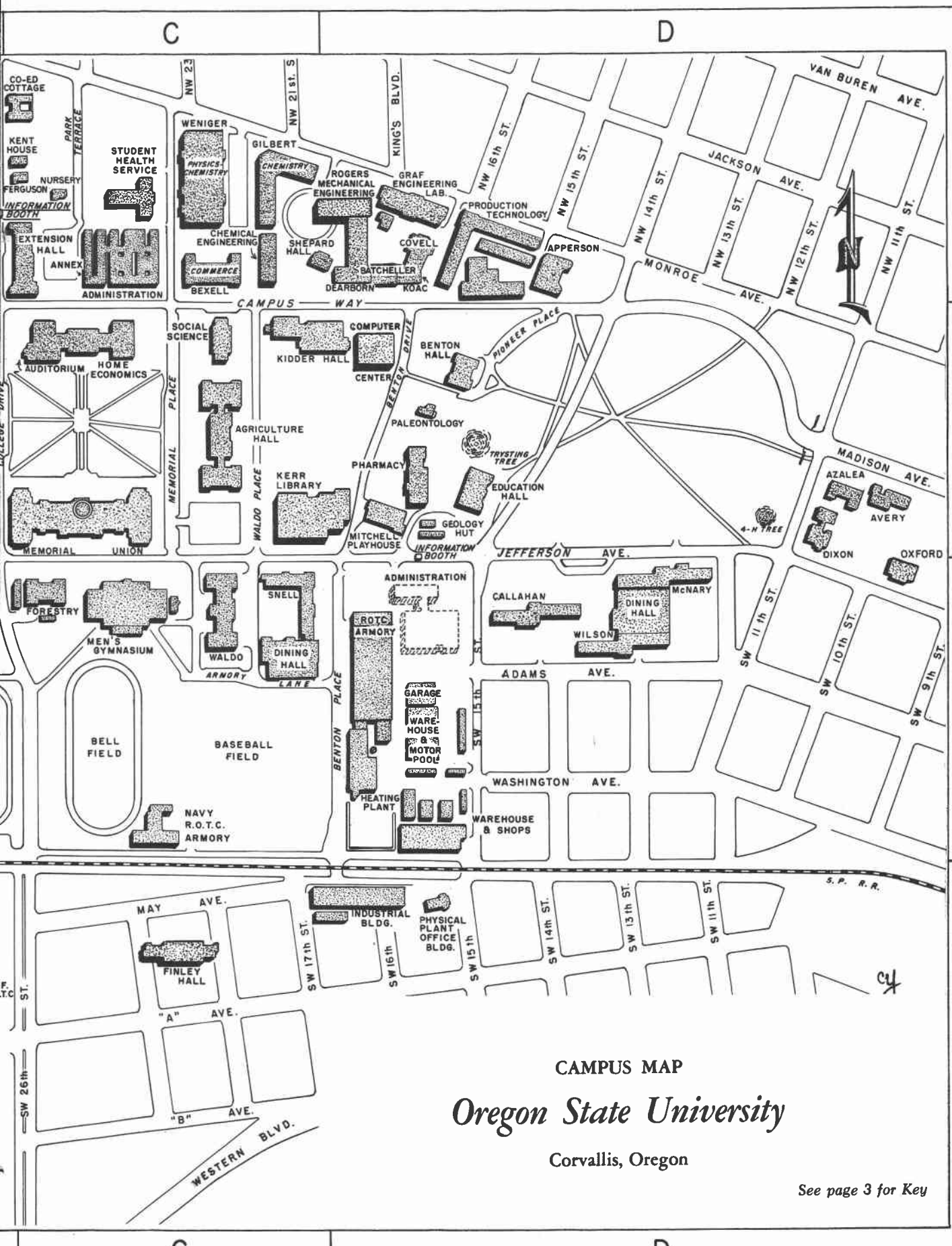
NW 32 ST.
JOHNSON AVE.
NW 30th
NW 29
NW 28
NW 27th ST.
OCEANOGRAPHY
NW 35TH STREET
ORCHARD AVE.
FOREST INSECT LAB.
HORSE BARN
EXPERIMENT STATION GREENHOUSES
FOOD TECHNOLOGY
WITHYCOMBE
GREEN HOUSES
CORDLEY
NURSERY SCHOOL
ANIMAL SCIENCE BUILDINGS
CAMPUS WAY
FARRIER'S SCHOOL
FARM IMPLEMENT INSTRUCTION
AGRI. CAR POOL
MEATS LABORATORY
WATER QUALITY LABORATORY (U.S.P.H.S.)
RADIATION CENTER
MALL
FARM CROPS ANNEX
BIO-SCIENCE
AG. UTILITIES
FARM CROPS
GILMORE (AGRICULTURAL ENGINEERING)
WOMEN'S BLDG.
COLLEGE DRIVE
SACKETT PLACE
SACKETT HALL
FAIRBANKS HALL
JEFFERSON WAY
FOREST SCIENCES LABORATORY (U.S.F.S.)
FORESTRY
THE
REED HECKART DINING HALL
WEST HALL
SACKETT PL.
HAWLEY
BUXTON
CAUTHORN
POLING
WEATHERFORD PL.
WEATHERFORD HALL
DINING HALL
SW 35TH STREET
BROODER HOUSES
DRYDEN (POULTRY VETERINARY)
VETERINARY DAIRY BARN
DIAGNOSTIC LABORATORY
INTRAMURAL LANE
INTRAMURAL FIELD
TRACK
TENNIS COURTS
WASHINGTON WAY
DORMITORY SERVICE BUILDING
VETERINARY SHEEP BARN
CAMPUS COURT
KOAC-TV
GILL COLISEUM
FOOTBALL PRACTICE FIELD
A.F. R.O.T.C.
HORNER MUSEUM
ST.
PARKER STADIUM
SW 26th
CYCLOTRON
FOREST RESEARCH LABORATORY
AERO JET LAB
OAK CREEK



CAMPUS MAP

Oregon State University

Corvallis, Oregon

See page 3 for Key

General Information

Charter

Federal Land-Grant (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 hereinafter 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 . . .

Act 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.

Designated Land-Grant institution, October 27, 1868

. . . 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.

Action of October 27, 1868, made permanent, October 21, 1870

Corvallis College, in Benton County, is hereby designated and permanently adopted as the Agricultural College of the State of Oregon.

Full State control, February 11, 1885

. . . the permanent location of the State Agricultural College at Corvallis, in Benton County . . . is hereby ratified and confirmed.—Provided . . . that the general government of the said College shall be vested in . . . a board of Regents of the State Agricultural College of the State of Oregon.

State Board established, March 1, 1929:

There hereby is created a . . . department of higher education . . . under the control of . . . the state board of higher education, [which] . . . shall succeed to and hereby is invested with all the powers and duties . . . of the board of regents of the Oregon State Agricultural College.

Name changed, April 15, 1953:

. . . and such college shall be named Oregon State College (ORS 352.230).

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.

Guidelines

THE HIGHEST ASPIRATION of a University is to free men's minds from ignorance, prejudice, and provincialism and to stimulate instead a lasting attitude of inquiry. Oregon State University shares this aspiration with universities everywhere.

Accordingly, Oregon State University accepts the charge of the State Board of Higher Education that it provide a general education for its students so that "they will acquire the knowledge, skills, and wisdom for (1) personal development and enrichment, particularly through arts and letters; (2) responsible participation in a democratic society; (3) an understanding of the scientific methodology which has wrought a revolution in the ways of knowing and the extent and application of knowledge; and (4) an understanding of other cultures and natures as well as our own."

As the State's land-grant institution, Oregon State University must fulfill these obligations while simultaneously developing professional and vocational excellence in various fields of human endeavor. A university grows strong around a distinguished faculty devoted to liberal studies in the sciences, the arts, the humanities, and the social sciences as well as in the technical and professional disciplines. Oregon State University, therefore, is defined as a university composed of schools in which the liberal studies are pursued, together with professional and technological schools which depend chiefly on the sciences and social sciences.

Responsibilities

The responsibilities of Oregon State University are:

I. To provide effective instruction for qualified students insuring that each student, including the most gifted, has the opportunity for maximum achievement.
II. To encourage research, creativity, and excellence of scholarship among students and staff.
III. To extend education throughout the state and to nations throughout the world in cooperation with other institutions and agencies.
IV. To maintain and develop in an orderly fashion appropriate undergraduate and graduate programs.
V. To provide academic and professional leadership and assume responsibility for development of the University curriculum.

Services

Services characteristic of Oregon State University include:

I. Support and promotion of scientific and technical institutes.
II. Service and educational programs in conservation and utilization of natural resources.
III. Assistance to industry, business, government, and education through consultation with the University staff.
IV. Education for National Defense.
V. Programs in Continuing Education.
VI. Cooperative programs with other educational institutions, business, industry, and government.

The degree to which the objectives implicit in these Guidelines can be attained is in direct relationship to the individual and combined efforts of a dedicated, competent staff working freely and cooperatively with the encouragement and support of the citizens of the State.

This Statement of Oregon State University Guidelines was approved in 1964 by the Faculty Senate and the State Board of Higher Education.

Organization

The Administrative Council

Robert W. MacVicar,* Ph.D. ..... President

Milosh Popovich, M.S.....Dean of Administration

David B. Nicodemus, Ph.D. .....Dean of the Faculty

Robert W. Chick, Ed.D.....Dean of Students

Roy A. Young, Ph.D. ..... Dean of Research

J. Kenneth Munford, Ed.D.....Secretary

Richard A. Adams ..... Director, Physical Planning and Construction

Samuel H. Bailey, M.S. ..... Director of Information

James G. Barratt, B.S. ....Director of Intercollegiate Athletics

Wilbur T. Cooney, M.S.....Dean and Director of Agriculture

Wallace E. Gibbs, Ed.M.....Registrar and Director of Admissions

Gordon W. Gilkey, Arts D.....Dean of Humanities and Social Sciences

† George W. Gleeson, Ch.E. ..... Dean of Engineering

Earl E. Goddard, D.B.A.....Dean of Business and Technology

Keith Goldhammer, Ph.D. ..... Dean of Education

Colonel Frank N. Halm, M.B.A. ..... Professor of Aerospace Studies

Henry P. Hansen, Ph.D.....Dean of the Graduate School

Betty E. Hawthorne, Ph.D.....Dean of Home Economics

Captain John H. Hitchcock, M.S.....Professor of Naval Science

James W. Long, Ph.D. .....Director of Physical Education

Dan W. Poling, D.Ed. .....Associate Dean of Students, Director of New Student Affairs

G. Morris Robertson, M.S.....Director of Business Affairs

Colonel Mark H. Terrel, M.S. ..... Professor of Military Science

Fred M. Shideler, M.S. ..... Director of University Relations

Carl H. Stoltenberg, Ph.D. ..... Dean of Forestry

Jo Anne J. Trow, Ph.D. ..... Associate Dean of Students

Rodney K. Waldron, M.A. ..... Director of Libraries

John M. Ward, Ph.D. .....Dean of Science

Charles O. Wilson, Ph.D.....Dean of Pharmacy

* Effective July 1, 1970.
† Resignation effective June 30, 1970.

Administrative Offices

Admissions
Wallace E. Gibbs, Ed.M., Director
Waldo Bowers, Ed.M., Assistant Director

Alumni Relations
Crawford H. Graham, B.S., Director
William R. Nelson, B.S., Assistant Director

Business Affairs
G. Morris Robertson, M.S., Director
Nedry V. Burris, L.L.B., Assistant to the Director
Hugh F. Jeffrey, Jr., B.S., Business Manager
Robert L. Newton, B.S., Cashier
Anthony D. Birch, M.B.A., Budget Officer
Frank Euren, B.A., Purchasing Agent
William R. Millison, Research Financial Administrator
Jack A. Danley, Payroll Supervisor
Clifton R. Dickerson, M.B.A., Civil Service Personnel Officer

Council on Curriculum and Academic Policy
J. Frank Ligon, Jr., Ph.D., Executive Secretary
Delmer M. Goode, M.A., Curriculum Consultant

Foreign Students
Elizabeth Hamlin, M.Ed., Adviser

Honors Program
Stuart E. Knapp, Ph.D., Director

Information Department
Samuel H. Bailey, M.S., Director
Ted H. Carlson, M.S., Radio-TV News Editor
Gwil O. Evans, M.S., Marine Science Editor
Charles A. Boice, M.S., Editor, Oregon Stater

Institutional Research
George E. Thornburgh, M.S., Director and Chairman, Facilities Planning and Use Committee
James Wilson, B.A., Research Analyst

International Education
Gordon R. Sitton, Ph.D., Director

Library (See page 9)

Physical Plant
Everett H. Lillig, B.S., Director
S. Miles Metzger, B. Arch., Superintendent for Planning and Construction

Printing Department
Charles W. Peckham, B.S., Director

Publications Office
J. Kenneth Munford, Ed.D., Director
Tom T. France, B.S., Assistant Director

Registrar
Wallace E. Gibbs, Ed.M., Registrar
Clayton A. Shaw, B.S., Assistant Registrar
Russell G. Dix, M.F., Assistant Registrar

Student Personnel Services (See page 16)

Summer Term
Robert L. Phillips, Ph.D., Director

University Development
James W. Dunn, M.S., Development Officer

History and Accreditation

History

OREGON STATE UNIVERSITY started as 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 of a state-assisted college in the Far West.

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 assistance to higher education on October 27, 1868, when it designated Corvallis College "the agricultural college of the State of Oregon." In taking this action the Legislative Assembly 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 on Fifth Street between Madison and Monroe. 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 1888.

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 professorships (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 1908. 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 (A.M.) was awarded in 1876. A committee on advanced degrees appointed in 1910 began to lay the foundations of the Graduate School. The first Ph.D. degrees were conferred in 1935.

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. The Transportation Research Institute and the Water Resources Research Institute were established in 1960. The Oregon Forest Products Laboratory, established in 1941, was expanded into the Oregon Forest Research Center adjacent to the campus in 1957, and became the Oregon State University Forest Research Laboratory in 1961.

In 1961 the Oceanography Department acquired the 80-foot research vessel *Acona* and in 1964 replaced it with a research vessel of greater range and versatility, the 180-foot *Yaquina*. Also in 1964 the $1,000,000 Oregon State University Marine Science Laboratory with 30,000 square feet of research and aquarium areas and a dock was constructed on Yaquina Bay to permit expansion of studies of the ocean and estuaries by oceanographers, fisheries specialists, engineers, and marine biologists, including zoologists, botanists, entomologists, and microbiologists.

The Radiation Center, established in 1964, houses a number of research and training facilities in nuclear science and engineering. Twenty thousand square feet of specially designed laboratories are available to accommodate radiation research programs.

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, 1941-42; August Leroy Strand, 1942-61; James Herbert Jensen, from 1961.

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.

Facilities

Campus

The city of Corvallis, in which Oregon State University is located, has a population of 30,000. It lies in the heart of the Willamette Valley between the Cascade Mountains on the east and the Coast Range on the west, 80 miles south of Portland. The climate is mild and equable with rainfall averaging about 30 inches annually.

The 400-acre main campus has grown out of plans prepared by the eminent landscape architects John C. Olmstead (1908) and A. D. Taylor (1925, 1945). The current plan for campus development was initiated in 1962 by Louis A. DeMonte of the firm of DeMonte and Wagner, University Planning Consultants, and approved by the State Board of Higher Education in 1964. It takes into consideration the nature and aims of the University, anticipated enrollment, density of land use, building location and heights, parking space, and the expanding role of the University in service to the State.

Present buildings, with dates of original construction and later additions or major remodeling, are listed below. For temporary buildings the dates indicate either date of erection or date of purchase for Oregon State University use.

Administration (1947)
Administration Annex (1948)
Aero Engine Laboratory (1953)
Agricultural Car Pool (1954)
Agriculture Hall (1909, 1911, 1913)
Agricultural Utilities (1909)
Apperson Hall (1898, 1920, 1950, 1963)
Armory (1910, 1911)
Avery Lodge (1966)
Azalea House (1953)

Batcheller Hall (1913)
Benton Hall (1888)
Bexell Commerce Hall (1922, 1958)
Bio-Science (1970)
Buxton Hall (1961)

Callahan Hall (1964)
Cauthorn Hall (1957, 1963)
Chemical Engineering Building (1955)
Coed Cottage (1926, purch. 1956)
Computer Center (1970)
Cordley Hall (1957, 1967)
Covell Hall (1928, 1960)
Cyclotron (1952)

Dairy Barn (1968)
Dearborn Hall (1949)
Dixon Lodge (1966)
Dormitory Service Building (1961)
Dryden Poultry-Veterinary Hall (1927)

Education Hall (1902, 1940)
Extension Hall (1921, 1951)

Fairbanks Hall (1892, 1936)
Farm Crops (1919, 1924, 1951)
Ferguson House (1915)
Finley Hall (1967)
Food Technology (1951)
Forest Insect Laboratory (1957)
Forest Research Laboratory (1961, 1968)
Forest Science Laboratory (1962)
Forestry (1917)
Foundry (1899)

Gilbert Chemistry Hall (1939)
Gill Coliseum (1950)
Gilmore Agricultural Engineering Hall (1912, 1939)
Graf Engineering Laboratory (1920)
Greenhouse (1928, 1951, 1954, 1957, 1964, 1966)

Hawley Hall (1959, 1963)
Heating Plant (1923, 1949, 1953, 1960, 1966)
Heckart Lodge (1954)
Home Economics (1914, 1920, 1952)

Industrial Building (1947, 1958)
Kent House (purch. 1924)
Kerr Library (1963)
Kidder Hall (1918, 1941, 1966)

McNary Hall (1963)
McNary Dining Hall (1963)
Marine Science Center at Newport (1965)
Meats Laboratory (1967)
Memorial Union (1928, 1960)
Men's Gymnasium (1915, 1921, 1953)
Mitchell Playhouse (1898, 1950)

Naval ROTC Armory (1946, 1954, 1959)
Nuclear Reactor (1967)

Oceanography Building (1964, 1970)
Orchard Court Apartments (1961, 1963)
Orchard Street Nursery School (1939)

Paleontology Laboratory (1892)
Park Terrace Nursery School (1918, purch. 1945)
Parker Stadium (1953, 1967, 1969)
Pharmacy (1924, 1966)
Physical Plant Warehouse (1948, 1952)
Physical Plant Office (1961)
Poling Hall (1957, 1963)
Production Technology (1908, 1949, 1963)

Radiation Center (1964)
Reed Lodge (1954)
Rogers Hall (1967)

Sackett Hall (1947, 1963)
Shepard Hall (1908)
Snell Hall (1959)
Snell Dining Hall (1959)
Social Science Hall (1912, 1951)
Student Health Service (1936, 1961)
Swine Barn (1965)

Veterinary Dairy Barn (1930)
Veterinary Diagnostic Laboratory (1952, 1961)
Veterinary Sheep Barn (1938, 1962)

Waldo Hall (1907, 1959)
Water Quality Laboratory (1966)
Weatherford Dining Hall (1957)
Weatherford Hall (1928)
Weniger Hall (formerly Physics-Chemistry) (1959, 1961, 1966)
West Hall (1960)
West Dining Hall (1960)
Wilson Hall (1964)
Withycombe Hall (1952)
Women's Building (1926)

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 land, 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, Dunn Forest, and the 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.

William Jasper Kerr Library

Director of Libraries ..... Rodney K. Waldron, M.A.
Associate Librarian ..... Donald R. Hunt, M.A. in L.S.
Head of Technical Services..Lawrence W.S. Auld, M.S. in L.S.
Serials Librarian ..... Irene L. Craft, M.S. in L.S.
Acquisitions Dept.....Stanley Swanson, B.A., M.Ed., M.A.L.S.; Hans Weber, B.A., M.L.S.
Catalog Librarian ..... Marie Hull Jackson, B.S. in L.S.
Head Reference Librarian ..... Etta Judd, B.A., B.S. in L.S.
Business and Social Sciences Librarian .... Stephens T. F. Shou, M.A., B.A. in L.S.
Chief Science and Technology Librarian .... Katherine Osborn, M.A., B.S. in L.S.
Education and Fine Arts Librarian ..... Caroline G. Lybeck, M.A. in L.S.

The William Jasper Kerr Library, now containing 610,000 volumes, is housed in a new building providing space for 625,000 books and 1,600 readers. Books are, with a limited number of exceptions, on open shelves directly available to faculty and students.

The books are grouped into four major areas. On the first floor are the music-fine arts-education books, a music listening room, a map room, a general reading room, and the reserve book room. The second (main) floor houses humanities books, the central reference services, the public catalog, and control and checkout desks.

The third floor is occupied by administrative, acquisition, and cataloging offices and books in business and social sciences. The fourth floor contains books in science, agriculture-forestry, pharmacy, and engineering. Carrels for advanced research, individually assigned on a quarter basis, are provided on all floors. Each floor also has a conference room for the use of undergrad-

uates and others. All book collections are under the direction of subject specialists.

Collections. The books in the Library, and the 32,000 or more volumes added annually, are closely coordinated with teaching and research. The collections are therefore primarily technical and scientific. Books in the humanities and the social sciences are now being acquired in increasing quantities in support of the School of Humanities and Social Sciences. These give the Library 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 5,900 periodicals are received currently. A large portion of the Library's holdings are consequently bound journal volumes. Newspapers received currently, a number of which are on microfilm, total 160. The Library has one of the most comprehensive map collections in the Northwest. This ever-growing collection now contains over 93,600 maps.

Like many large libraries, the Library is a general depository for publications of the United States Government. In addition, it has been designated as a depository for specific types of materials: U.S. Atomic Energy Commission, Military and Federal Specifications and Standards, publications and maps of the Army Map Service, repository for materials emanating from research and investigations under the Anadromous Fish Act, and the Commercial Fisheries Research and Development Act. In addition to United States Government publications, the Library receives on a depository basis materials from the United Nations, official publications of the State of Oregon, and materials from many organizations and institutions.

Books may be taken for home use by anyone connected with Oregon State and by others with permission. Students may keep books for two weeks, with privilege of renewal. Faculty members may borrow for more extended periods.

All books, numbering over 2,250,000 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 and world.

Unified Facilities. Library facilities of the state institutions of higher education in Oregon are coordinated through a Dean of Libraries. The dean is also librarian of the University of Oregon at Eugene, where administrative offices 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.

Museums and Collections

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

The Horner Museum (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 encompassing approximately 14,500 articles in all. Visitors to the Museum exceed 80,000 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 (PAUL W. OMAN, curator) contains approximately 600,000 specimens of insects (including 6,000 microscope slides), chiefly from the Pacific Northwest. The collection is particularly strong in Hymenoptera, Coleoptera, Heteroptera, and Diptera. Five hundred Riker mounts of economically important insects are included in the collection. A special collection of Acarina, or mites, under the direction of G. W. Krantz, contains approximately 8,000 slides and 1,000 vials of specimens. All collections are housed in Cordley Hall.

The Geological Collection, housed in Education Hall, includes minerals, ores, rocks, invertebrate fossils, some vertebrate fossils, and a number of fossil plants. More than 2,400 mineral specimens are arranged according to the Dana classification. This collection is now broken up for use in classes. 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 153,000 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 type specimens of Northwest vascular plants. Part of the Herbarium, a collection of 750 sheets of marine algae, is housed at the Marine Science Center in Newport. The Mycological Collections (W. C. DENISON, curator) consist of approximately 30,000 dried specimens of fungi and lichens, supplemented by microscope slides and a culture collection. Included in the Mycological Collections are the H. C. Gilbert Myxomycete Collection and the Forest Service Pathology Herbarium.

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 on the first and fifth floors of Cordley Hall II, 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 ornithological notes and literature.

Publications

Official Publications of Oregon State University, published through the Office of Publications and printed by the Department of Printing include:

OREGON STATE UNIVERSITY BULLETIN (Catalog Issue, Summer Term Catalog, Graduate School Catalog, General Information).

BULLETINS, TECHNICAL BULLETINS, CIRCULARS, and *Oregon's Agricultural Progress* (quarterly) for the Agricultural Experiment Station.

BULLETINS, CIRCULARS, AND FACT SHEETS for the Federal Cooperative Extension Service, including farm building plans, range plant identification series, fertilizer recommendation series, home economics series, regional cooperative publications, and miscellaneous publications.

Publications of the School of Forestry.

Oregon Stater (alumni journal) and OSU Scope.

Miscellaneous programs, announcements, folders, posters, career guides, and pamphlets.

The **Oregon State University Press** is the publishing and sales agency for the following:

MONOGRAPHS, including series in botany, economics, education and guidance, entomology, geology, history, literature and languages, political science, and zoology.

BIOLOGY COLLOQUIUM PROCEEDINGS (annually)

IMPROVING COLLEGE AND UNIVERSITY TEACHING (quarterly)

PROCEEDINGS OF THE PACIFIC NORTHWEST CONFERENCE ON HIGHER EDUCATION (annually)

YEARBOOK OF THE ASSOCIATION OF PACIFIC COAST GEOGRAPHERS (annually)

GENETICS LECTURES (annually)

Miscellaneous books and other publications as approved by the Board of Governors of the Oregon State University Press.

Admissions Information

OREGON STATE UNIVERSITY WELCOMES ALL STUdents of good moral character without regard to race, creed, color, or national origin who provide evidence of suitable preparation for work at the university level.

Admission to Freshman Standing

A. **Early Confirmation of Acceptance:** A high school senior may apply for fall term admission at any time following completion of the first half of his final year. (See ADMISSION PROCEDURE, page 13.) Resident applicants with a grade average of 2.50 or higher or with a combined score of 950 or higher for the verbal and mathematical sections of the Scholastic Aptitude Test (SAT) of the College Entrance Examination Board are notified immediately of acceptance for fall term. (A 3.00 average or SAT scores of 1,000 plus minimum high school GPA of 2.50 is necessary for nonresident applicants.)

B. **Oregon residents being admitted as freshmen:**
   1. Must be graduated from a standard high school and have:
      (a) For fall term only, a 2.25 grade-point average or above in all high school subjects taken toward graduation*, or a 2.00 (C) average winter or spring terms,
      or
      (b) A combined score of 887 points fall term (880 points winter and spring terms) on the verbal and mathematical sections of the Scholastic Aptitude Test of the College Entrance Examination Board,†
      (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 term.

C. **Nonresidents being admitted as freshmen:**
   1. Must have graduated from an accredited high school.
   2. Must qualify for admission under the following standards:
      (a) A freshman having a high school grade-point average of 2.75 is eligible for admission without specific test score requirements. An applicant whose high school GPA is between 2.25 and 2.74 may be admitted on the basis of his predicted success in college as determined by a combination of his high school GPA and College Entrance Examination Board test scores.
      (b) An alternative for the student who does not qualify as outlined in (a) above is the achievement of a minimum grade-point average of 2.25 on 12 term hours of college-level work (may be done through summer school, extension, or correspondence courses of an accredited college or university) or on 9 term hours in a prescribed program in a regular collegiate summer term.

D. **Entering freshmen with superior records:** Entering freshmen who demonstrate unusual competence in scholastic pursuits are provided special academic opportunities.
   1. *Advanced Placement Program:* Advanced placement or credit may be granted to entering freshmen who have completed college-level work and who have satisfactorily completed the College Board Advanced Placement Examinations during their senior year.
   2. *University Honors Program:* On the basis of high school records and College Board test scores, entering freshmen may be invited to participate in the University Honors Program. For additional information, see page 29.
   3. *Credit by Examination:* Students with special competence in specific academic areas may apply on campus for a departmental examination which may qualify them for advanced placement or credit in that department.

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* Admission is granted on the basis of the high school (including the ninth grade) record. The required testing program is for placement rather than entrance purposes, and is discussed under PLACEMENT EXAMINATIONS, page 13.

† Information concerning scheduled examination dates and examination centers may be obtained from the College Entrance Examination Board, Box 1025, Berkeley, California, or P.O. Box 592, Princeton, New Jersey. Official scores are forwarded to Oregon State by Educational Testing Service upon student request.

Admission of Transfer Students

Transfers from other colleges are required to present (1) evidence of eligibility to return to the last college or university attended and (2) a satisfactory grade-point average. Residents may transfer with a 2.00 (C) or higher grade average while nonresidents must present a minimum of 2.25. A student transferring fewer than 12 term hours must satisfy the entrance requirements for both transfers and entering freshmen. Transfers should review ADMISSION PROCEDURE, and PLACEMENT EXAMINATIONS. Foreign students entering as undergraduates should review the section on ADMISSION OF FOREIGN STUDENTS.

Oregon State University accepts in transfer college-level courses successfully completed in fully-accredited colleges and universities.

Courses taken at accredited two-year institutions of collegiate rank after a student has completed 93 term hours may be used to satisfy course requirements, but credits for such will not count toward graduation from Oregon State University. Hours attempted and points earned are used in calculating cumulative grade-point average. Credits beyond 93 hours must be earned in an accredited baccalaureate-degree-granting institution.

Upon arrival on campus, each transfer is assigned an adviser with whom the academic program is planned. Reports showing credit and class standing received from Admissions will often differ from departmental evaluation. Admissions determines college entrance eligibility only, while departments determine specific departmental degree requirements.

Transfer students are required to file complete official records of all college academic work attempted, certified by the Registrar of each institution where the work was undertaken.

Enrollment Limitation

Because of pressure of enrollment, the Oregon State Board of Higher Education, at the instance of the Oregon State Legislature, has provided for enrollment quotas for the institutions of the state system of higher education, of which Oregon State University is a member.

These enrollment quotas mean that Oregon State University will not be able to offer admission to all nonresident students who meet the basic nonresident admission requirements stated above. In determining which nonresident students will be admitted, the institutions will use various criteria including the high school GPA, College Entrance Examination Board SAT scores, the proposed major field of study, date of application, and other, subjective criteria. Projections indicate that nonresident freshman applicants meeting early confirmation admission requirements, outlined in A above, can expect to be in contention for admission although admission is not assured to these students.

Admission to Professional Programs and Schools

To protect students and professional standards, the admission and retention requirements and standards for evaluation and acceptance of transfer credit are often in addition to general admission and transfer requirements. Admission to Oregon State University does not, therefore, automatically admit students to its professional programs and schools. Because professional education is accredited and approved by societies established by the professions, students admitted to these schools must be prepared to undertake the curriculum at whatever level they enter it and to maintain school standards.

Admission with Graduate Standing

To be considered for admission to the Graduate School, an applicant must have a baccalaureate degree from an accredited college or university, and a scholastic record and background and other evidence that indicate he is capable of doing satisfactory graduate work. See GRADUATE SCHOOL for further information; also ADMISSION PROCEDURE, page 12.

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 or Graduate School, (2) must have achieved a superior scholastic record on the basis of his own grading system, and (3) must have certified English proficiency as indicated by an appropriate score on the test of English as a foreign language (TOEFL). A student with less than a four-year bachelor's degree, or with a diploma, certificate, or title not accepted as equivalent to a bachelor's degree, may apply for undergraduate admission but may not enter Graduate School.

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. A GPA of 2.50 is necessary to transfer from an American college or university.

Admission to Summer Term

The only requirement for admission to the Summer Term 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 satisfy regular admission requirements.

Admission as a Special Student

The Admissions Committee may consider for entrance as a special student:

(1) A person qualified but not planning to earn a degree at Oregon State.

(2) A mature person who does not qualify for admission for degree work but who could benefit from limited study.

(3) A high school senior with a B or better grade-point average who is recommended by his principal.

A special student signs a statement indicating that he is not a degree student and that recorded credit will be applied to a degree only if he qualifies according to Academic Regulation 18 *Schedule of Classes* as a regular student and satisfies regular admissions procedures and regulations.

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 are granted physical education and/or ROTC credit but do not receive college credit for service schooling or USAFI tests or courses. Application should be made to the Registrar during first term attendance at Oregon State University.

Admission Procedure

Questions regarding admission and applications for admission, accompanied by the $10 nonrefundable application fee (payable to Oregon State University) should be addressed to: Office of Admissions, Administration Building, Oregon State University, Corvallis, Oregon 97331.

Application Blanks, Form A, are available from the Office of Admissions. The special Oregon high school application form is available at all Oregon high schools at the close of the first semester of the senior year. The applicant requests the high school principal and/or the Registrar of each college attended to forward certified transcripts of all academic records directly to the Office of Admissions for evaluation purposes. All records submitted become the property of Oregon State. Transcripts for transfer students must include all schoolwork beyond high school and, for graduate students, must include all undergraduate and graduate records.

Applications should be initiated at least thirty days in advance of desired entrance date to permit processing. If currently in college elsewhere, applicant should apply during his final term or semester. The deadline to apply for fall term admission is August 15, unless space remains in the enrollment quota.

Placement Examinations

High school seniors planning to enter Oregon State should take the Scholastic Aptitude Test (SAT) of the College Entrance Examination Board. See footnote page 11.

This test, together with the high school and other records, provides the academic adviser with valuable information about the student's educational development, abilities, and aptitudes.

The SAT should be completed prior to arrival on campus. Students who find it necessary to complete the test during the special campus administration may face delays in counseling and registration.

Transfer students who have not previously completed a college-level mathematics course must present scores of the College Entrance Examination Board before registration in an Oregon State University mathematics course.

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.

Students who enter Oregon State University with previous language training in another institution and wish to continue their study of the language are required to take a language proficiency examination to determine placement level.

The **medical examination** required of all students entering Oregon State University for the first time is described on a later page under STUDENT HEALTH SERVICE.

New Student Programs

Undergraduate students who enroll fall term are required to participate in a program of orientation and advising before officially registering in the university. For the school year 1970-71, Oregon State University will hold seven, two-day sessions of orientation and advising to assist new students in preparing for entry into college. Six of these programs, for freshmen only (those without previous college credit), will be held during the period July 5-24. The seventh will be held September 22 and 23. Transfer students will meet with their academic advisers at 1 p.m. on September 21. Detailed information concerning these new student programs and registration is sent to those accepted for admission well in advance of the term of entrance.

Student Motor Vehicle Regulations

Space limitations in the university community make the problem of student-operated vehicles one of grave concern to the administration, the faculty, and the students.

A student who brings a car to the campus must be willing to assume the following obligations:

a. That he furnish proper information on any vehicle in his possession or control for use on the Oregon State University campus at any time during the school year. The student is required to furnish the vehicle information in the Coliseum during registration for courses each term, or at the Traffic Committee Office in Room 12, Home Economics Building, at other times.

b. That he abide by the driving and parking regulations established for the OSU Campus. This includes purchase of an appropriate permit. Parking is restricted to certain designated areas and vehicles must display permits to authorize campus parking.

c. That he familiarize himself with all regulations which are published in "Your Car on Campus." This pamphlet may be obtained during registration in the Coliseum, at the Traffic Committee Office in Room 12, Home Economics Building, or from the Visitor's Information Booths at the 26th Street and the Jefferson Street entrances to campus.

d. That he keep his vehicle in mechanically safe driving condition, and that he obey the legal stipulations in the State Motor Vehicle Code.

Failure to accept these obligations as personally binding may cause the student driver to lose his motor vehicle privileges or receive more stringent penalties.

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., M.B.A., M.S.*
Education, *B.A., B.S., M.A., M.S., Ed.M., Ed.D., Ph.D.*
Engineering, *B.A., B.S., M.A., M.S., A.E., Ch.E., C.E., E.E., I.E., M.E., Min.E., M.Mat.Sc., M.Oc.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.*
Pharmacy, *B.A., B.S., M.A., M.S., M.Pharm., Ph.D.*
Physical Education and Health, *B.A., B.S.*

Aerospace Studies, Military Science, 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 below) 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, as well as in law and in veterinary medicine.

Requirements

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. Physical education: five terms in activity courses. Students over 30 years of age are not required to take physical education activity courses. Normally hygiene and physical education classes should not be taken at the same time. No more than one activity course may be taken at one time, except for physical education majors, but it is permissible for hygiene and an activity class to be taken concurrently.

b. General hygiene: one term.

Graduation Requirements (Institutional)

a. Term hours: minimum, 192 (in Engineering [except Technology majors] and Forestry, 204; in Pharmacy [five-year curriculum], 240). The minimum must include:
   (1) Hours in upper division courses: minimum, 45, exclusive of upper division physical education activity courses.
   (2) Hours in major: minimum, 36, including at least 24 in upper division courses.
   (3) English Composition: 9 term hours (exclusive of Wr 10).

b. Distribution of hours for baccalaureate degrees:
   (1) Bachelor of Arts: 36 hours in humanities (except English Composition and Corrective Speech) including proficiency in a foreign language equivalent to that attained at the end of the "Second-Year" course in the language.
   (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 (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 Division of Continuing Education courses).
   (3) Last 45 hours for which registered.
   (4) In at least two of the last three terms.

d. Residence: Minimum, the last 45 term hours or 45 of the last 60 if authorized by approval of a petition to the Academic Requirements Committee. Classroom work taken through the Division of Continuing Education is not considered as residence work.

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 (applied music): maximum, 12 term hours. (Restriction not applicable to majors in music.)

g. Application for degree: To become a candidate for a degree a student must have achieved senior standing[1] 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 the 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 two-year curriculum and with approval of dean.

Certificate in Engineering, granted on application and completion of two-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 twelve weeks each.

Summer Term: a session extending from late June for eight or eleven weeks depending upon the program chosen.

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: the background necessary for successful performance in a course. In addition to stated requirements, or acceptable substitute, consent of instructor is implied for admission to class.

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 description in this catalog or in the separately published *Schedule of Classes.* To convert semester hours to term hours, multiply by 1½ (every 10 semester hours count as 15 term hours).

Period: a class meeting for discussion, lecture, laboratory, etc. 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 one-hour period, ② a two-hour period, ③ a three-hour period, etc. For example: 2 ① 1 ③ indicates *two one-hour periods and one three-hour period.*

Grade-Point Average: Total number of grade points received for A, B, C, D, or F grades divided by total term hours. (See POINTS, below.)

[1] Before senior standing may be achieved, a student must complete 135 term hours with a grade-point average of 2.00. He must include five terms of physical education activity, and one term of hygiene.

Grading System

Grades

The grading system consists of five basic grades, *A, B, C, D,* and *F. A* denotes exceptional work accomplished; *B,* superior; *C,* average; *D,* inferior; *F,* failure. Other marks are *E,* final examination not taken; *I,* incomplete; *W,* withdrawal; *R,* thesis in progress; *P,* pass; *S,* satisfactory; *U,* unsatisfactory.

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 and the scheduled final examination has been taken, but some minor 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 forms 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 E, I, W, P, R, S,* and *U* 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:

1- 10.	Noncredit remedial courses not offered in regular curriculum.
11- 49.	Noncredit courses or credit courses of a terminal or semi-professional 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 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:
401, 501.	Research.
403, 503.	Thesis.
405, 505.	Reading and Conference. (Individual reading reported orally to instructor.)
406, 506.	Projects.
407, 507.	Seminar.
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 with grade points earned subtracted). 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 of $136 per term—$408 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 regular athletic events; and admission to concerts and lectures. No reduction in fees is made to students who may not desire to use these privileges.

Concurrent Enrollment

Oregon State University students paying full tuition may enroll for courses through other units of the Oregon State System of Higher Education, at no additional cost, in a concurrent enrollment program initiated Fall Term, 1967. Complete details of policies and procedures are available in the Registrar's Office.

Nonresident Fee

Undergraduate students who are not residents of Oregon pay regular fees and in addition pay a nonresident fee of $333 per term, or $999 per year—a total of $1,407 per year for fees and tuition.

Under the regulations of the Oregon State Board of Higher Education, a minor student whose parents are bona fide residents of Oregon qualifies 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 six 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.

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 (including fellows) registered for 8 term hours of work or more pay tuition and fees of $162 a term. Graduate students do not pay nonresident fee. Teaching or research assistants pay $38 per term. Graduate students (including fellows) registered for 7 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

An **advance registration deposit of $75** is required of all undergraduate students with payment due as follows: (1) currently- or previously-enrolled nonresident students must pay by July 1; currently- or previously-enrolled Oregon students by August 1; and all newly-admitted students by May 1, or within two weeks of admission, whichever is later.

Persons who enroll for academic credit (except staff members) must make a deposit of $25, 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 residence hall equipment. If at any time charges against this deposit become excessive, the student may be called upon to reestablish the original amount.

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

Special Fees

Part-Time and Auditor's Fees ..... per term hour, $17.00
Undergraduate and graduate students enrolled for 7 term hours or less pay, instead of the regular fees, a part-time fee in accordance with the following scale: 1-2 term hours, $34; 3 term hours, $51; 4 term hours, $68; 5 term hours, $85; 6 term hours, $102; 7 term hours, $119. 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 $136.

Staff Fee (except staff auditors) .....per term hour, $3.00
Staff members may register for courses at a $3-per-term-hour rate. Full-time staff members are limited to a maximum of 3 hours per term, except a *single* course carrying up to 5 hours is permitted. Any employee whose appointment is equivalent to .50 or more (but less than full-time) may take up to 10 hours a term at this rate. Payment of fees entitles member to instructional and library privileges only.

Application Fee $10.00
Must accompany admission application.

Advance Registration Deposit $75.00
For details, *see Deposits, above.*

Late-Registration Fee..first day $5.00, additional days each $1.00
Students registering after scheduled registration dates of any term pay a late-registration fee of $5 a day for the first day and $1 a day thereafter. Part-time students pay $1 a week. Auditors are not required to pay late-registration fees.

Return-of-Check Fee $5.00
If institutional charges are met by a check which is returned because of any irregularity for which student is responsible, a fine will be charged in the amount of $5.

Change-of-Program Fee .....per course, $1.00
The student pays this fee for each course change in his official program after the scheduled last day of mass registration.

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, $5.00
$5 per term hour for the privilege of taking an examination for advanced credit, or other special examinations.

Registration-in-Absentia Fee ..... per term hour, $17.00
Minimum fee $34; maximum $136 for undergraduates, $162 for graduate students.

Transcript Fee, per copy ..... $ 1.00

Late Application Filing Fee (fall term only) $10.00
In addition to application fee if admission filed for after August 31.

Annual Counseling Fee $7.50

College Board Aptitude and Achievement Test Fees.....$4.50 to $11.25

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

Microfilming Doctoral Thesis.....$20.00

Placement Fee (See School of Education).
Initial registration, no charge; registration..per year, $5.00

Applied Music Fees (See Music).....per term, $30.00 to $50.00

Horseback Riding Fee.....per term, $25.00

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. The 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 Personnel Services

Dean of Students ..... Robert W. Chick, Ed.D.
Associate Deans of Students .....Morris L. Lemay, D.Ed.
Dan W. Poling, D.Ed.
Jo Anne J. Trow, Ph.D.
Assistant Deans of Students ..... William J. Brennan, M.Ed.
Janet L. Crist, M.S.
Director of Counseling Center .... Charles F. Warnath, Ph.D.
Assistant Director ..... Leslie G. Dunnington, Ph.D.
Counselors ..... Thomas A. Murphy, M.A.
John L. Shelton, Ph.D.
Jennie Taylor, M.A.
William H. Venema, Ph.D.
Director of Financial Aid ..... Richard E. Pahre, M.A.
Assistant Directors ..... James S. Woodland, M.Ed.
Stephen Flynn, M.Ed.
Director of Housing ..... Thomas F. Adams, B.S.
Associate Director ..... J. Franz Haun, D.Ed.
Director, Residence Halls Food Service ..... Vernon E. Wiard, B.S., B.A.
Director of Memorial Union and Student Activities ..... George F. Stevens, M.Ed.
Assistant Director of Memorial Union ..... G. Baker Bokorney, M.S.
Manager, Memorial Union ..... Duane S. Fitzgerald, B.S.
Manager, Student Publications and Public Events ..... Irwin C. Harris, M.A.
Manager, Student Activities .... Donald R. Sanderson, M.A.
Social Adviser, Student Activities ..... Barbara C. Simpson, M.Ed.
Director of Residence Hall Program ....James P. Duncan, Ed.D.
Assistant Director ..... Mary A. Southham, M.S.
Director of Student Health Service ....James E. Garvey, M.D.
Assistant to the Director .... D. Leonard Gibson, M.S., M.A.
Chief Clinical Psychologist ....Raymond S. Sanders, Ph.D.
Clinical Psychologist ..... J. Mark Wagener, Ph.D.
Pharmacist ..... John C. Kula, B.S.
Physicians .....Clifford Anderson, M.D.
John H. Baker, M.D.
John S. Giffin, M.D.
Reginald A. MacHaffie, M.D.
William R. Marriott, M.D.
Ernest L. Nelson, M.D.
Charles C. Reger, M.D.
William P. Stephen, M.D.

The Coordination of the Student Personnel Services Program, including counseling, general student welfare, and activities, is the responsibility of the Office of the Dean of Students. This program relates student life outside the classroom to the university's instructional program and assists students in deriving greater benefits from their university experiences. The following student services are administered through this office: student housing, Student Health Service, Counseling Center, Memorial Union, educational activities, student organizations, and financial aid including loans, scholarships, work-study, and part-time employment.

Student Housing

Oregon State University considers the housing of students an important and relevant educational function. The kind and quality of housing influences a student's education and the right type of living conditions can aid him in his studies and provide opportunities for personal and social growth.

OSU students live in university-operated residence halls and cooperatives, private cooperatives, fraternities and sororities, and off-campus housing. Every effort is made to provide a living environment conducive to study, safety, and health.

Housing Regulations

The following housing regulations have been established by the Student-Faculty Housing Committee for students enrolled for 10 or more hours at Oregon State University. Students enrolled for courses both in the Division of Continuing Education and Oregon State University are subject to the 10-hour rule. Students are expected to know and observe these:

1. Living arrangements must be approved by the Department of Housing, normally at the time of registration.
2. Single freshman students under 21 years of age must live in university residence halls, fraternities, sororities, or cooperatives unless living at home.
3. Single students 21 years of age or older, sophomores, juniors, seniors, or married students may live wherever they choose.
4. Only students regularly enrolled in Oregon State University for 10 or more credit hours may reside in university residence halls, fraternities, sororities, or cooperatives.
5. HOUSING AGREEMENT: The application for a university residence hall reservation is for the entire school year, as defined in the official university calendar, and becomes a contract upon payment of the $50 housing reservation deposit. Except in special cases, housing agreements for accomodations beginning in September are for the academic year (fall, winter, and spring terms). Agreements sent out for the winter term include both the winter and spring terms. Agreements sent out for the spring term are for the spring term only. Special agreements for one term are prepared for students engaged in practice teaching, and in other unusual cases. A student who joins a fraternity, sorority, or cooperative is permitted to vacate the residence hall at the end of the term. The housing deposit of $50 will be forfeited. Should the student leave the living group to which he has moved during the contract period while remaining a student, the contract will be reinstated.
6. Because of their recognized danger, firearms may not be kept in student living quarters. Special locked facilities for storage of firearms are provided in all men's residence halls.
7. In unusual circumstances exceptions to these policies will be considered by the Housing Committee.

Residence Halls

The main educational aim of the residence halls is to encourage among students mature self-direction. As an integral part of the academic community, the halls provide comfortable, pleasant surroundings in which informal education of a type consistent with the objectives and curriculum of the institution can take place.

The 12 separate residence halls owned and operated by the university on a self-supporting basis house approximately 4,200 men and women. The halls are divided into living groups, with 60 such groups in all. In addition to co-educational dining rooms, they have lounges, recreational areas, kitchenettes, and private dining rooms for small dinner meetings. Each hall has coin-operated laundry facilities, ironing rooms, vending machines, and luggage storerooms. Nearby are parking lots and lighted tennis courts and other recreational facilities.

Rooms are furnished with bed, chest, study desk, and chairs. Linens provided include mattress cover, blankets, sheets, and pillow cases. Draperies are furnished except in Sackett and Weatherford halls. Students are responsible for upkeep of their own rooms.

For a more complete description of the residence halls programs see the booklet. "Residence Halls Handbook."

All students who live in residence halls take their meals in adjacent dining rooms. Special diets for health reasons are available at an additional charge upon recommendation of the Student Health Service.

Reserving a Room

To reserve a room in a residence hall a student should obtain an Application and Contract blank from the Office of Admissions or Director of Housing, complete the application blank, and send it to the Business Office with a $50 deposit. Money orders or checks should be made payable to Oregon State University.

Hall Assignments and Policies

The university's acceptance of the housing application does not guarantee assignment or admission to the university. Assignment is contingent on the final acceptance for admission by the university and on the available space. Assignments are mailed by July 15 for fall term and two weeks before the opening of winter and spring term.

Requests for assignment to a particular hall will be honored whenever possible. Consideration is given to roommate preference if both students send their deposits at the same time and roommate requests are mutual. Assignments are made on the basis of the date deposit is received.

Once the assignment is made, no changes in hall preference will be considered until after the second full week of classes of the first quarter the contract is in effect. Present occupants are given preference until June 15. Freshmen are given preference between June 15 and August 1. Applications from freshman students received after August 1 will be considered with those from other students and assigned by date of application. Returning graduate students and students who will be graduate students who do not complete their deposit and contract by June 15 will be assigned after August 1 on the basis of date of deposit and availability of space.

The university reserves the right to refuse any application for accommodations in the university residence halls by returning the deposit. Hall assignments will be canceled at 9 a.m. the first day of classes unless the Housing Office receives notification of a late arrival. Reassignment will be made upon arrival.

Reservation Deposit

The $50 reservation deposit must accompany the application. The full $50, less any charges, will be returned to the student after he checks out of the residence hall at the completion of the contract period.

The reservation deposit is forfeited if the contract is broken, except in the special cases stated in the contract. If the student contracts to return to the residence halls for the succeeding academic year, the $50 will be retained as a reservation deposit. Charges for damages cannot be made against the reservation deposit during the contract period.

The deposit may be used to pay outstanding hall dues and/or charges for repair or replacement of damaged furniture or fixtures for which the student is responsible. Charges for loss or damage of equipment or to defacement of any area in common use such as lounges, recreation rooms, corridors or bathrooms may be assessed equally against the residents of the area. Any balance remaining in the deposit after all charges have been paid will be refunded about six weeks after the close of the contract period.

Contract Period

The residence halls will be open to receive students into the halls at 9 a.m. on Sunday preceding registration for each term, and will remain open until 12 noon on the day after the last day of finals in each term. Students may not occupy or leave belongings in any student room before the time when the residence hall is officially scheduled to open and the student's room becomes available, unless he is participating in a scheduled program and pays an additional rental fee. All room assignments are exclusive of university-scheduled vacation periods. This contract terminates 24 hours after the individual student's last final examination at the end of the contract period.

Payment of Room and Board

Residence hall charges include both room and board and must be paid in advance. If it is not possible to pay the full term charge at the beginning of each term, partial payments may be made according to published schedules and are due the first day of each month. A memorandum statement of charges may be placed in the student's mail box, but it is the responsibility of the student to pay the posted charges on the due dates. A ten-day extension after the first payment each term may be granted to those receiving payroll checks on the tenth of the month. The student must complete a form in the Housing Office, before the due date, requesting permission for late payment. A penalty of $1 per day up to a maximum of $5 is assessed for late payments. The student's registration may be canceled if payment is not made by the tenth of the month.

All housing contracts are for both room and board. Meal tickets are not transferable. Three meals are served each weekday and Saturday, and two on Sundays and holidays. Meals are not provided during Thanksgiving vacation. Board and room charges do not include meals or housing during Christmas or spring vacation.

The State Board of Higher Education reserves the right to change room and board rates.

Cancellation of Application and Contract

The housing contract is binding, and the student and/or guarantor shall be responsible for the full amount of charges except as noted below:

1. The application and contract may be canceled by written request to the Director of Housing no later than August 1 for fall term. Application and contracts for winter or spring terms may be canceled if notification is received 14 days before the first day of registration for winter or spring terms. (See refund schedule.)
2. Between August 1 and 10 days prior to the first day of registration, this contract may be canceled, with forfeiture of the deposit, by a written notification to the Director of Housing.
3. If a student registers in school and has not canceled his application and contract as indicated above, he will be required to comply with his contractual agreement.

Termination of Contract: A contract may be terminated under the following conditions:

1. If a student withdraws from the University during the contract period.
2. If a student marries, the room contract will continue until the end of the term. Board charges will be refunded. The reservation deposit is forfeited.
3. If a student joins a fraternity, sorority, or co-op, he will be permitted to vacate the residence hall at the end of the term. The reservation deposit of $50 is forfeited. Should the student leave the living group to which he has moved during the contract period, while remaining a student, the contract will be reinstated.
4. If a student is drafted into military service, a prorated refund of both room and board charges will be made. The reservation deposit, less any charges, is refunded.
5. A hall officer who has fulfilled the eligibility requirements for termination of his contract may wait until the term his office expires to make his choice.
6. Students who do not pay all room and board charges within ten calendar days after final payment date shall be evicted from the residence hall and their registration shall be canceled.
7. When a student's conduct is such as to require his removal from the residence hall in the best interest of other residents, his contract shall be terminated.

Refunds

A. Reservation Deposit

The application and contract may be canceled by a written request to the Director of Housing no later than August 1. Reservation deposits canceled before the cancellation deadlines indicated above will be refunded, less a $10 charge to cover some of the costs of processing the application and making the refund. The reservation deposit will be forfeited if canceled after August 1 unless admission to the university is denied. The $50 reservation deposit will be forfeited if the student withdraws from the university or moves from the residence hall before the completion of the contract.

B. Room and Board

1. Full refund is made if the student is denied admission to the university, or if accommodations are not available.
2. If a student withdraws from the university, a refund of charges will be made according to the following refund schedule:
   Fall term—$4 per day, winter term—$3 per day, spring term—$2.50 per day.
3. If a student moves from the residence hall but does not withdraw from the institution, he must pay all board and room charges for the remainder of the contract period. Exceptions to this policy must be approved by the Housing Committtee. Should a request to leave the residence halls during the contract period be granted a student by the Housing Committee, the student will be charged rent for the room reserved but not occupied.
4. Board charges will be refunded on a prorated basis if the student is absent from Corvallis for ten or more consecutive days as an academic or health requirement. There is no refund of room rent for this period.
5. Board refund may be granted graduating seniors who leave the institution on Commencement Day. There is no refund on board for an absence of 10 days or less prior to Commencement.
6. Refunds will not be made to students for absences while confined in the Student Health Service because of illness or accident.

Residence Hall Rates

All Oregon State University residence halls and dining facilities are built entirely with income from resident students. No state or tax funds are used.

Approximate Multiple Board and Room Per Term

Residence Hall	Rate per term Fall	Winter	Spring	Rate per year
Buxton, Callahan, Poling, Cauthorn women	$418	$278	$232*	$928
Sackett, double	428	285	238*	951
Finley, Hawley, McNary, Snell, Wilson, West, Cauthorn men, Sackett triple	405	270	225*	900
Weatherford	385	257	213*	855

* Students not in residence fall term will be charged winter term rates.

A $10 social fee is collected with the first room and board charge fall term.

Single rooms in Buxton, Callahan, Poling, and floors occupied by women in Cauthorn Hall are $1,108 per year.

Single rooms in Weatherford Hall are $1,010 per year.

Single rooms in all other halls are $1,080 per year.

The State Board of Higher Education reserves the right to make changes in the rates quoted here.

Telephone Service

Buxton, Callahan, and Poling halls and floors occupied by women at Cauthorn hall have telephones located in each student room. Students are able to dial direct to any on-campus number or any number listed in the Corvallis directory. They may receive direct incoming calls. Only credit card or collect calls may be made from room telephones.

In Cauthorn, Finley, Sackett, and Wilson halls, students may obtain a room telephone by paying an additional charge at the housing office after checking into the residence hall.

All remaining residence halls have telephones located on each floor for student use. Hall telephones may be used only for collect or credit-card long distance calls. Students may not accept incoming calls on these phones or try to place calls from these phones on a prepay basis. Pay station phones are provided for this service.

Graduate Housing

Graduate students may live in any of the residence halls if space is available. In addition, housing facilities for graduate men and women are provided in separate wings of Sackett C. Double occupancy rooms in this hall have more space than the normal student room and sleeping areas are separate from the study area. Twenty meals a week are provided in small dining areas.

Graduate students are given first priority in assignment to the 80 spaces available in Sackett C. In exceptional cases consideration will be given to veterans 21 years of age or older, to fifth-year seniors in five-year degree programs, and to other mature underclassmen.

Graduate students who prefer to live off campus will find a listing of available rooms and apartments at the Department of Housing, Administration 15.

Summer Term

Residence hall housing is available for summer students. Because of the large number of fall term reservations made by former residents, students entering the university for the first time in the summer may be assigned to one hall for the summer and a different one in the fall.

Off-Campus Housing

Rooms and apartments in Corvallis and the surrounding community are available for married couples, graduate, senior, junior, and sophomore students. Lists of vacancies are posted in the Department of Housing for the convenience of eligible students, but cannot be provided by mail because they are continually changing.

Housing for Married Students

Oregon State University maintains a number of furnished apartments for married students. Rentals range from $45 to $110 per month with water and garbage-disposal service furnished. Apply to the Department of Housing. A married student seeking living accommodations off campus should consult the Department of Housing.

Cooperative Housing

The cooperative houses at OSU include those:

Operated by the University: Azalea House, Coed Cottage, and Oxford House for women and Dixon Lodge, Avery Lodge, Reed Lodge, and Heckart Lodge for men.

Operated by Co-Resident Women, Inc.: Jameson House, Heather Rae, and Anderson House for women.

Independently operated: Beaver Lodge and Varsity House for men.

Each living group has a university-approved housemother or head resident. Each group is governed by a constitution, elected officers, and policies determined by the members. The cooperative houses are united under the Inter-Cooperative Council (ICC).

Students living in cooperative houses save approximately $20 a month by each doing three or four hours of house work every week. Additional information and application blanks may be obtained from the Department of Housing or from the individual houses.

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 approximate those of the residence halls. Cost of membership, social fees, and sometimes building fees, are extra. Both fraternities and sororities have "rush" (selection of prospective members) at the beginning of the fall term and at other periods during the year.

Sororities provide supervised small group living accommodations for sophomore, junior, and senior women. Freshman women, even though pledged, generally 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 and rush may be obtained from the Panhellenic Council, c/o Associate Dean of Students Office, 114 Bexell Hall.

Sororities at Oregon State: Alpha Chi Omega, Alpha Delta Pi, Alpha Gamma Delta, Alpha Omicron Pi, Alpha Phi, 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.

Fraternities provide comfortable, supervised accommodations for men. A freshman man pledged to a fraternity may live in the chapter house unless he has made other housing commitments, in which case he must fulfill them before moving into the fraternity house. A fraternity brochure and booklet are available from the Interfraternity Council, c/o Associate Dean of Students Office, 114 Bexell 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, FarmHouse, 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.

Additional Information

For more detailed information on all types of housing, you may obtain a brochure entitled "Student Housing" from the Department of Housing.

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. Registered students 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. After-hours emergency service is provided at the college infirmary by student health staff physicians. Staff physicians are on twenty-four hour emergency call, including weekends. A student in attendance for three terms is allowed a total of 15 days hospitalization during any one academic year. Extra charges are made to cover costs of such items as overtime in the infirmary, special medications, x-rays, and laboratory tests.

All expenses connected with surgical operations, fractures, specialized medical care, and special nursing must be met by the student who requires such attention. The health service will not pay or be responsible for bills from private physicians or private hospitals.

Limited dispensary service is available during the summer term.

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

The health service building contains a dispensary and 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 pharmacist, a laboratory technician, and an x-ray technician.

The Mental Health Service is staffed by full-time psychologists and part-time psychiatrists. There is no charge to the student for this service. Records are confidential and are not released unless authorized by the patient.

Medical Examination

A medical examination, tuberculin test, and immunizations are required of all entering students. These are performed by a licensed M.D. or D.O. physician and surgeon of the student's own choice and at the student's expense before he arrives on campus. They are required of former OSU students, including those in the Graduate School, returning to the campus after a lapse of five years.

Tests and immunizations required include a tuberculin test within the past six months, vaccination against smallpox within the past ten years, diphtheria-tetanus (adult type) immunization within the past ten years, and other tests deemed necessary to protect the health of the student body. Immunization against poliomyelitis is recommended.

Exceptions to these requirements are made for students who decline immunization 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 parent or guardian 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, tetanus diphtheria, or poliomyelitis while students at this university. However, a T.B. skin test or chest x-ray is required.

Students transferring from another college or university may request a medical transcript from the Student Health Service of the institution previously attended and present it as part of their medical record. They must also complete the front page of the OSU medical examination form and complete smallpox and diphtheria-tetanus immunization and the tuberculin skin test requirements.

Students separated from military service within one year of registration may present a copy of the separation examination. In addition, they are required to complete the front page of the Oregon State University medical examination form and to fulfill the smallpox and diphtheria-tetanus immunization and the tuberculin skin test requirements.

Foreign students are required to purchase approved medical insurance before registering for classes.

Direct inquiries regarding the medical examination, or any other health requirements for admission, to the Student Health Service, Oregon State University.

Student Accident and Sickness Insurance

The ASOSU Insurance Plan (Students' and Dependents' Accident and Sickness Medical Expense Plan) is offered to students at registration or afterward at the Memorial Union Business Office until the final day of registration. Term costs are approximately $11, and for the year, $33. If three terms of coverage are purchased at fall registration, summer coverage is included. This plan will cover all insured students 24 hours a day, anywhere in the world, including vacations. The policy provides added benefits for recreational sports and diagnostic x-ray and laboratory fees for illness on an out-patient basis. The policy will pay up to $1,000 for accidents, illness, and dismemberment. Also available is a separate Voluntary Accidental Death and Dismemberment Plan which pays $10,000 on accidental death or double dismemberment. Cost is $12 per year.

Activities which include athletic events and which are registered at the Student Activities Center must include accident insurance coverage for participants in the form of student insurance, personal policies, or day-coverage policies for the event. The latter may be purchased through the Activities Center.

Counseling Center

A student in college needs to make decisions regarding majors, educational plans, and vocational goals and may need assistance in developing efficient study habits and effective relationships with others. Other personal concerns may affect his performance in school.

The Counseling Center, located in Room 308, Education Hall, provides a confidential setting where a student may explore his concerns with a professionally trained counselor. A student is assisted in reaching solutions by achieving a better understanding of himself and his environment through personal interviews, group sessions, testing, and information.

The center maintains a complete file of interest, personality, special aptitude, and achievement tests, in addition to a library of career information and college catalogs, The center also offers information, counseling, and referral services on questions related to military and governmental programs such as VISTA, the Peace Corps, and selective service. Staff members are also available for consultation with student groups. There is no fee for counseling, but there is a nominal charge for testing.

Activities

Oregon State University recognizes the value of student activities as a part of a college education. It is through the activities program that students are stimulated to discover and experiment with their own capabilities and capacities, and to be creative in their approach to problem solving. Leadership experience gained through participation in self-governing organizations and programs encourages the formation of habits of civic responsibility. Activities enhance social and cultural development by fostering participation in the social, intellectual, and aesthetic life of the campus. Because of their close relationship to the educational program, many activities are cocurricular rather than extracurricular.

Eligibility

To be eligible to hold office in any extracurricular or cocurricular activity officially recognized by OSU a student must: (1) Have earned at least 12 hours of credit in his most recently completed term. (2) Be registered for at least 12 hours currently. (3) Have an accumulative GPA of 2.00 or higher.

Memorial Union

The Memorial Union, located in the heart of the campus, is a community center for Oregon State University. It provides services, facilities, and programs to meet the varied social, recreational, and cultural needs of Oregon State University students, faculty, staff, alumni, and campus guests.

The building contains an activity center for the use of all student organizations. It provides a complete food service including cafeteria, snack bar, and banquet facilities, a book store, recreation area including billiards, bowling, and table tennis facilities, a music room, ballroom, art gallery, craft shop, lounges, and meeting rooms of all types. 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, recreational, and cultural programs.

The building stands as a constant reminder of this nation's struggle for peace, and a living memorial to the students who have given their lives in the service of their country.

Student Government

The Associated Students of Oregon State University (ASOSU) is the student government on the OSU campus. In recent years ASOSU has become increasingly active in the policy making and operation of the university through student participation on some 33 university committees. ASOSU also sponsors and coordinates such all-campus events as Homecoming, Dads Weekend, Mothers Weekend, student insurance program, Beaver Open House for high school seniors, and other special events.

Associated Women Students (AWS) represents the interests and general welfare of all women students and provides programs which will complement their academic experiences. It is responsible for formulating and implementing the enforcement of women's regulations.

Class Organizations formed by each entering class retain their identity throughout the four undergraduate years.

Councils representing both men's and women's living groups have important roles in student self-government. They include Panhellenic Council, Women's Residence Hall Council, Interfraternity Council, Men's Residence Hall Council, and the Inter-Cooperative 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 Program Council and the Art Department, exhibitions in the Memorial Union stimulate interest in architecture, painting, sculpture, and related arts. They give the student acquaintance with his cultural heritage and an awareness of contemporary art movements throughout the world. Student and faculty art exhibits are shown in the Fairbanks Hall galleries throughout the year.

Membership in the student musical organizations is open to all students after consultation with the directors concerned.

The Corvallis-OSU Symphony, the Concert Band, the University Chorus, Madrigal, and the Choralaires present several concerts annually on the campus.

OSU groups are members of the American Symphony Orchestra League and the American Choral Foundation. Students in these activities earn regular credit.

The Corvallis and OSU Music Association 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. The all-student Encore Committee brings to the campus popular entertainment in the form of pops concerts and entertainment.

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, the Intercollegiate Forensic Association of Oregon, and Model United Nations. Special student organizations, such as Masque and Dagger, KBVR, the Campus Puppeteers, and chapters of Delta Sigma Rho-Tau Kappa Alpha, Zeta Phi Eta, and National Collegiate Players also provide outlets for forensic, dramatic, and broadcasting talent.

Training and experience in acting, play production, and stagecraft are provided by the Speech Communication Department. Each season, seven major plays and groups of one-act plays are presented in Mitchell 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. Music, information, news, and sports are programmed over KBVR; television programs are prepared and telecast over a closed-circuit system. A full schedule of forensic activities for both men and women students, including debate, oratory, extempore speaking, after-dinner speaking, and discussion, are under the direction of the Speech Communication 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 additional 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 Convocations and Lectures, Faculty Men's Club, American Association of University Women, Faculty Women's Club, College Folk Club, Liberal Arts Programs, Committee on Religious Education, Round Table, Associated Students, Associated Women Students, Phi Kappa Phi, Sigma Xi, and others.

Sports and Athletics. As a member of the Athletic Association of Western Universities (AAWU), Oregon State University conducts a regular program of competition with other large Pacific Coast universities in football, basketball, baseball, track, crew, wrestling, swimming, tennis, and golf. OSU also engages in intercollegiate competition in the following recreational sports: soccer, rugby, skiing, men's bowling, women's bowling, pistol and rifle, women's field hockey, and gymnastics.

A comprehensive program of intramural sports, closely correlated with instruction in physical education, provides an opportunity for every student, whether he is proficient in a sport or not, to belong to a team that competes with other teams on the campus in a wide variety of outdoor and indoor sports. Stimulation and recognition of achievement in athletics and sports are provided through the Division of Physical Education, the Recreational Sports Committee, honor societies in physical education, and other 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); *Student Handbook; The Annual Cruise* (illustrated annual published by Forestry Club); *The Oregon State Student Directory* (published by student journalism and advertising societies); and *Oregon State Review* (literary magazine).

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
Gamma Theta Upsilon	Both	1928	1956	Geography
Mortar Board	W	1918	1933	Senior leadership
Omicron Nu	Both	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	1924	Engineering
Xi Sigma Pi	M	1908	1921	Forestry
Departmental Honor Societies				
Beta Alpha Psi	Both	1919	(1923) 1959	Accounting
Beta Gamma Sigma	Both	1913	1963	Business
Eta Kappa Nu	Both	1904	1921	Electrical Engineering
Iota Sigma Pi	W	1900	1960	Chemistry
Kappa Delta Pi	Both	1911	1928	Education
Pi Delta Phi	Both	1906	1962	French
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
Epsilon Pi Tau	M	1927	1929	Industrial Arts
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
Zeta Phi Eta	W	1893	1967	Speech
Recognition Societies				
Alpha Phi Omega	M	1925	1946	Service (Boy Scouts of America)
Arnold Air Society	M	1947	1951	Air Force
Blue Key	M	1924	1934	Service (Seniors)
Delta Sigma Rho	Both	1906	1926	Forensics
Kappa Kappa Psi	M	1919	1922	Band
Kappa Pi	Both	1911	1949	Art
Mu Beta Beta	Both		1928	4-H
National Collegiate Players	Both	1922	1923	Dramatics
Pershing Rifles	M	1892	1949	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
Talons	W	.....	1933	Service
Thanes	M	.....	1936	Service
Local Honor Societies				
Euterpe	W	.....	1920	Music
Masque and Dagger	Both	.....	1917	Dramatics
Orange O	W	.....	1922	Physical Education
Orchesis	W	.....	1929	Dancing
Parthenia	W	.....	1929	Physical Education
Silver Wings	M	.....	1956	Air Force

* As classified by *Baird's Manual*, 1968.

Student Expenses

The table below gives estimated *average expenses* for the first term and the first year. Some courses of study require more expensive books and supplies than others; for example, drawing instruments and slide rule for engineering students cost about $75. Board and room costs are based on charges in the halls of residence. Cost of clothing and other incidental items vary greatly with the individual.

Average expenses per month may vary from $160 to $250 but a student meets large financial demands in the first two weeks of college. He pays registration fees for the whole term, room and board a term in advance, and he must buy books at the beginning of the term. If he cannot pay room and board for the whole term, he may arrange to pay on a monthly basis. Students from Oregon should come prepared for an initial expense of at least $650. Nonresident students should be prepared for an initial outlay of about $1,000. Personal checks in the exact amount provide the most convenient and safest method of payment.

First Year Expenses

	Oregon residents		Nonresidents	
	First term	*First year*	*First term*	*First year*
Tuition and Fees	$136	$ 408	$ 469	$1,407
General Deposit	25	25	25	25
Board and Room	394	950	394	950
Books and Supplies	60	150	60	150
Clothing	60	125	60	150
Incidentals	135	442	135	418
* Totals	$810	$2,100	$1,143	$3,100

* *Does not include travel to and from the University.*

The State Board of Higher Education reserves the right to make changes in the fee schedule without notice. For further information on fees see pages 15, 16.

Financial Aid

Philosophy. Oregon State University's financial aid program provides assistance and advice to students who would be unable to pursue their education at the University without such help. Scholarships, grants, loans, and part-time employment are available singly or in various combinations to meet the difference between what the student and his family could reasonably be expected to provide and the expected cost of attending OSU.

Need Analysis. To qualify for financial aid, each student must demonstrate financial need. Oregon State University uses College Scholarship Service, a national nonprofit need analysis organization, to assist the University staff in determining financial need. This service uses a fair and uniform analysis system based upon family income, assets, and other resources of the student. In applying for financial aid, a student is required to submit the Parents' Confidential Statement to College Scholarship Service or the married/independent budget form to the Financial Aid Office. The financial aid staff determines the student's need upon receiving the completed application and the financial data from College Scholarship Service. For most aid, an interview is held with the student.

Application Procedures. Returning OSU students and transfer students may request application forms from the Financial Aid Office, 108 Plageman Hall, Oregon State University, Corvallis, Oregon 97331. Entering freshmen may obtain application forms from their high schools.

With the exception of the guaranteed student loan program students may apply for scholarships, loans, grants, and College Work-study on a single application form. For these programs, applicants are expected to furnish a 'Confidential Statement' to the College Scholarship Service, P.O. Box 1025, Berkeley, California 95701. The deadline for scholarship applicants to submit this statement is January 15; for other financial aid applicants, February 15. The completed application form should be submitted to the OSU Financial Aid Office by March 1 for all forms of aid except the guaranteed student loan application. Applications received after March 1 will be considered after other applications have been processed. Guaranteed student loans will be considered after July 1.

Student Loans. A student must have been admitted to OSU or have been in attendance at OSU prior to making application for a student loan. Funds are usually advanced in equal amounts at the beginning of each term of the academic year. To qualify for all programs, students must be enrolled full-time (12 credit hours per term for undergraduates; 9 credit hours per term for graduates) and not be on probation.

National Defense Student Loan. Loans are available to students who qualify on the basis of financial need analysis. Undergraduates may borrow up to $1,000 per academic year and graduate students up to $2,500 per year. Repayment is arranged on a monthly basis following the termination of full-time studies. Interest is charged during the repayment period at 3 percent simple interest. Undergraduate Pharmacy students must apply for the Health Professions Student Loan in lieu of the National Defense Loan.

Guaranteed Student Loans. Loans are available to OSU students through cooperation of the university, the student's *home state* loan guaranty agency, and the student's home town bank. Oregon residents should contact the OSU Financial Aid Office for further information; nonresidents should contact their home state guaranty agency or home town lending agency. Undergraduates may borrow up to $1,000 per class year and graduate students up to $1,500 per class year. Interest at 7 percent per year may be subsidized by the federal government while the student is in school if the family of the student has an adjusted gross income of under $15,000 for the previous tax year. Repayment is on a monthly basis starting 10 months after the student leaves college.

Regular Student Loans. Loans based upon financial need analysis are available to students in good standing at the university who have completed at least one term at OSU. The borrowing limits are: freshmen $300, sophomores $450, juniors $600, and seniors and graduate students $700. Loans to freshmen and sophomores are due the following September 1. Upperclassmen may borrow up to 24 months. Interest is charged at 4 percent per year until the due date. A Contract of Guaranty (co-signer) is required for ALL regular loans.

Other Loans. 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, Seed, and Suppliers Association 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; Marion Horton Loan Fund; and Alva W. Blackerby Memorial Loan Fund for students in forestry; W. C. Williams Loan Fund for seniors in engineering; A. A. Osipovich Loan Fund for students in Engineering; Oregon State Horticultural Society Fund for studying varied phases of horticulture; Oregon Home Economics in Homemaking Loan Fund for home economics students; E. N. Sidor Memorial Loan Fund for students in Engineering; Benton County TB and Health Loan Fund, for students in health education and pre-nursing, Health Professions Student Loan Program for junior, senior I, senior II students in pharmacy; the OSU Book Stores, Inc. Loan Fund; Jerry R. Alexander Loan Fund for Navy ROTC students; and Lt. Lawrence Gallego Loan Fund for Army ROTC.

The trustees also cooperate in the administration of the J. T. Apperson Educational Fund (administered by the State Land Board) and the Fred A. Rosenkrans Loan Fund (administered by the First National Bank of Oregon, Portland). Applications and further information for these funds are available at the OSU Financial Aid Office.

Grants. The Educational Opportunity Grant Program provides cash awards to students with exceptional financial need. The student must be a citizen of the United States or have an immigrant visa. Grants range from $400 to $1,000 per academic year. The grant must be matched by other types of financial aid received through the University, including scholarships, loans, and part-time employment. A student applying for an Educational Opportunity Grant should usually apply for other assistance from OSU to meet the matching requirement.

Work-study. The College Work-study program provides federally supported part-time employment for students qualified through financial need analysis. Full-time summer employment with nonprofit agencies which have Work-study contracts with Oregon State University is available to students living in the Corvallis area and in many communities throughout the state. Students must be admitted to the university or be full-time students (12 credit hours for undergraduates; 9 credit hours for graduate students) to qualify for this program.

Part-time Employment. The Financial Aid Office assists students in securing part-time jobs while enrolled in college and also assists them in obtaining vacation jobs. A variety of job opportunities exists for those students who want to work on campus or in the local community.

Students may request additional information about financial aid opportunities from the Financial Aid Office, 108 Plageman Hall, Oregon State University, Corvallis, Oregon 97331.

Scholarships

The scholarships program is coordinated through the University 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 Oregon State University Financial Aid Office, Student Health Service, Room 108, or from any Oregon high school principal. *Applications, including transcripts of all academic work to date of application, should be forwarded to the Financial Aid Office by March 1 of each year.* Exceptions to these procedures will be noted for certain of the scholarships administered by other agencies.

State

Resident Students

Partial Tuition and Fee Scholarships

Under law created by the Oregon State Legislature, Partial Tuition and Fee Scholarships (regular tuition fees less $38 which the student himself pays each school quarter) are awarded by the State Scholarship Commission equal in number to 2½% of the enrollment in State-supported institutions. Entering freshmen having financial need are eligible to apply if ranked in the upper one-half of their high school class. A college student, with financial need and not on any form of probation, is eligible to be considered for a scholarship if he (1) has a cumulative GPA of 2.50; (2) has earned a 2.50 GPA in the term preceding the selection of scholarship winners. In order to receive a scholarship, however, the student must have earned a 2.50 GPA for the term during which he received official notice of his selection. Currently enrolled students apply directly to the Financial Aid Office, Student Health Service, Room 108. Applications for Partial Tuition and Fee Scholarships are available to entering freshmen from the high school principal.

District and County Scholarships

The State Scholarship Commission awards annually one four-year scholarship for each Oregon county and for each State Legislative seat. The value of these scholarships is the same as the Partial Tuition and Fee Scholarships. Students wishing to apply for these scholarships do so by making application to the State Scholarship Commission, 1445 Willamette St., Eugene, Oregon 97403 through the high school principal.

State Cash Scholarships

Outstanding high school seniors having financial need are eligible to apply for Cash Scholarships awarded by the State Scholarship Commission. These awards have an annual value of from $100 to $500 and are renewable until graduation provided a term and cumulative grade-point average of 2.50 is maintained. Awards may vary from year to year dependent upon a student's financial need. The Commission provides each high school principal with scholarship application forms and applications are made directly to the State Scholarship Commission. Recipients of Cash Awards may attend any State or private institution.

Nonresident Students

A limited number of scholarships are available to nonresident students. To be eligible for such scholarships a student, if a freshman, must have earned at least a 3.00 in high school; if an entering transfer, a student must have earned a 2.75 either in a junior college or a four-year college. Currently enrolled nonresident students must meet the same requirement as currently enrolled resident students. A recipient must have financial need, must have demonstrated good character, and must show a potential for future academic success. These scholarships cover a portion of the fees charged—$100, $150, or $190 a term. Applications for these scholarships are made to the Financial Aid Office, Student Health Service, Room 108, Oregon State University, prior to March 1.

Foreign Students

Scholarships for a limited number of students from foreign countries attending institutions of the Oregon State System of Higher Education are available. All applications for scholarships on the part of foreign students should be made to the Financial Aid Office, Student Health Service, Room 108.

All-Campus

AIR FORCE ROTC SCHOLARSHIPS: The Air Force Financial Assistance Program provides tuition, textbooks, and $50 monthly for students enrolled in four-year Air Force ROTC. Scholarships based on performance and potential rather than need. All four-year AFROTC cadets considered. High school seniors may apply through their high school. For information contact Air Force ROTC. Oregon State University.

ALBRIGHT MEMORIAL SCHOLARSHIP: A four-year scholarship covering tuition and books honoring Mable Norman Albright. Applicant must be a graduating senior from a Benton County high school. Selection based on scholastic standing, high school and community activities, good citizenship, and financial need.

ARMY ROTC SCHOLARSHIPS: Tuition, textbooks, laboratory and other instructional fees, and $50 per month subsistence allowance. Four-Year Scholarship available to high school seniors through Army Area Commanding General; two-year Scholarship available through Professor of Military Science to college Sophomores enrolled in Army ROTC Program.

ASSOCIATED WOMEN STUDENTS SCHOLARSHIP: Financial aid to one or more women in recognition of outstanding campus service and high scholarship.

BERGER SCHOLARSHIPS: Scholarships ranging from $300 to $800. Available to both resident and nonresident undergraduates. Selections based on high scholarship, financial need, and character, with promise of rendering service to the University. A memorial to Marie Harbeck Berger.

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.

CORVALLIS ROTARY CLUB SCHOLARSHIP: Tuition and fees to a Benton County high school graduate or a Benton County resident who, because of school boundaries, attended high school in a neighboring county. Application submitted to Scholarships Committee of Corvallis Rotary Club through club president. Financial need, educational interests, and goals should be expressed in a letter of not more than two typewritten pages.

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. Selections are made on the basis of a qualifying examination held in Lake County.

DELTA DELTA DELTA SCHOLARSHIP: One or more scholarships 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 attend Oregon State University. Application through high school principal with approval of local unit extension officers.

GENERAL ELECTRIC COLLEGE BOWL SCHOLARSHIP: $500 cash to a junior man or woman. Applicant must have maintained high scholarship, and have demonstrated individual responsibility and those academic qualities which characterized the members of the successful College Bowl team.

WILLIAM AND ALICE HERRIN SCHOLARSHIP: Annual tuition and fees scholarship to men or women students in their junior or senior year. Selection based on high scholarship, unimpeachable character, and demonstrated service to the University.

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.

LEONORA H. KERR-FOLK CLUB SCHOLARSHIP: Full tuition to an 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 Oregon State University 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 UNIVERSITY BOOKSTORE, INC., SCHOLARSHIPS: Full tuition and fees scholarships presented annually to students who have maintained good scholarship and citizenship and who have financial need.

OREGON STATE UNIVERSITY FOLK CLUB SCHOLARSHIPS: One or more full tuition scholarships to outstanding freshman women from Oregon high schools.

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

OREGON STATE UNIVERSITY DADS CLUB SCHOLARSHIPS: Tuition and fees to men and women selected by the Oregon State University Dads Club in conjunction with the Dean of Men and Dean of Women. Recipients chosen on basis of scholastic attainment and financial need.

OREGON STATE UNIVERSITY MERIT SCHOLARSHIPS: Two $2,000 scholarships to entering freshmen to be awarded $500 per year for four years. National Merit Award semi-finalists from Oregon and those semi-finalists from out of state who have indicated a preference for Oregon State University are eligible to apply.

OREGON STATE UNIVERSITY 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 woman with grade-point averages above 3.00.

PHI KAPPA PHI MERIT SCHOLARSHIPS: Two $500 scholarships based on academic merit; one to entering freshmen and one to an Oregon State University junior.

FRANK AND FRANCES RAMSEY SCHOLARSHIP: $500 to a male student selected by a committee composed of the Dean of Men, Director of Alumni Relations, and the Director of Athletics of Oregon State University; based upon the characteristics of citizenship, academic standing, and athletic ability.

THRIFT SHOP SCHOLARSHIP: Full tuition to an outstanding freshman woman from a Benton County, Oregon, high school.

School of Humanities and Social Sciences

KATE L. BARTHOLOMEW JOURNALISM INTERN-SCHOLARSHIP: Annual award of $500 to $1,000 to a sophomore, junior, or senior preparing for a career in journalism. Provided by Frank Bartholomew, chairman of the board and former president of United Press International and an OSU alumnus, in memory of his mother.

RACHEL HOLLANDS MEMORIAL SCHOLARSHIP: Approximately $400 annually awarded alternately between art and agricultural economics. Selection of recipient based on financial need, scholastic achievement, good character, and U. S. citizenship.

KAREN LARSON MEMORIAL: $100 annually provided by the OSU Art Students' Union to OSU student who has completed at least 9 term hours in art with grade-point average of 3.25 or above. Application through the society or head of Art Department.

LAKE JOURNALISM SCHOLARSHIP: $150 presented annually by the OSU student chapter of Theta Sigma Phi to a high school senior woman who has been active in journalism, has high scholastic standing, and plans to include journalism courses in studies at OSU. Named in honor of Adelaide V. Lake. Address inquiries to Department of Journalism. Application deadline March 1.

MUSIC STUDY SCHOLARSHIPS: Annual scholarships of $30 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 freshmen enrolled in Music 111. Application through Music Department.

FRED M. SHIDELER TECHNICAL JOURNALISM SCHOLARSHIP: Annual award of $100 to an incoming freshman majoring in technical journalism. Funds provided by the OSU chapter of Sigma Delta Chi, professional journalistic society, in honor of Fred M. Shideler, head of the OSU Department of Journalism 1932-1967, and member of the OSU faculty for 40 years.

D. PALMER YOUNG MEMORIAL DRAMA SCHOLARSHIP: Partial tuition awarded annually to a student who, in the judgment of the university theater staff, shows the greatest promise of contribution to the Oregon State University Theater program and has financial need.

School of Science

BENTON COUNTY MEDICAL SOCIETY SCHOLARSHIP: $500 to an undergraduate premedical student. Selection based on scholarship, financial need, and qualities such as personality and ability determined by personal interview. Recipient need not be an Oregon resident, and may be of any race, color, or creed.

BOEING SCHOLARSHIPS: Two full resident tuition and fee scholarships for juniors or seniors in mathematics and physics. Selection made on basis of academic achievement, personal qualities, and financial need. Recipients are chosen without regard to race, color, creed, or national origin, but must be U. S. citizens.

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. Award made to a junior or senior who shows outstanding promise in the School of Science.

PAUL COPSON MEMORIAL SCHOLARSHIPS: Approximately $200 annually from the bequest of June Seeley Copson '15 for each of two scholarships, one in physics and one in mathematics. Awards made to juniors or seniors on the basis of character, promise in scholarship, and general scientific aptitude.

MILTON HARRIS SCHOLARSHIPS: Two $300 scholarships for outstanding juniors or seniors in science, one preferably in chemistry. Selection based on academic achievement and promise, and on need of financial assistance.

LONGVIEW FIBRE COMPANY PULP AND PAPER UNDERGRADUATE SCHOLARSHIP: $369 to a worthy sophomore or junior in chemistry. Selection based on need of financial assistance, scholarship, professional interest, and personal qualities. Recipient must be a permanent U. S. resident. Summer employment with company may be available.

JOSEPH E. SIMMONS MEMORIAL SCHOLARSHIP: $200 or more to a worthy and promising student in microbiology. Established by the widow and friends of the late Professor Joseph E. Simmons, formerly head of the Bacteriology Department.

STANDARD OIL COMPANY OF CALIFORNIA SCHOLARSHIP: $750 to a worthy sophomore or junior geology major nominated by the faculty of the Department of Geology. Candidates must be citizens of the U.S. or holders of permanent immigration visas.

TEXACO SCHOLARSHIPS: Approximately $1,600 divided into three or more scholarships for upper division men in chemistry, physics, mathematics, geology, or engineering, who may qualify for careers in the petroleum industry. Selections based on scholastic ability, financial need, personal qualities, and sound health. Recipient may be of any race, color, or creed, and awards to juniors normally are renewed for the senior year.

UNION OIL COMPANY OF CALIFORNIA FOUNDATION SCHOLARSHIP: $500 to a worthy undergraduate geology major nominated by the faculty of the Department of Geology on the basis of scholastic achievement, extracurricular activities, and good citizenship. Candidates must be U. S. citizens.

School of Agriculture

AGRICULTURAL ECONOMICS AGRIBUSINESS SCHOLARSHIPS: Two scholarships supported by Pacific Supply Cooperative, one by Blue Lake Packers, Inc., and one by Spokane Bank for Cooperatives, provide cash awards equivalent to one year regular tuition for two majors in Agricultural Economics with apparent high capacity for success in Agribusiness. Selection based on scholarship, aptitude for business, desire to pursue an agribusiness vocation, and related factors.

AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS STUDENT BRANCH SCHOLARSHIP: $50 to an incoming freshman in agricultural engineering. Provided by the Oregon State Student Branch of ASAE.

ASSOCIATED BLUE LAKE GREEN BEAN CANNERS, INC. SCHOLARSHIP: $500 to a junior or senior in food technology. Applicants use State Scholarship Application form. Recipients selected by representatives of Department of Food and Dairy Technology, approved by Oregon State University Scholarship Committee.

P. M. BRANDT AND G. H. WILSTER MEMORIAL SCHOLARSHIP: One year tuition to a freshman, sophomore, junior, or senior majoring in food science and technology, or dairy microbiology. Sponsored by the Oregon Dairy Industries.

BUMBLE BEE SEAFOODS, INC. SCHOLARSHIP: $1,000 annually to a junior or senior in food science and technology, supported by work in selected engineering courses, with potential summer employment between junior and senior years and renewal of scholarship during the senior year. Limited to students with sincere interest in career in commercial fisheries industry.

CROWN ZELLERBACH FOUNDATION SCHOLARSHIP IN FISHERIES AND WILDLIFE: $500 annually to a junior or senior in fisheries and wildlife, preferably fisheries.

DEL MONTE SCHOLARSHIP: $300 to a junior in food science and technology. Selection based largely on past academic performance and sincere interest in food technology.

FIRST NATIONAL BANK OF OREGON SCHOLARSHIP: $500 for a senior in agricultural economics. Limited to Oregon residents and awarded on the basis of scholastic achievement, leadership, and financial need.

GENERAL FOODS FUND SCHOLARSHIPS: Ten $400 scholarships for entering freshmen in pomology, vegetable crops, food science and technology, or agricultural engineering. Awards based on intellectual competence, demonstrated leadership ability, high moral character, and financial need. Five recipients will receive $200 their sophomore year. Applications made to dean of agriculture, OSU.

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.

RACHEL HOLLANDS MEMORIAL SCHOLARSHIP: Approximately $400 annually awarded alternately between agricultural economics and art. Selection of recipient based on financial need, scholastic achievement, good character, and U. S. citizenship.

G. R. HYSLOP MEMORIAL FOUNDATION SCHOLARSHIPS: Tuition and fees for one year; one to an outstanding high school senior and one to a junior in farm crops.

KIWANIS CLUB OF SOUTH RIVERSIDE AND SOUTH RIVERSIDE KIWANIS FOUNDATION SCHOLARSHIP: $225 annually to a senior in fisheries and wildlife. Award based on scholastic ability and financial need. Recipient must be a resident of Oregon, preferably from the greater Portland area.

EZRA J. KRAUS MEMORIAL SCHOLARSHIP: $300 annually to entering freshman interested in a career in floriculture or nursery management. Hand written letter indicating hobbies, work or real interest in ornamental plant line should accompany scholarship application. Deadline May 1.

LAMB-WESTON, INC. SCHOLARSHIP: $400 to an entering freshman in food technology from a high school in the general area of Weston, Oregon.

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: $100 annually for an outstanding senior in fisheries and wildlife. Preference given qualified students from the Milwaukie area. Selection based on scholastic ability, leadership, career interest in fisheries and wildlife, and financial need.

MOORE-RANE MANUFACTURING COMPANY SCHOLARSHIP: $100 to an incoming freshman in agricultural engineering. Provided by the Moore-Rane Manufacturing Company.

NORTH WILLAMETTE VALLEY HORTICULTURE SOCIETY SCHOLARSHIP: One $50 scholarship to an incoming freshman student from Multnomah, Clackamas, or Columbia County, who has expressed an interest and intent to major in horticulture.

OREGON BEEF INDUSTRY SCHOLARSHIP: A minimum of $200 to an outstanding sophomore or junior in Animal Science Department. Selection based on scholarship, personal characteristics, and financial need, plus evidenced interest in beef cattle industry.

OREGON FEDERATION OF GARDEN CLUBS SCHOLARSHIPS: Two $300 grants-in-aid for sophomores or upperclassmen, one in landscape architecture and one in ornamental horticulture.

OREGON FRYER COMMISSION SCHOLARSHIPS: Two $500 scholarships awarded annually to propagate the expressed interest in poultry science of sophomore, junior, and senior students. Freshman may be considered if exceptional ability and interest has been demonstrated.

OREGON TURKEY IMPROVEMENT ASSOCIATION SCHOLARSHIP: $500 for a junior or senior in Poultry Science interested in some phase of the turkey industry. Preference given to Oregon residents and students who anticipate working in Oregon's turkey industry.

PACIFIC NORTHWEST PLANT FOOD ASSOCIATION SCHOLARSHIP: $250 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

BILL SCHAFFER MEMORIAL SCHOLARSHIP: $50 provided by Multnomah Anglers and Hunters Club for a sophomore major in fisheries and wildlife in recognition of his accomplishments and to promote continued excellence in his studies in wildlife conservation and management.

CHAN SCHENCK CONSERVATION SCHOLARSHIP: $200 provided by Multnomah Anglers and Hunters Club for a junior or senior majoring in fisheries and wildlife to assist him in continuing his studies in wildlife conservation and management.

STAYTON CANNING COMPANY COOPERATIVE SCHOLARSHIP: $300 to an incoming freshman in agricultural engineering from one of the following high schools: Cascade, Dayton, Jefferson, Regis, Scio, Silverton, and Stayton. Provided by the Stayton Canning Company Cooperative.

R. M. WADE FOUNDATION SCHOLARSHIP: $250 annually for a junior or senior majoring in agricultural education.

WESTERN ROD AND REEL CLUB SCHOLARSHIP: $300 annually to a junior or senior majoring in wildlife or fisheries. Selection based on real financial need, ambition and desire for further study, and scholastic accomplishment.

School of Business and Technology

ARTHUR YOUNG AND COMPANY SCHOLARSHIP: $250 awarded annually to an outstanding student in the field of accounting; recommendation by accounting faculty, primarily on basis of scholarship and professional promise.

BERTHA W. STUTZ-CORVALLIS WOMAN'S CLUB SCHOLARSHIP: $300 annually to a sophomore, junior, or senior girl from the Corvallis area who is majoring in business education or secretarial science; award based on merit and need. Selection by Corvallis Woman's Cub Scholarship Committee from nominations by departments of Business Education and Secretarial Science.

BOEING SCHOLARSHIPS: Two $330 scholarships annually to undergraduates in business administration with emphasis on accounting, finance, business statistics, and production.

ERNST AND ERNST SCHOLARSHIP: $250 anually to an outstanding student in the field of accounting; recommendation by accounting faculty, primarily on basis of scholarship and professional promise.

FIRST NATIONAL BANK OF OREGON SCHOLARSHIP: $500 awarded annually to a student with prime interest in finance and banking. Selection made by a representative group of faculty of the Department of Business Administration.

MARSHALL AND MELISSA MARTIN DAWES SCHOLARSHIP: One $123 scholarship to a senior man or woman in the School of Business and Technology who is academically deserving and has financial need.

MEIER AND FRANK CO. SCHOLARSHIP: $400 annually to an outstanding senior man or graduate marketing student interested in retailing; recommended by the marketing faculty.

PRICE-WATERHOUSE SCHOLARSHIPS: Two $250 scholarships annually to business administration students concentrating in accounting; recommendation by accounting faculty, primarily on the basis of scholarship and professional promise.

RAYONIER SCHOLARSHIP: $500 annually to a business administration student concentrating in accounting who is a citizen of the United States, has a minimum of 2.50 GPA and is in need of financial assistance. Recommended by accounting faculty.

STANDARD OIL COMPANY OF CALIFORNIA UNDERGRADUATE SCHOLARSHIP: $750 annually provided by the Standard Oil Company of California for an undergraduate student in business administration with an area of concentration in accounting.

WESTERN KRAFT SCHOLARSHIPS: Two $360 scholarships provided by the Western Kraft Corporation to juniors in the School of Business and Technology for their senior year. Candidates must be U. S. citizens.

School of Education

PARENT-TEACHER SCHOLARSHIPS: $250 annually with a maximum of $1,000, to encourage capable young people to enter elementary or secondary 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, 603 Loyalty Building, Portland.

EVA M. SEEN SCHOLARSHIP: $100 annually to an incoming senior woman in professional physical education; award based on professional interest, womanliness in appearance and character, leadership, and scholarship. Recipient must be a member of Parthenia (Women's Physical Education Honorary).

School of Engineering

ALCOA FOUNDATION UNDERGRADUATE SCHOLARSHIPS: Two $600 scholarships annually to juniors and seniors in electrical, mechanical, industrial, and chemical engineering. Provided by Aluminum Company of America Foundation.

AMERICAN SOCIETY OF CIVIL ENGINEERS SCHOLARSHIP (Oregon section): Full tuition annually for a senior in civil engineering.

AMERICAN SOCIETY OF TOOL AND MANUFACTURING ENGINEERS SCHOLARSHIP: Awarded to a junior, senior, or graduate student in a program related to manufacturing engineering. Provided by the Portland Chapter of the American Society of Tool and Manufacturing Engineers.

AMPEX COOPERATIVE SCHOLARSHIP: To a junior, preferably with strong interest in Product Design or Manufacturing Production, selected for a graduate work-study program involving summer employment. $1,000 stipend available during year master's thesis is completed.

AUXILIARY TO THE PROFESSIONAL ENGINEERS OF OREGON SCHOLARSHIP: $408, renewable for a second year, to an Oregon sophomore in engineering who has a 3.00 GPA and an indicated need.

BEGHTEL FOUNDATION SCHOLARSHIP: $500 to an engineering student or students completing the junior year. Provided by the Bechtel Foundation, to be administered through the Dean of Engineering.

BECHTEL UNDERGRADUATE SCHOLARSHIPS: Two scholarships of varying amounts available to graduating seniors; provided by an unrestricted grant from the Bechtel Foundation for use by the School of Engineering.

BOEING SCHOLARSHIPS: Four $369 scholarships annually to juniors and seniors majoring in the School of Engineering.

CENTRAL LINCOLN PEOPLES UTILITY DISTRICT SCHOLARSHIP: Awarded to an electrical engineering student in power engineering, it provides tuition and $150 for books and fees during the first academic year. Scholarship is available to senior graduating male students of the Peoples Utility District service area high school. Provided by the Central Lincoln Peoples Utility District.

CO-SIGNERS SCHOLARSHIP: The Co-Signers (Engineers' wives club) makes a scholarship award each year in variable amount, preferably to a married student in need of financial assistance. Final selection of recommended candidates by donor.

COVERT SCHOLARSHIP: Approximately $200 to a freshman in chemical engineering; provided by the late Lloyd W. Covert. Award made on basis of scholarship, ability, and potential leadership.

ESCO UNDERGRADUATE SCHOLARSHIP: $500 awarded to a graduating senior in the top twenty-five percent of his class. Candidate should have an interest in manufacturing processes or metallurgy and be willing to accept summer employment with the Corporation Plant at Portland, Oregon. A 2.80 GPA must be maintained.

FOUNDRY EDUCATION SCHOLARSHIPS: $2,000 for scholarships to students who are interested in the foundry industry. Provided by the Foundry Education Foundation.

FREIGHTLINER SCHOLARSHIPS: An annual amount of $1,000 will be distributed in sums of not less than $200 or more than $500 to juniors or seniors from the Department of Mechanical Engineering.

HERMANN SCHOLARSHIP: One or more approximately $500 scholarships annually to outstanding seniors in civil engineering in memory of the late Otto Hermann, graduate of School of Engineering.

HUMBLE OIL AND REFINING COMPANY SCHOLARSHIPS: Two $450 scholarships to seniors who are interested in the petroleum industry or allied areas; from unrestricted grant funds donated by the Humble Oil and Refining Company to the School of Engineering.

JIM MCCALL MEMORIAL SCHOLARSHIP: Income from a memorial fund, provided in the name of Jim McCall, to a senior student in the department of Civil Engineering. Selected by the faculty of the department.

KAISER ALUMINUM AND CHEMICAL CORPORATION INDUSTRIAL ENGINEERING SCHOLARSHIP: Full tuition and fees plus $2,300 for one academic year upon entering into a masters degree program. Recipient is selected as a junior in industrial engineering and must be interested in an industrial career.

LONGVIEW FIBRE COMPANY PULP AND PAPER SCHOLARSHIPS: Five full tuition scholarships to sophomores, juniors, and seniors in mechanical or chemical engineering.

MINNESOTA MINING AND MANUFACTURING COMPANY SCHOLARSHIPS: Three $400 scholarships to juniors and seniors; based upon academic accomplishment and need for assistance.

PAPER INDUSTRY MANAGEMENT ASSOCIATION SCHOLARSHIP: $500 annually to an engineering undergraduate majoring in chemical, civil, electrical, industrial, or mechanical engineering. Award based on scholastic standing and financial need.

PETER KIEWIT SONS' SCHOLARSHIP: Financial assistance in the form of scholarships to a varying number of students in varying amounts. Recipients are selected by the donor from students in the department of civil engineering.

RAYONIER INCORPORATED SCHOLARSHIPS: Three scholarships annually totaling $1,000 to undergraduates in the School of Engineering, one in chemical engineering, and two from among the departments of mechanical, electrical, or civil engineering. Candidates must be U.S. citizens.

STANDARD OIL COMPANY OF CALIFORNIA UNDERGRADUATE SCHOLARSHIPS: Four $750 scholarships provided by the Standard Oil Company of California for one undergraduate student in chemical engineering, one in electrical engineering, and two in mechanical engineering.

STAUFFER CHEMICAL COMPANY SCHOLARSHIPS: $500 awarded to each of two students in their final undergraduate year in chemical engineering. Selection made by the faculty of the department with financial need a factor in selection of awardees.

TEXACO SCHOLARSHIPS: Financial assistance in varying amounts and numbers for upper division majors in engineering qualified for careers in the petroleum industry; awards based on scholastic ability, qualities of leadership, financial need, and sound health.

WESTERN ELECTRIC FUND SCHOLARSHIP: $500 to a student in electrical or mechanical engineering above the freshman year, preferably a junior.

WESTERN KRAFT SCHOLARSHIPS: Three $420 scholarships provided by the Western Kraft Corporation to upper division students in the School of Engineering. Candidates must be U. S. citizens.

School of Forestry

ALBERT H. POWERS MEMORIAL SCHOLARSHIP: Income from an endowment fund, to an outstanding student in forestry. A memorial to Albert H. Powers, prominent Oregon livestock man, for many years a representative of this industry on the Oregon State Board of Forestry.

AUFDERHEIDE MEMORIAL SCHOLARSHIP: Income from an endowment fund, a memorial to Robert Aufderheide, class of 1935, to an outstanding forestry student.

AUTZEN FOUNDATION SCHOLARSHIP: $550 provided for an outstanding student in forestry.

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

CRAHANE MEMORIAL SCHOLARSHIPS: Two $500 scholarships provided from an endowment fund for outstanding Oregon freshmen entering the School of Forestry. A memorial to Joe M. Crahane, prominent Oregon lumberman.

CROWN ZELLERBACH FOUNDATION SCHOLARSHIP: $1,500 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.

GORDON AND PRISCILLA DUNCAN SCHOLARSHIP: Income from endowment fund for a deserving forestry student, preferably in forest products, nominated by forestry faculty.

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

OREGON LOGGING CONFERENCE SCHOLARSHIP: $500-$1,000 provided by the Oregon Logging Conference for a deserving forestry student selected by the forestry faculty.

RANDALL MEMORIAL SCHOLARSHIP: Income from an endowment fund, a memorial to "Casey" Randall, forestry faculty member, awarded annually to forestry student chosen by School staff.

RAYONIER FOUNDATION SCHOLARSHIP: $500 for an upper division student in forestry; based on high scholarship and need.

ST. REGIS PAPER COMPANY SCHOLARSHIP: $1,600 provided by the St. Regis Paper Company to an outstanding forestry student extending through his junior and senior years. Recipient selected from juniors nominated from Schools of Forestry at Washington State University, University of Idaho, University of Washington, University of Montana, and Oregon State University.

SIERRA-CASCADE LOGGING CONFERENCE FORESTRY SCHOLARSHIPS: $1,000 provided by the Sierra-Cascade Logging Conference for two outstanding junior students in the School of Forestry at Oregon State University or the University of California in Berkeley. Restricted to residents of Oregon, California, or Nevada.

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

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

SOUTH SANTIAM EDUCATIONAL AND RESEARCH PROJECT SCHOLARSHIPS: $12,000 annually provided by the Louis W. and Maud Hill Family Foundation for 15 Oregon students enrolled in forestry (five students in each of the sophomore, junior, and senior years).

MARGARET O. STARKER MEMORIAL SCHOLARSHIP: Income from a bequest to further forestry education and research at Oregon State University School of Forestry; awarded to a deserving student selected by forestry staff.

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

School of Home Economics

BUENA M. STEINMETZ SCHOLARSHIP: $100 to a junior, senior, or graduate student, man or woman, majoring in child development or family relationships; in memory of Buena M. Steinmetz.

LEONE ELLIOTT COVERT SCHOLARSHIP: Approximately $200 to a freshman student in Home Economics; provided by the late Mrs. Covert. Award made on basis of scholarship, ability, and potential leadership.

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

E. SOON CHOI SCHOLARSHIP: Tuition, room, and board plus some additional expenses to a home economics student for one year's study at Yonsei University, Seoul, Korea, to promote international understanding through student life.

FHA SCHOLARSHIP: $300 for a freshman home economics student provided by the Oregon Association of Future Homemakers of America for graduate of an Oregon high school.

INTERNATIONAL FRIENDSHIP SCHOLARSHIP: For an upper division or graduate student from a foreign country studying home economics at Oregon State; provided by the OSU student Chapter of the Oregon Home Economics Association.

JACKSON COUNTY HOME EXTENSION SCHOLARSHIP: $150 to a young woman, preferably a sophomore, junior, or senior, from Jackson County seeking a career in home economics; awarded on the basis of financial need, high scholarship, and an interest and aptitude in this field.

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

See SCHOOL OF PHARMACY for Pharmacy scholarships.

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 graduate student in home economics from the Orient; provided by the Oregon Federation of Business and Professional Women's Clubs.

GERTRUDE STRICKLAND SCHOLARSHIP: A fund to provide financial assistance to foreign students. Awards are made by University Scholarships Committee to a limited number of qualified foreign students.

INTERFRATERNITY COUNCIL SCHOLARSHIPS: Three one-year scholarships to foreign students enrolled in Pavia, Stuttgart, and Waseda Universities. The scholarship includes a foreign student scholarship and one year of room and board in a fraternity at Oregon State University.

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

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

Administered by Other Agencies

CORVALLIS ROTARY CLUB SCHOLARSHIP: $400 to a graduate of a Benton County high school or a resident of Benton County who, because of school boundaries, attended high school in a neighboring county. Application submitted to the Scholarship Committee of the Corvallis Rotary Club through the club president. Applicant should express financial need, educational interests and goals in a letter of not more than two typewritten pages.

CROWN ZELLERBACH FOUNDATION SCHOLARSHIPS: $625 per year for four years to students in education. Information through high school principals.

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.

FORESTRY MEMORIAL SCHOLARSHIP: Income from funds contributed as memorials to graduates and friends of the School of Forestry to a worthy student; administered through Oregon State University Alumni Association.

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.

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.

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.

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 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 four-year period awarded a senior in an Oregon high school for enrollment as a home economics major in an Oregon college granting a degree in home economics. Application through high school teacher of home economics.

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

OREGON STATE EMPLOYEE'S ASSOCIATION SCHOLARSHIP (OSU Faculty Chapter No. 72): $100 annually to a son or daughter of a chapter member; for outstanding scholastic achievement.

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.

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: One scholarship for $300 to freshmen 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 University.

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 University. The act provides $110 per month for full-time training. Eligible students should apply to the Veterans Administration.

WILLAMETTE INDUSTRIES SCHOLARSHIPS: $550, $676, and $776 awarded to beginning sophomores, juniors, and seniors, respectively, enrolled in forestry, business, or engineering. Scholarships are contingent upon student working during the summer at one of Willamette Industries' operations.

E. E. WILSON SCHOLARSHIPS: Annual assistance grants up to $800 each, from a trust fund provided in the will of E. E. Wilson, Corvallis banker and attorney. Awards, based primarily on financial need, followed by character and scholastic attainments, granted to deserving young men and women who are bona fide residents of Benton County. To apply, eligible students should submit a letter to the E. E. Wilson Scholarship Awards Committee, Mr. Fred C. Zwahlen, Jr., Coordinator, Waldo Hall 222, Oregon State University.

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 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-round distinction.

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.

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.

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.

DUNN SENIOR AWARD: Income from an endowment fund provided by Paul M. and Neva K. Dunn. An annual award to the outstanding senior in the forestry graduating class.

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.

OSU OUTSTANDING STUDENT AWARDS: Presented to an outstanding man and woman student in each class with scholarship, leadership, character, and contributions to the campus considered. These awards are a memorial to Clara H. Waldo.

OSU SCHOLARSHIP AND LEADERSHIP AWARDS: Presented to selected freshmen, sophomore, junior, and senior men and women students, based on scholarship and leadership, as a memorial to Edward A. Cummings. Two awards each to freshmen and sophomore men and women; three awards each to junior and senior men and women.

OSU SCHOLASTIC AWARDS: Presented to the man and woman in the sophomore, junior, and senior classes who have the highest grade-point averages for their five, eight, or eleven terms. These awards are a memorial to Drucilla Shepard Smith.

School of Humanities and Social Sciences

ALPHA CHI OMEGA AWARD: Presented by the Portland Chapter to the girl who contributes most in rendering service to the Music Department, to the university, and to the community. Name of recipient engraved on a cup.

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.

ALICE CAREY DILWORTH SENIOR AWARDS $100 presented annually to the outstanding senior in music on the basis of scholarship and professional ability. Name of recipient engraved on a plaque.

INGALLS AWARD: Trophy given annually to the senior who has contributed most to the 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.

ROBERT WAYNE SMITH BOOK AWARD: $100, $60, $40 for purchase of books from the OSU bookstore awarded annually to three undergraduates. Selection based on best 1,000-1,500-word essay reviews of a non-technical book.

School of Science

IOTA SIGMA PI AWARDS: A $25 gift certificate for books given to a junior girl in chemistry or a closely related field; for high academic standards. A Chemical Rubber Handbook of Chemistry and Physics to a freshman girl in chemistry with the highest GPA.

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; winner's 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

AGRICULTURAL COOPERATIVE COUNCIL OF OREGON AWARD: An annual award of $100 to a junior or senior in agricultural economics who has shown interest in farmer cooperatives and agricultural business management. In honor of Paul Carpenter, long a devoted Agricultural Extensionist at Oregon State University, and Council Secretary.

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.

ARTHUR G. B. BOUQUET HORTICULTURE AWARD: Annual award of $100 to a selected junior or senior in horticulture.

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.

S. B. HALL MEMORIAL AWARD IN ANIMAL SCIENCE: $275 to the outstanding junior in Animal Science majoring in Dairy Production.

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.

THE OREGON SOCIETY OF FARM MANAGERS AND RURAL APPRAISERS AWARD IN AGRICULTURAL ECONOMICS: $123 to an outstanding sophomore or junior majoring in agricultural economics at Oregon State University.

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

ARTHUR YOUNG ACCOUNTING BOOK AWARDS: Books in accounting theory for a professional library of a practicing accountant valued at $25 per recipient. Awarded to four seniors of high academic standing selected by the accounting faculty.

BUSINESS AND TECHNOLOGY AWARD: Inscription on School of Business and Technology Honor Plaque of names of outstanding men and women graduates determined by representatives of School of Business and Technology students and faculty.

NBEA AWARD: Certificate of merit, leather magazine holder, and one-year membership in the National Business Education Association to an outstanding senior in business education. Provided by the National Business Education Association with selection made by departmental faculty.

OREGON SOCIETY OF CERTIFIED PUBLIC ACCOUNTANTS AWARD: Accounting books valued at $50 awarded to a senior for high academic standards and leadership qualities in accounting.

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.

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: awarded 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

AMERICAN SOCIETY OF AGRICULTURAL ENGINEERS HONOR AWARD: Certificate of recognition and key awarded one recipient from each student chapter ASAE as determined by local selection; name engraved on bronze plaque in Gilmore Hall.

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.

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS: Cash awards, certificate, and travel allowance to regional meeting in support of the student papers contest sponsored by the student branch of IEEE.

AMERICAN INSTITUTE OF INDUSTRIAL ENGINEERS: Pins awarded and names of the outstanding senior industrial engineer and the student who contributed most to AIIE activities during the year engraved on a plaque.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS AWARDS: Awards of $25, $15, and $10 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.

AMERICAN SOCIETY FOR TESTING AND MATERIALS: Certificate of recognition and subscriptions to ASTM publications. One or two awards each year to outstanding upper division students who have shown an interest in the materials field.

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: A Hamilton watch awarded to a senior in engineering attaining highest academic accomplishment in humanistic-social science subjects as combined with scholastic accomplishment.

THE INDUSTRIAL PRESS AWARD: A copy of Machinery's Handbook to the outstanding student in machine design.

INSTITUTE OF AERONAUTICAL SCIENCES AWARDS: Certificate of merit and one-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 to 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 PLAQUE: 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.

PAUL M. DUNN SENIOR AWARD: Presented annually to the graduating forestry senior with the highest scholastic average.

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 AWARDS: 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

DANFORTH AWARDS IN HOME ECONOMICS: All-expense trip for a three-week program in St. Louis and at a Michigan summer camp awarded to an outstanding junior; cost of two weeks' leadership training at a Michigan summer camp awarded to an outstanding freshman; provided by Ralston Purina Company of St. Louis, Missouri.

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: $100 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.

LEE AWARD: $100 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 ACHIEVEMENT AWARD: Awarded annually to one to four outstanding seniors in home economics. Based on high scholarship, leadership and service in home economics and on all University activities.

ELEANOR TRINDLE MEMORIAL AWARD: Two annual awards, $100 each, to juniors in Home Economics; provided by the Oregon Extension Homemaker's Council.

ESTHER KIRMIS AWARD: An annual award of $50 by the Oregon Extension Homemaker's Council in memory of Esther Kirmis to a junior in home economics.

STOKLEY-VAN CAMP, INC. AWARD: A Silver Trivet given to a top-ranking graduating senior in home economics by Stokley-Van Camp, Inc.

See SCHOOL OF PHARMACY for Pharmacy awards.

University Honors Program

Director: STUART E. KNAPP, Ph.D.

The University Honors Program provides enriched educational opportunities to students of superior scholastic ability. All of the facilities of the university are available to provide a wide variety of intellectual experiences. Flexibility is stressed in an effort to tailor the education to the needs of the individual.

Honors work began at Oregon State in the School of Science in 1959. A combined program between that school and the School of Humanities and Social Sciences was initiated in 1964 and led to the establishment of the present program on a university-wide basis. All students, regardless of their school or departmental affiliations, participate in freshman and sophomore honors colloquia, attend special lectures, take recommended basic courses outside their area of specialization, and participate in senior honors seminars. This portion of the program is designed to provide breadth.

At the beginning of the junior year, the student begins departmental honors work. The nature and extent of this work is determined by the department and is adapted to the specific field. Normally, this work includes special seminars and courses, guided reading programs, independent study and research. The latter frequently culminates in a senior thesis presented to the departmental faculty. Specific details may be obtained from the departments. The various schools on campus may provide additional lectures or seminars to augment the general and departmental programs.

Application. Entering freshmen who feel they may qualify for this program are invited to apply. Application forms may be obtained from the Director of the University Honors Program, Bexell Hall, as soon as the student has been accepted for admission to Oregon State. Thereafter, any qualified student may make application through the first term of the junior year. Transfer students also may apply. August 15 is the deadline for receipt of applications for the following fall quarter. Qualified students who apply after this date will begin their honors work at the start of winter term.

Admission is based on evidence of high scholastic performance in high school, recommendations from the high school faculty, and suitable scores on the College Entrance Examination Board Tests including the Scholastic Aptitude Test. The Honors Committee will exercise discretionary powers in judging individual applications. No application can be acted upon by the Committee until the results of these tests are available. The student is urged to complete these examinations well before the August 15 deadline.

Requirements. Satisfactory completion of the following requirements will lead to graduation with honors from Oregon State University:

1. Enrollment during the freshman and sophomore years in the Honors Colloquia sequences; at present these sequences are GS 111H, 112H, 113H and GS 214H, 215H, 216H.
2. Maintain a minimum grade-point average of 3.00. Some departmental requirements are higher for work in major fields.
3. Enrollment in recommended basic courses in fields outside the area of concentration. The number and nature of these courses will be determined on an individual basis.
4. Enrollment in the Junior-Senior Honors Seminars. These special seminars normally are interdisciplinary in nature.
5. Satisfy all school and departmental honors requirements during the junior and senior years. The nature of these requirements will depend on the school and department involved.

Withdrawal. A candidate for the University Honors Program may withdraw or be dropped from the program without prejudice when the Honors Committee deems such action to be in the best interests of the student, the program, the department, and the school. Petition for re-admission may be made to the Honors Committee at any time.

Summer Term

Director: ROBERT L. PHILLIPS, Ph.D.

Assistant to the Director: ANITA F. WHITTLE

The summer term at Oregon State University is designed for maximum flexibility.

Some students continue their studies during the summer in order to graduate sooner. Other students use the summer to complete graduate degrees and/or to complete requirements for certification. Still others use the summer to prove they can do satisfactory college work and thereby qualify for admission. For these students and others, Oregon State University is a scholarly and friendly place for summer study in many fields.

Summer courses. Most of the academic work in summer 1970 will be presented in the eight-week term beginning June 23. An eleven-week program beginning June 23 is reserved primarily for the presentation of courses in sequence, meaning that a student may complete a three-term sequence of a given subject in the eleven-week period.

To round out the educational program, several workshops are offered, ranging in length from one to six weeks.

Most of the course work offered in 1970 is taught in the Schools of Education, Humanities and Social Sciences, Business and Technology, Science, and Home Economics although courses are available in every School within the University.

Credits, fees, and housing. The student enrolled in the eight-week term may earn up to 12 hours of credit, or more with the approval of one's dean. The student enrolled in the eleven-week term may take one complete sequence plus 6 hours of credit, making a total of 15-18 hours in the eleven-week period.

The fee for summer term is the same for residents and nonresidents; undergraduates: $136 for 8 or more credit hours; graduate students: $162 for 8 or more credit hours. Part-time students pay $17 per credit hour.

There is plenty of housing available in the summertime. Information and application forms may be received by writing to the Department of Housing, Oregon State University.

The Summer Term Bulletin and other special announcements may be obtained by writing the Director of Summer Term, Oregon State University.

International Education

Director: GORDON R. SITTON, Ph.D.
Foreign Student Adviser: ELIZABETH C. HAMLIN, Ed.M.
Foreign Study Adviser: MARGARET JO ROACH, Ed.M.

To promote policies, programs, and activities that will contribute to a broader understanding among nations and peoples, the University combines on-campus activities with programs of study, research, teaching, and technical assistance in many areas of the world.

The Americans Abroad Adviser and the Director of International Education advise students and faculty who wish to participate in the study abroad programs of the University and assist in developing opportunities for travel and work abroad.

The Foreign Student Counselor assists students from abroad in their personal, social, and academic adjustment to American university life. Additional assistance is given in connection with visas and finances. The Counselor helps to promote educational and social experiences between foreign students and American student groups, faculty, and community.

Foreign Study Programs

The Oregon State System of Higher Education sponsors overseas study centers in Germany, Italy, and Japan. The study centers—each with a different type of program—are designed to enable qualified students to earn three terms of academic credit from Oregon State University while pursuing their studies abroad.

German Study Center

University of Stuttgart, Germany
Resident Director: LOTHAR SCHMIDT

The German Study Center makes it possible for students from a wide range of disciplines to pursue their studies for two semesters at the University of Stuttgart or at one of the other institutions of higher education in or near Stuttgart. All applicants must have upper division standing and must have had the equivalent of two years of college German to be eligible. Participants may be enrolled for a four-week language refresher course in Stuttgart immediately before the beginning of the school year. It is expected that students will be qualified to participate fully in the academic, cultural, and social life of the German university to which they are assigned.

Italian Studies Center

University of Pavia, Italy
Resident Director: WALTER H. KRAMER, D.B.A. (PSU)

The Italian Studies Program provides an opportunity for the qualified student to deepen his understanding of our cultural debt to Europe by studying in Italy for a full academic year. Courses are available in humanities, social sciences, and business. Located near Milan in Northern Italy, Pavia is within easy traveling distance of many European cultural centers for weekend and vacation travel. (Administered by Portland State University.)

Japan Study Center

Waseda University, Tokyo
Resident Director: MATSU-KICHI AMAMO, Ph.D.

The Japan Study Program provides an opportunity for students to undertake significant academic study for one year in the history, culture, and current social and economic conditions of Japan and other parts of Asia. Except for language classes, instruction is in English. Students are permitted opportunity for travel throughout Japan.

Oregon State University as a member of the Northwest Inter-Institutional Council on Study Abroad offers: LIBERAL ARTS STUDY PROGRAMS in England, Ireland, France, and Sweden, for OSU credit.

Academic year: London; *Summer:* London. Courses are offered in Art, History, Modern Drama, Music, Shakespeare, Political and Social Institutions, Theater, and Independent Study. Students live with English families. Students may enroll for one or more quarters.

Academic year: Avignon; *Summer:* Paris. Courses are offered in Art, Language, Drama, History, Literature, Political Science, and Independent Study in both French and English.

Summer: Stockholm. Courses are offered in Swedish language, culture, history, drama, and literature.

Additional information may be obtained from the Office of International Education.

Center for Self-Instruction

The CENTER FOR SELF-INSTRUCTION is available to students of the University who wish to undertake self-initiated independent study projects. The Center includes an extensive library of self-instructional materials of various types such as films, tapes, slides, and programed instructional material in a wide range of subjects. It is just off Jefferson Way adjacent to Education Hall and Mitchell Playhouse.

Instructional Resources and Materials

Facilities of the INSTRUCTIONAL RESOURCES AND MATERIALS CENTER are available for instructional purposes to all resident faculty, departments, and schools at no cost. The Center offers a complete and modern audio-visual service to the OSU campus, including projectors, speaker systems, and recording equipment. This equipment is set up and operated by qualified IRAM employees. Films may be ordered with IRAM handling all details. The Center is located in Kidder Hall 109, ext. 2121.

Parent and Alumni Organizations

Dads and Mothers Clubs

The Dads Club, composed of fathers and male guardians of Oregon State University students, was founded on the premise that no persons have greater or more legitimate interest in promoting the welfare of Oregon State than do the fathers of its students who invest not only substantial sums of money for the education of their children, but also an abundance of their hopes and aspirations for their mental, physical, and spiritual growth. The Club, through its annual and life membership dues program, awards full tuition and fees scholarships to worthy students, makes available emergency grants, helps underwrite a campus-wide tutorial program, contributes to the university loan fund, and awards annually certificates of merit to outstanding high school seniors. The Board of Directors meets monthly, September through June. Dads Weekend is an annual winter term campus event.

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. Individual units of the Mothers Club are organized in many communities of the State. Annual meetings of the State organization are held on campus Mothers Weekend. The Mothers Club donates full tuition scholarships to deserving students.

Alumni Association

Attendance at Oregon State makes one eligible for membership in the Oregon State University Alumni Association which provides informed, organized alumni backing of Oregon State Projects. The Association publishes the *Oregon Stater,* the bimonthly alumni magazine, which is distributed to all alumni fund contributors and life members of the Association. Complimentary copies go to members of the Alumni Golden Jubilee Association and to retired faculty. *OSU Scope* is mailed four times each year to all alumni with good addresses. All contributions to the Oregon State Fund accumulate toward a $100 life membership and are considered for allocation to the various categories of need by the Alumni Board of Directors.

Officers and directors of the association are elected at the annual business meeting which is held in the spring. Officers are elected annually; directors serve for a three-year period. Officers and directors are:

Executive Committee:

DONALD E. JOHNSON, '36, President, Corvallis
RICHARD G. FARNES, '54, First Vice-President, Portland
MRS. JOHN H. HANN, '42, Second Vice-President, Salem
TERRY B. ELDER, '47, Treasurer, Corvallis
B. DON ANDERSON, '35, Portland
ROBERT M. BEARDSLEY, '39, Roseburg
JOHN H. GALLAGHER, JR., '37, Corvallis
E. B. LEMON, '11, Corvallis
EUGENE H. SCHAUDT, '50, Eugene
BURTON C. SELBERG, '40, Portland

Board of Directors:

W. DEL BALL, '33, Tigard
MRS. ARTHUR BIGGS, '59, Tigard
MRS. FRANK D. CHOWN, '40, Portland
ORVILLE W. CORBETT, JR., '53, Burns
JOE DAY, '47, Newport
JAMES O. FISHER, JR., '54, Portland
ROBERT F. GILL, '58, Medford
R. STEVENS GILLEY, '56, West Linn
STAURT L. HENZEL, '58, Klamath Falls
GERALD B. HOMAN, '39, Enterprise
ROBERT C. INGALLS, '37, Corvallis
RICHARD J. JAEGER, '54, The Dalles
MRS. WALTER KELLY, '51, Portland
M. I. MASTERSON, JR., '35, Long Beach, California
LARRY D. MCKENNON, '59, Albany
SPENCER T. MOORE, '45, Corvallis
RICHARD J. NELSON, 51, Astoria
ROBERT PAYNE, '52, Corvallis
THOMAS R. PICKENS, '58, Salem
MRS. MARK POSTLEWAITE, '51, Bellevue, Washington
WILLIAM D. PROPPE, '48, Portland
ROBERT W. RIGGERT, '57, Tillamook
CLYDE C. SAYLOR, JR., '44, Eugene
RUDY H. THIELEMANN, '34, Portland
MRS. STANTON WALLACE, '32, Corvallis
HARVEY M. WATT, '50, Bend
JOHN H. WELBES, '37, Pendleton
CLYDE WILLIAMSON, '08, Albany

School Representatives:

TERRY B. ELDER, '47, Agriculture
R. STEVENS GILLEY, '56 Business and Technology
WILLIAM D. PROPPE, '48, Education
JOHN H. GALLAGHER, JR., '37, Engineering
MRS. ARTHUR BIGGS, '59, Home Economics
SPENCER T. MOORE, '45, Forestry
CLYDE C. SAYLOR, JR., '44, Pharmacy
H. H. WYMORE, '38, Science
MRS. STANTON WALLACE, '32, Humanities and Social Science

Ex-Officio Members:

JAMES W. DUNN, '51, Executive Secretary, OSU Foundation
HAROLD BRITTON, '70, ASOSU President
JACQUI MASON, '70, AWS President
WALDO B. TAYLOR, '33, Dads Club President
MRS. C. L. MINK, Mothers Club President
URSEL C. NARVER, '28, OSU Federation President

Staff:

C. H. "SCRAM" GRAHAM, '35, Corvallis, Director of Alumni Relations
W. R. "BILL" NELSON, '63, Corvallis, Assistant Director of Alumni Relations

Oregon State University Federation

The Oregon State University Federation, organized in 1951, includes representatives of the Associated Students, the University administration, the Mothers Club, the Dads Club, and the Alumni Association. Its purpose is to coordinate, implement, and encourage 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 University Foundation

The object of the Oregon State University 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 Oregon State.

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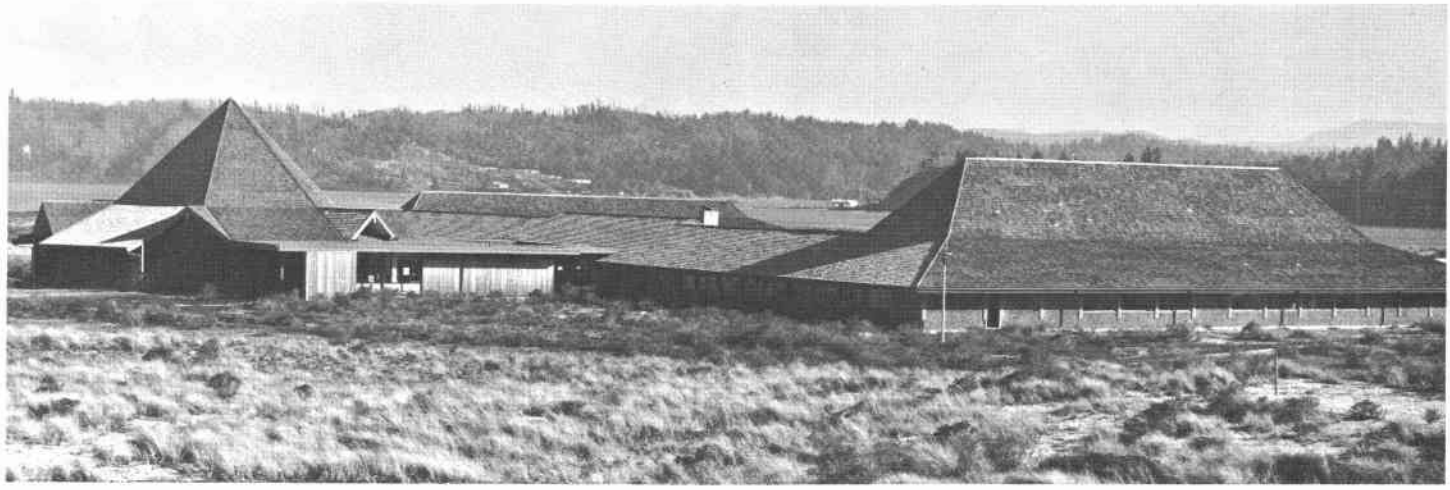
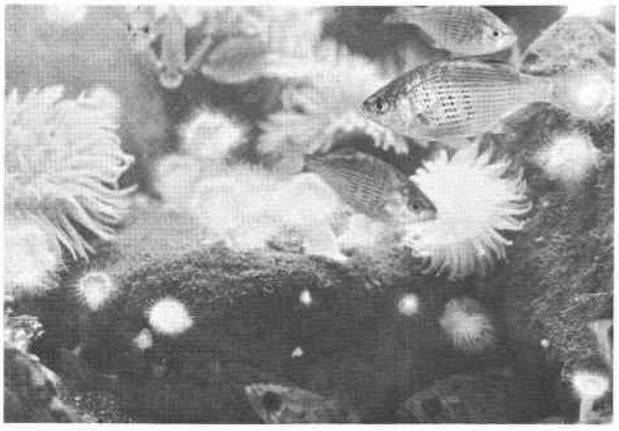
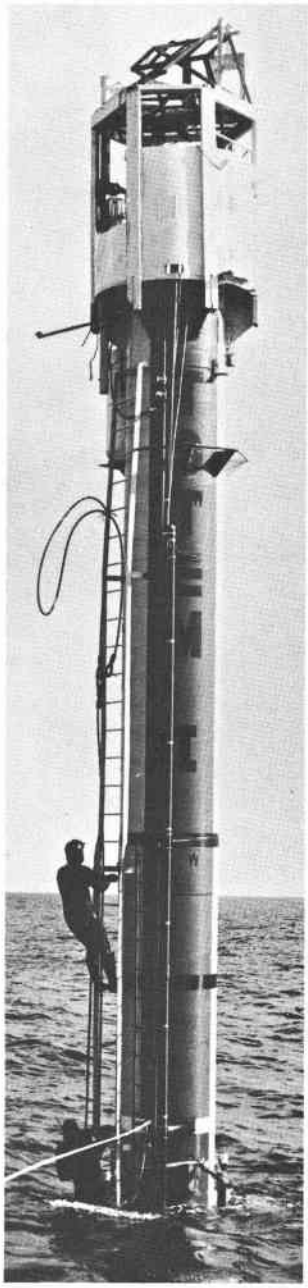


Marine Science at OSU



BUILT IN 1965 on the south shore of Yaquina Bay at Newport, the OSU Marine Science Center (top) is the heart of the university's coastal research and teaching facilities. It houses the Yaquina Marine Biology Laboratory in the east wing, the Pacific Fisheries Laboratory in the west wing, and the popular marine museum-aquarium in the public wing. Educational exhibits including aquaria stocked with marine plants and animals such as those shown (above right) are popular with coastal visitors and school groups. More than 700,000 persons have visited the center since it opened. Many have participated in graded, programmed learning about the ocean carried on as an extension function.

FLAGSHIP of the Oregon State University oceanographic fleet is the 180-foot *Yaquina* (right). At sea about 70 percent of the time, *Yaquina* is usually on cruises that last up to three weeks. Occasionally, she is sent on extended cruises of up to three months. Facilities aboard include quarters for 17 crew members and 18 scientists. There are eight oceanographic laboratories. Oregon State's involvement in a growing oceanographic and meteorological data buoy program has been widely noted. Called TOTEMs, the buoys are designed to aid scientific study of the air-sea interface and to help with real-time weather prediction. The massive steel spar buoys are 180 feet long, with the greater portion of the buoy submerged for stability (far right). (*See also pages 101, 145, 161.*)



Liberal Arts and Sciences

THOSE AREAS OF SUBJECT MATTER AND KNOWLEDGE KNOWN AS THE Arts and Sciences, or the Liberal Arts and Sciences, are divided at Oregon State University into six broad divisions in two Schools. They are called "liberal" because their study helps to liberate the mind and to foster a critical and creative spirit of inquiry regarding man, society, and nature. As fundamental subjects, they underlie all the professions and most other occupations. At the same time, the Liberal Arts contribute to the development of each person as a moral, social, and aesthetic being. All students, regardless of their intended future careers, are well advised to take as many of these subjects as possible while in the university.

Those fields of knowledge and experience having to do with the productions of man as a feeling, thinking creator and communicator are called *The Humanities.* At Oregon State University the SCHOOL OF HUMANITIES AND SOCIAL SCIENCES has eleven departments devoted to research and teaching in the Humanities. These are the departments of Architecture, Art, English, Journalism, History, Landscape Architecture, Modern Languages, Music, Philosophy, Religious Studies, and Speech Communication.

Those fields of knowledge having especially to do with human institutions, customs, and behavior which define man's social relationships are called *The Social Sciences.* At Oregon State the departments of Anthropology, Economics, History, Geography, Political Science, Psychology, Sociology, and some areas of the Department of Speech Communication in the School of Humanities and Social Sciences devote themselves to teaching and research in the Social Sciences.

In the School of Science, the natural sciences and closely related fields include:

Physical and Mathematical Sciences – Chemistry, Biochemistry and Biophysics, Mathematics, Physics, and Statistics.

Biological Sciences – Botany, Entomology, Microbiology, and Zoology.

Earth Sciences–Atmospheric Sciences, Geography, Geology, and Oceanography.

Special Programs–General Science, Science Education, and the preprofessional curricula in dentistry, dental hygiene, medicine, medical technology, nursing, and veterinary medicine.

School of Humanities and Social Sciences

FACULTY

As of January 1970

GORDON W. GILKEY, Arts D., Dean of the School of Humanities and Social Sciences.

KENNETH D. PATTERSON, Ph.D., Associate Dean.

HORTON L. FROSS, Ph.D., Director of Advising and Student Services.

BUDD N. TAMLER, M.A.T., Associate Professor of Social Science Education.

Emeritus Professors BAKKUM, BOURBOUSSON, BUTTS, CARTER, COLBY, DAWES, DREESEN, DUBACH, ELLISON, C. N. HARRIS, JENKINS, KUNEY, LAKE, LEWIS, MYATT, H. B. NELSON, M. N. NELSON, PARKS, C. K. SMITH, R. W. SMITH, SOLBERG, WASSON, WELLS, N. W. WILSON.

Anthropology: Associate Professors DAVIS (acting department chairman), CORMACK, HOGG.
Assistant Professors BROWN, DUNN, SMITH.
Research Associate SCHULTZ.

Architecture: Professors GLASS (department chairman), ELLIS, SINNARD.
Associate Professors METZGER, STADSVOLD.
Assistant Professor PIPER.

Art: Professors GUNN (department chairman), GILKEY, JAMESON, S. LEVINE, ROCK, SANDGREN, SPONENBURGH, TAYSOM, WHITE.
Associate Professors CHAPPELL, CROZIER, FOX, MUNRO.
Assistant Professors BOWMAN, PFAFFL, WIPRUD, WONG.
Instructors DEARSTYNE, HARDESTY, MCDONALD, VINSON, VISGATIS.

Economics: Professors HARTER (department chairman), FRIDAY, PATTERSON, WILKINS.
Associate Professors MCFARLAND, ORZECH, TOWEY, WOLFSON.
Assistant Professors DOST, FARRELL, MILLER, SORENSON, VARS.
Instructor STROH.

English: Professors FOREMAN (department chairman), CHILDS, C. A. GARRISON, GROSHONG, HEWITT, LIGON, NORRIS, SCHROEDER, E. D. SMITH.
Associate Professors R. W. CARLSON, DUBBÉ, R. E. KING, P. B. NELSON, POTTS, STAVER.
Assistant Professors ASTRO, BOTTI, CROCKER, DANKLEFF, FINNIGAN, FRANK, HENLEY, JEFFRESS, JONES, LAWRENCE, LUDWIG, MARTINELLI, MORRAY, ONSTAD, WEAVER, WILLEY.
Instructors BARKER, BEEZHOLD, BOHNAKER, BRUNK, ENGESSER, FINCH, L. E. GARRISON, GOULD, GRIFFITHS, HARPER, KOZIKOWSKI, MACCORMACK, MCCORMACK, J. C. NOLAND, J. E. NOLAND, OLIVER, ROEDER, SHARMA, WASSER, A. M. WOLFF, E. A. WOLFF, YBARRA.

Geography: Professors HIGHSMITH (department chairman), HEINTZELMAN, JENSEN, NORTHAM, RUDD.
Assistant Professors BARD, FRENKEL, HANSEN, MARESH, MUCKLESTON.

History: Professors CARSON (department chairman), ADOLF, BERKELEY, CARLIN, MEEHAN, SHAW, WILLIAMS.
Associate Professors D. B. KING, MCCLINTOCK, MURDZEK, WAX, WUBBEN.
Assistant Professors HALL, KENNEDY, MCILVENNA, MORRIS, PHILIPP, TROW.
Instructors HEWSON, HORVATH.

Journalism: Professors ZWAHLEN (department chairman), BAILEY, BIRDSALL, HARRIS, SHIDELER.
Associate Professors T. H. CARLSON, DORN.
Assistant Professors G. O. EVANS, VAN LEUVEN.

Landscape Architecture: Professors MARTEL (department chairman), FREDEEN.
Associate Professor DEDEURWAERDER.

Modern Languages: Professors KRAFT (department chairman), RICHTER, SJOGREN.
Associate Professors G. LEVINE, LUSETTI, ROSSBACHER, SCHMIDT, VERZASCONI.
Assistant Professors BOTTI, CERVANTES, DOUDOROFF, FERRÁN, JONAS, KIEKEL, MACLEAN, MALUEG, RICARD, SHELDON.
Instructor GANGLE.

Music: Professors CAMPBELL (department chairman), BRYE, GRAY, O'CONNOR, ROBERTS, WALLS.
Associate Professors KNAPP, LENCHNER-SCHMIDT, MOLTMANN, WILSON.
Assistant Professors BORGIR, M. CARLSON, DOUGLASS, GILMORE.
Instructors A. CARLSON, D. EISEMAN, D. R. EISEMAN, KRUEGER.

Philosophy: Professors HARRIS (department chairman), ANTON.
Assistant Professors DALE, LIST, OSLER.
Instructor FRANK.

Political Science: Professors FUQUAY (acting department chairman), MADDOX, MCCLENAGHAN, MCGRATH, SWYGARD, WALTER.
Associate Professor DEALY.
Assistant Professors CERVANTES, CROWE.

Psychology: Professors CROOKS (department chairman), MILLS, ROHDE, WARNATH.
Associate Professors MADDEN, SIMMONS.
Assistant Professors DUNNINGTON, LARSEN, MURPHY, SANDERS, SASLOW, SHELTON, THOMPSON, WAGENER.
Senior Instructor TAUBMAN.
Instructor BURT.

Religious Studies: Professor HOVLAND (department chairman).
Associate Professors CLARKE, YONKER.
Instructors HOSOI, J. P. KING.

Sociology: Professors PLAMBECK (department chairman), CANTRELL, MASON.
Associate Professors FOSTER, JENNÉ, SHIVELY.
Assistant Professors CREIGHTON, CURRY, HODGES, LANGFORD, MCCARTHY, SAUNDERS.

Speech Communication: Professors KELTNER (department chairman), CORTRIGHT, DOLER, LIVINGSTON, VALENTINE, WINGER.
Associate Professors CONKEY, E. HILDEBRANDT, PHILLIPS, ROBERTSON, WEINMAN.
Assistant Professors BENNETT, A. L. WALLACE, A. S. WALLACE.
Instructors EADS, GEORGE, H. HILDEBRANDT, MATSON, POLING.

THE SCHOOL OF HUMANITIES AND SOCIAL SCIENCES offers a major program in Liberal Studies; departmental majors in Anthropology, Art, Economics, English, History, Modern Languages (French, German, Russian, and Spanish), Music, Philosophy, Political Science, Psychology, Religious Studies, Sociology, Speech Communication, and Technical Journalism; and interdepartmental majors in American Studies and Russian Studies.

CURRICULA

In addition to fulfilling institutional requirements, the candidate for a baccalaureate degree must complete the following school requirements:

A. **Distribution Requirements:**

1. A sequence in a laboratory science.
2. A sequence in a social science.
3. A sequence in an additional science or social science.
4. Two sequences in the humanities (includes history).
5. A sequence in the arts.
6. A second-year modern language or a sequence in a non-European culture (African, Asian, Russian, Latin American).
7. Demonstrated mathematical proficiency at the Mth 51 or Mth 161 level.

Course work taken to satisfy requirement 3 should not be from disciplines used to satisfy requirements 1 and 2. No sequence selected to fulfill distribution requirements can be in the student's major field, with the possible exception of the one in requirement 6.

Students may determine specific sequences to satisfy these requirements by contacting their advisers.

B. **Concentration requirements:** Maximum 60 hours

1. *Major in Liberal Studies.*
   A minimum of 45 to a maximum of 60 hours of approved courses from two or more departments of the School of Humanities and Social Sciences. At least 27 hours must be upper-division. All course work constituting the major must be approved by the student's academic adviser.
2. *Departmental Majors.*
   See Departments of Anthropology, Art, Economics, English, History, Journalism, Modern Languages, Music, Philosophy, Political Science, Psychology, Religious Studies, Sociology, and Speech. Course work in a department that is over and above that required to satisfy that departmental major may be utilized to satisfy distribution requirements. However, no more than 60 credit hours from one department may be counted toward distribution *and* departmental major requirements. At least half the elective credit hours of a student taking a departmental major must be taken outside that department.
3. *Interdepartmental Major.*
   See American Studies and Russian Studies below and on next page.

C. **Electives:** Minimum 27 hours

Co-Majors in Officer Education

Under the principles establishing Officer Education (ROTC) at Oregon State University, it is stipulated that the prescribed program in aerospace studies, military science, or naval science may be taken by men as a co-major in any school (see DEGREES AND CERTIFICATES).

Teacher Certification

Basic and Standard Norm programs are offered in art, literature, writing, and language; social studies; language arts-social studies. Basic Norm programs are authorized in French, German, Spanish, Russian, speech and drama, speech correction, journalism, and music.

Students interested in qualifying for a State Teacher's Certificate should consult with their adviser or with the head counselor of the School.

University Honors Program

The Honors Program, which has been active in the School of Humanities and Social Sciences since 1964, is coordinated with programs in other Schools and administered by the Director of the University Honors Program (see page 28). Information concerning eligibility and application forms may be obtained from the Director.

Programs and Courses in Humanities and Social Sciences

AMERICAN STUDIES

An interdisciplinary major in American Studies is intended for students with an interest in American society, culture, and institutions. Requirements are flexible to permit individual programs suited to student interests and goals. The major in American Studies is a worth-while foundation for professional and post-graduate study, and for a variety of careers in business and government.

Requirements for B.A. or B.S. Degree

1. Satisfaction of the University requirements for the baccalaureate degree. See page 14.
2. Satisfaction of the School of Humanities and Social Sciences distribution requirements.
3. A minimum of 51 hours of approved courses including the following:
   a. American Studies 201
   b. A year's sequence in United States history: 9 hours
   c. A year's sequence in American literature: 9 hours
   d. A minimum of 24 hours of upper division work from at least *three* departments in courses with particular pertinence to a study of American social, cultural, political, or economic development.

Students interested in the major in American Studies should apply to the Committee on American Studies at the earliest opportunity.

Lower Division Course

Amer St 201. **Sources of American Civilization.** 3 hours fall. 1 ③
Basic books on American ideas, values, and institutions from colonial times to the present. Required of all American Studies majors in their sophomore or junior year.

RUSSIAN STUDIES

In response to the persistent importance of the Soviet Union in world affairs and a wide interest in Russian society and culture on the part of the American public, the School of Humanities and Social Sciences offers an undergraduate major program in Russian Studies. The program is especially suited to students interested in a broad knowledge of significant non-American centers of world power and influence.

The B.A. degree with major in Russian studies provides an excellent foundation for advanced study or for special career activities in American business, cultural, technical, and political participation in international agencies.

Requirements for B.A. Degree

1. For university requirements for B.A. degree see page 14. Russian must be used to meet language requirement.

2. For School of Humanities and Social Sciences distribution requirements and concentration requirements, see page 33.

3. A minimum of 45 hours of approved courses including:

a. Either RS 227,228, *or* Hst 447,448,449 ..... 9 hours

b. A minimum of 33 hours from at least three of the five participating departments, Economics, Geography, History, Modern Languages, Political Science, chosen from the following: 33 hours

Ec 450, 451	RS 227, 228
Geog 427	SL 311, 312, 313
Hst 447, 448, 449	SL 314, 315, 316
Hst 450	SL 317, 318, 319
Hum 407	SL 421, 422, 423
Hum 411, 412, 413	SL 461, 462, 463
PS 346, 438	LS 407

New courses may be added as approved.

c. A minimum of one 3-hour seminar (407) in the Russian area in either economics, geography, history, or political science taken during the senior year ..... 3 hours

TOTAL ..... 45 hours

Students interested in electing the major in Russian Studies should consult the Committee on Russian Studies about their programs.

Lower Division Course

RS 227,228. **Introduction to Russian Culture.**
5 hours each term.
1 to be arranged. 2 ②
RS 227: The Imperial heritage. *RS 228:* The Soviet era. Must be taken in sequence.

Liberal Studies

Upper Division Courses

LS 307. Seminar.
Terms and hours to be arranged.

LS 311,312,313. **Creative Epochs in Western Thought.**
3 hours each term. 1 ③
History, philosophy, science, art, and literature defining Western civilization. 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.

LS 402. **Independent Study.**
Terms and hours to be arranged.

LS 403. **Thesis.**
Terms and hours to be arranged.

LS 407. Seminar. (g)
Terms and hours to be arranged.*

LS 411,412,413. **The Russian Novel in English.** (g)
3 hours each term. 3 ①
Major Russian novels from early nineteenth century to present. Special emphasis on Gogol, Tolstoy, Dostoevsky, Turgenev, Pasternak, and Sholokhov. Prerequisite: 9 hours of literature.

General Social Sciences Courses

SSc 411. **Social Science Research Laboratory.**
Terms and hours to be arranged.
Empirical analysis and computer utilization in social science research. Prerequisite: 10 hours of social science coursework.

SSc 423. **Small Group Behavior.** (g)
3 hours. 3 ①
Field and laboratory research and developments in small group dynamics and processes. Prerequisite: Sp 323 or Psy 221.

SSc 424. **Theory of Conflict and Conflict Management.** (g)
3 hours. 3 ①
Intrapersonal, interpersonal, and intergroup conflict; causes and effects of conflict; social and psychological aspects of conflict behavior; decision making, force, suppression and destruction; conflict development and areas of greatest conflict in society. Prerequisite: Sp 323 or Psy 221.

ANTHROPOLOGY

The Department of Anthropology offers an undergraduate program leading to the Bachelor of Arts degree in Anthropology. Courses are offered to meet the needs of (1) students majoring in Anthropology, (2) students concentrating on Anthropology in the Social Science degree program, and (3) students choosing such courses as a part of other degree programs or desiring a comprehensive understanding of human societies and their cultures.

Anthropology is the science (1) of man's biological and cultural origins and developments, and (2) the description, classification, and comparison of man's present world-wide biological, linguistic, and cultural diversity.

For a B.A. degree in Anthropology the requirements, in addition to those established for the university and the school, include the following:

Lower Division: General Anthropology (Anth 101,102,103).

Upper Division: Peoples of the World (Anth 314,315,316) or one ethnology area sequence, Physical Anthropology (Anth 320,321,322), Seminar (Anth 407) or applied Anthropology (Anth 410) or approved topical course, Archaeology (Anth 430,431,432), and Anthropological Linguistics (Anth 490,491,492).

Lower Division Courses

Anth 101,102,103. **General Anthropology.**
3 hours each term. 3 ①
Anth 101: Human evolution. *Anth 102:* Contributions of archaeology and ethnology to understanding man's past. *Anth 103:* Development of culture. Taken in any sequence.

Anth 207,208,209. **Cultural Anthropology.**
3 hours each term. 3 ①
Meaning and patterns of human culture; significance for human beings; variability through time and space; processes of change. Taken in sequence.

Upper Division Courses

Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

Anth 304,305,306. **Social Anthropology.**
3 hours each term. 3 ①
Social relationships and structural patterns as manifest in selected areas of the world. Kinship, families, age and sex groups as bases of social organization. Comparison of social organizations of selected settings. The analysis of social systems. Taken in sequence. Prerequisite: 9 hours of anthropology or sociology.

Anth 314,315,316. **Peoples of the World.**
3 hours each term. 3 ①
Historical treatment and development of world culture areas. Significance of regional variations in culture in contemporary world affairs. Prerequisite: 6 hours of anthropology or sociology.

Anth 320,321,322. **Physical Anthropology.**
3 hours each term. 3 ①
Human and primate evolution; processes of raciation. *Anth 320:* man as a primate, fossil man, human evolution; *Anth 321:* morphology and genetics, raciation and human races; *Anth 322:* primate behavior, introduction to applied physical anthropology. Taken in any sequence. Prerequisite: Anth 101 or equivalent in biological science; junior standing.

* Graduate credit in LS 407 may not total more than 9 hours.

Anth 323,324,325. Physical Anthropology Laboratory.
1 hour each term. 1 ②
Lecture and laboratory exercises in osteology, anthropometry, anatomy, and serology in human and non-human primates. To accompany Anth 320,321,322.

Anth 401. Research. (g)
Terms and hours to be arranged.

Anth 402. Independent Study.
Terms and hours to be arranged.

Anth 403. Thesis.
Terms and hours to be arranged.

***Anth 405. Reading and Conference.** (g)
Terms and hours to be arranged.

Anth 406. Projects. (g)
Terms and hours to be arranged.

***Anth 407. Seminar.** (g)
Terms and hours to be arranged.

Anth 408. Workshop.
Terms and hours to be arranged.

Anth 410. Applied Anthropology. (g)
3 hours. 3 ①
Methods and problems in applying anthropological assumptions and theories to effect changes in culture. Culture change in various world regions. Prerequisite: 9 hours of anthropology; senior standing.

Anth 411,412,413. Ethnology of the Americas. (g)
3 hours each term. 3 ①
Culture history of the populations of the Americas. *Anth 411:* Pre-Columbian; *Anth 412:* Post-Columbian cultures; culture contacts and consequences for aboriginal cultures; *Anth 413:* Modern Americas, the effect of industrialization. Prerequisite: 9 hours of anthropology; junior standing.

Anth 414,415,416. Ethnology of Sub-Saharan Africa. (g)
3 hours each term. 3 ①
The cultures of Sub-Saharan Africa, their history and development; the problems and solutions posed in Africa's quest of modernization. Prerequisite: 9 hours of anthropology; junior standing.

Anth 417,418,419. Ethnology of South and East Asia. (g)
3 hours each term. 3 ①
Cultures, historical and regional variations, and continuity in South and East Asia. *Anth 417:* India and South Asia. *Anth 418:* China. *Anth 419:* Southeast Asia. Prerequisite: 9 hours of anthropology; junior standing.

Anth 430,431,432. Archaeology.
3 hours each term. 3 ①
Method and theory in American archaeology; development of Old and New World civilizations from their paleolithic bases; significance of archaeology to the analysis of human culture. Taken in sequence. Prerequisite: 9 hours of anthropology; junior standing.

* Graduate credit for Anth 405 and Anth 407 must not total more than 9 hours.

Anth 433. Archaeology Laboratory.
3 hours. 2 ③
Excavation of model sites in collection of archaeological specimens and data; analysis of field data; laboratory procedures, techniques and analytic methods; illustration of archaeological data, preparation of site reports. Field trip. Prerequisite: Anth 430.

Anth 460,461,462. Afro-American Cultures. (g)
3 hours each term. 3 ①
Anth 460: Historical and cultural backgrounds of Afro-American culture. *Anth 461:* Adaptations and acculturation of Afro-Americans in the New World. *Anth 462:* Contemporary relations in Afro-American cultures.

Anth 467. Anthropological Theory.
3 hours. 3 ①
An explanation of problem and theory in anthropology; deterministic and partitive theories of culture; social structure and function; social organization and culture. Prerequisite: 9 hours of anthropology; senior standing.

Anth 470. Cultural Patterns and the Individual. (g)
3 hours. 3 ①
Cross-cultural perspective. Interplay of culture and the individual experiencing socialization, acculturation; influence of the innovator on culture patterns. Prerequisite: 9 hours of anthropology, anthropology and sociology, or psychology.

Anth 490,491,492. Anthropological Linguistics. (g)
3 hours each term. 3 ①
Language as an aspect of human behavior and culture; language and culture; phonetics; historical linguistics. Prerequisite: 9 hours of anthropology; upper division standing.

ARCHITECTURE

Courses in Architecture and Allied Arts, designed to meet cultural and informational needs, are offered by the Department of Architecture both for students who anticipate more advanced study in environmental design, architecture, interior design, and building construction and for those desiring a brief introductory study only.

Selected courses may form a field of concentration leading to a B.A. or B.S. degree in Humanities. Instruction is planned to coordinate effective study of the total environment, recognizing the importance of art, landscape architecture, and the social, political, psychological, economic, anthropological, and historical forces that determine the nature of life in an architectural environment.

Architectural courses may form a minor for students majoring in certain other fields of work.

Professional courses permit a student to prepare to major in upper division architectural instruction in the State System of Higher Education and other universities.

Student models and drawings are the property of the department and may be retained for exhibition purposes.

Lower Division Courses

AA 10,11,12. Design Orientation.
No credit.
Theory and practice of planning and design. Intended to acquaint the student with the scope and nature of the design professions. Required for majors in architecture, landscape, architecture, and interior architecture. Normally taken concurrently with AA 287.

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

AA 121. Construction Materials.
2 hours. 2 ①
Materials and techniques of constructing buildings and furnishings; 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.

AA 178. Housing and Architectural Philosophy.
3 hours any term. 2 ① 1 ③
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.

AA 187. Design Studio I.
3 hours each term, three terms. 3 ②
Projects and exercises intended to familiarize the student with fundamental form and space concepts of architecture; control of proportion, scale, and design relationships. Students are encouraged to develop habits of problem formulation and sound bases for value judgments; the release of the student's potential creative capacities is a primary concern of the course.

AA 200. Delineation.
3 hours each term, three terms. 3 ②
Perception and communication by use of shade and shadow, orthographic projection, and perspective drawing necessary to indicate common architectural forms. Skills necessary for discrimination of form, color, and composition and for free experimentation of aesthetic expression. Pencil, pen and ink, and related media skills.

AA 207,208,209. History and Theory of Architecture.
3 hours each term. 3 ①
Review of architectural theory and form as a reflection of its social, economic, political, intellectual, and religious context; roots of contemporary theory.

AA 218,219,220. Construction.
3 hours each term. 3 ①
Material and methods; individual research and observation; sketching existing examples: discussion.

AA 223. Elements of Interior Design.
2 hours. 2 ②
Scope, aim, and technique to give understanding of professional field. All work done in drafting room. Open to nonmajor students with consent of instructor.

AA 287. Design Studio II.
3 hours each term, three terms. 3 ③
Major factors which influence design decisions; relation of the physical and human environment to design; integration of design considerations involved in the production of an art form. Required for majors in architecture, interior architecture, and landscape architecture. Prerequisite: AA 187 or equivalent.

AA 288. Interior Design.
2 hours. 2 ③
Introduction to the field; relation to architecture and allied arts; basic principles and planning processes by which interior spaces and forms are studied and executed.

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

ART

The Department of Art offers major programs leading to the Bachelor of Arts or Bachelor of Science. University requirements for the B.A. and B.S. degrees are shown on page 13, school requirements on page 35.

Departmental requirements for the B.S. or B.A. degree are: *Lower Division*—6 hours of Basic Design, 6 hours of Basic Drawing, 6 hours of 200-level art concentration, and 9 hours of Introduction to Art History. *Upper division*: 9 hours of History of Art, 6 hours of Drawing or Composition, 9 hours of 300-level art concentration, and 9 hours of 400-level art concentration. The areas of concentration within the department are: Design, Advertising Design, Ceramics, Printmaking, Sculpture, Painting, Art History, Photography, and Jewelry and Metalsmithing.

All art courses must be taken in sequence, except upper division History of Art.

For the four-year Basic Norm in Art Education see SCHOOL OF EDUCATION.

The Department of Art reserves the right to retain upper division student work for purposes of exhibition and for the permanent collection.

Lower Division Courses

Art 105,106,107. Basic Drawing.
2 hours each term. 2 ②
Form and space as defined on the two-dimensional surface through both traditional and contemporary techniques, with special emphasis on creative and analytical vision.

Art 110,111. Recreational Use of Arts and Crafts.
2 hours each term. 2 ②
Various 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.

Art 195,196,197. Basic Design.
2 hours each term. 2 ②
Language of visual arts; color, texture, form, and space explored in studio and through study of works of art.

Art 231,232,233. Art Crafts.
2 hours each term. 2 ②
Application of original designs to textile and other materials by block and silk-screen printing and in weaving. Prerequisite: Art 197.

Art 235. Introductory Metal Design.
2 hours. 2 ②
Processes and techniques in designing, forming, and fabricating non-ferrous metals as preparation for additional work in jewelry and metalsmithing. Prerequisite: Art 197.

Art 236. Jewelry.
2 hours. 2 ②
Design, tools, and techniques of jewelry construction with semiprecious materials, silver, and other metals. Prerequisite: Art 235.

Art 237. Metalsmithing.
2 hours. 2 ②
Skills and techniques involving hand processes of raising and forging using nonferrous metals. Prerequisite: Art 235.

Art 245,246,247. Lettering and Layout.
2 hours each term. 2 ②
Introductory experience in commercial art lettering, layouts, packaging, and display advertising. Prerequisite: Art 197.

Art 251,252,253. Drawing.
2 hours each term. 2 ②
Expressive modes of drawing and composition as related to media and technique. Enrichment of visual vocabulary. Some sections will be scheduled as life drawing. Prerequisite: Art 107.

Art 255,256,257. Ceramics.
2 hours each term. 2 ②
Pottery-making materials and techniques. Laboratory hours to be arranged. Prerequisite: Art 197.

Art 261,262,263. Introduction to Art History.
3 hours each term. 3 ①
Architecture, painting, sculpture, and the minor arts from prehistory to the present. Special emphasis on the development of Western art.

Art 275,276,277. Illustration.
2 hours each term. 2 ②
Drawing and illustration techniques adapted to the needs of students in scientific and technical fields. Prerequisite: Art 107.

Art 281. Printmaking.
2 hours. 2 ②
Basic techniques of intaglio, relief, and lithographic printmaking. Prerequisite: Art 107.

Art 285,286,287. Sculpture.
2 hours each term. 2 ②
Creative clay and plaster modeling and stone and wood carving; technical methods developed in conjunction with expressive design. Prerequisite: Art 107 and 197.

Art 291,292,293. Painting.
2 hours each term. 2 ②
Introductory studio work in media, technique, and composition with either oils or water color according to section designation in schedule of classes. Prerequisite: Art 107 and Art 197.

Art 295,296,297. Three-Dimensional Design.
2 hours each term. 2 ②
Examination of vocabulary; function and application of three-dimensional form and structure. Exploratory work challenging traditional and existing three-dimensional design concepts encouraged. Prerequisite: Art 197.

Upper Division Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

Art 313. Art in the Elementary Schools.
3 hours. 3 ②
Studio projects, discussions, and observations to give practical approach to arts and crafts instruction at preschool and elementary school levels. Prerequisite: Art 197.

Art 335. Metal Design.
3 hours. 3 ②
Development of design and construction process with nonferrous metals as foundation work for Jewelry and Metalsmithing. Prerequisite: Art 236 or 237.

Art 336. Jewelry.
3 hours. 3 ②
Design and techniques of jewelry construction with semiprecious and varied materials. Prerequisite: Art 335.

Art 337. Metalsmithing.
3 hours. 3 ②
Technique and design development in hand processes using nonferrous metals. Prerequisite: Art 335.

Art 341,342,343. Photography.
3 hours each term. 3 ②
Deals with photographic technology as a resource for creative expression. Inventive possibilities of the medium stressed. Problems in design and visual theory along with limited demonstrations on technical processes. Prerequisite: Art 197.

Art 345,346,347. Advertising Design.
3 hours each term. 3 ②
Lecture and studio projects in advanced layout and lettering typography, production methods in printing; illustration techniques. Prerequisite: Art 107 and 247.

Art 351,352,353. Drawing.
3 hours each term. 3 ②
Conceptual analysis of form: continued research in media and technique. Some sections will be scheduled as life drawing. Prerequisite: Art 253.

Art 355,356,357. Ceramics.
3 hours each term. 3 ②
Methods for forming clay pottery continued; use of textures and glazes. Prerequisite: Art 257.

Art 361,362,363. History of Art.
3 hours each term. 3 ①
Principal stylistic manifestations of European architecture, sculpture, and painting from Middle Ages to seventeenth century. May be taken in any order. *Art 361:* Medieval; *Art 362:* The Renaissance; *Art 363:* Baroque Art. Prerequisite: Art 263; Hst 103.

Art 364,365,366. History of Art.
3 hours each term. 3 ①
Principal movements in painting, sculpture, and architecture in Europe and America since 1700. *Art 364:* Eighteenth Century; *Art 365:* Nineteenth Century; *Art 366:* Twentieth Century. May be taken in any order. Prerequisite: Art 263; Hst 103.

Art 371. Creative Art Projects.
2 hours any term, six terms. 2 ②
Advanced studio work on approved projects in drawing, painting, sculpture, graphic arts, ceramics, metal design, and weaving. Upper division standing, one year lower division work in the selected medium, and approval of instructor required.

Art 381,382,383. Printmaking.
3 hours each term. 3 ②
Basic techniques of lithography, relief, and intaglio; development of craftsmanship and creative possibilities of the media. Prerequisite: Art 281.

Art 385,386,387. Sculpture.
3 hours each term. 3 ②
Life modeling, anatomical studies, figure composition employing traditional and experimental media. Prerequisite: Art 287.

Art 391,392,393. Painting.
3 hours each term. 3 ②
Composition and techniques continued; figure composition, space concepts. Prerequisite: Art 293.

Art 395,396,397. Composition and Visual Theory.
3 hours each term. 3 ②
Advanced work in composition and design with special attention to visual phenomena. Principles of continuity and unity, fragmentation of forms, challenging of classic design concepts. Prerequisite: Art 297.

Art 401. Research.
Terms and hours to be arranged.

Art 402. Independent Study.
Terms and hours to be arranged.

Art 403. Thesis.
Terms and hours to be arranged.

Art 405. Reading and Conference. (g)
Terms and hours to be arranged.*

Art 406. Projects.
Terms and hours to be arranged.

Art 407. Seminar. (g)
Terms and hours to be arranged.*

Art 408. Workshop.
Terms and hours to be arranged.

Art 415. Art in the Secondary School.
(g) 3 hours. 3 ①
Art Education: current thinking and practice regarding the processes of learning through art. Examination of the creative process through laboratory work and individual research. Prerequisite: a program of studies leading to a teaching norm.

Art 416. Art in the Secondary School.
(g) 3 hours. 3 ①
Art education on the junior high school level: role of art experiences in early adolescence examined through laboratory work, reading, and classroom observation. Prerequisite: Art 415 or Art 313.

Art 421. Art Problems in Elementary Schools. (g)
3 hours. 3 ①
Research and literature in early childhood art education. Laboratory work and research coordinated with observation of children working with art materials. Investigation of problems related to classroom procedure. Prerequisite: Art 313.

Art 435. Advanced Metal Design. (g)
3 hours. 2 ③ 1 ③
Further development of design and skills with construction processes using non-ferrous metals. Prerequisite: Art 335.

Art 436. Advanced Jewelry. (g)
3 hours. 2 ③ 1 ③
Advanced design and techniques of jewelry construction with semi-precious and varied materials. Prerequisite: Art 336.

Art 437. Advanced Metalsmithing. (g)
3 hours. 2 ③ 1 ③
Advanced technique and design development in hand processes using non-ferrous metals. Prerequisite: Art 337.

* Graduate credit under Art 405 and 407 may not total more than 9 hours.

Art 441,442,443. Advanced Photography. (g)
3 hours each term. 3 ②
Color photography, stereophotography, advanced composition problems in black and white. Individual projects related to individual interests. Prerequisite: Art 343.

Art 445,446,447. Advanced Advertising Design. (g)
3 hours each term. 3 ②
Finished work in advertising illustration in specific directions for a professional portfolio, plus a terminal project. Prerequisite: Art 347.

Art 451,452,453. Drawing.
3 hours each term. 3 ②
Advanced work in drawing; individual research in media, technique, and expression. Some sections scheduled as life drawing. Prerequisite: Art 353.

Art 455,456,457. Advanced Ceramics.
(g) 3 hours each term. 3 ②
Perfection of ceramic skills and the growth of imaginative craftsmanship. Prerequisite: Art 357.

Art 461,462,463. Art of the Americas. (g)
3 hours each term. 3 ①
Architecture, sculpture, painting, and the minor arts of North and South America: Pre-Columbian, Colonial, Nineteenth and Twentieth Centuries. Prerequisite: 9 hours from Art 361-366.

Art 481,482,483. Advanced Printmaking. (g)
3 hours each term. 3 ②
Workshop instruction in making and printing engravings, etchings, lithographs, linoleum cuts and woodcuts. Prerequisite: Art 383.

Art 485,486,487. Advanced Sculpture.
(g) 3 hours each term. 3 ②
Mature use of sculptor's materials and media; exploration of sculptor's potentialities. Prerequisite: Art 387.

Art 491,492,493. Advanced Painting.
(g) 3 hours each term. 3 ②
Application of techniques used in contemporary painting with emphasis upon student's personal development. Prerequisite: Art 393.

Art 495,496,497. Advanced Design. (g)
3 hours each term. 3 ②
Mature artistic experimentation into both two- and three-dimensional design areas with emphasis upon student's personal development. Prerequisite: Art 397.

ECONOMICS

The Department of Economics offers a major program leading to the Bachelor of Arts or Bachelor of Science degree. Instruction serves the cultural and informational needs of all students interested in economic problems in relation to citizenship; it provides a sound basis for later professional or graduate education in economics; it supplies a foundation for law, business, or public service; and meets the prescriptions found in professional curricula.

In addition to the university and school requirements, the following courses are required:

Lower Division: Principles of Economics (Ec 201,202,203), Intermediate Algebra (Mth 51).

Upper Division: Microeconomic Theory (Ec 457, 458, 459), Macroeconomic Theory and Policy (Ec 475, 476, 477), History of Economic Thought (Ec 470), an approved course in statistics.

Additional economics requirements met by any one of the following options:

a. *General Economics:* 18 additional hours of upper division economics including at least one sequence.

b. *Quantitative Economics:* 18 additional hours of upper division economics including Mathematical Economics (Ec 480, 481, 482), Econometrics (Ec 483).

c. *Economic History and Development:* 18 additional hours of upper division economics including at least 12 from the following: Comparative Economic Systems (Ec 450, 451), Economic History of Modern Europe (Ec 454), Economic Development (Ec 445, 446), American Economic History (Ec 487, 488).

Lower Division Courses

Ec 115. Outlines of Economics.
4 hours. 4 ①
Principles and institutions. May not be taken in place of Ec 201,202, or 203.

Ec 201,202,203. Principles of Economics. 3 hours each term. 3 ①
Introduction to economic theory, policy, and institutions.

Ec 213,214. Principles of Economics.
4 hours each term. 4 ①
Similar to Ec 201,202,203. A two-term sequence.

Ec 215. Economic Development of the United States.
3 hours. 3 ①
Economic institutions including industry, agriculture, commerce, transportation, labor, and finance; economic progress of the United States.

Upper Division Courses

Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

Ec 357. Microeconomic Theory.
3 hours. 3 ①
Intermediate microeconomic theory. Prices and output under various market structures. Prerequisite: Ec 115 or Ec 201,202 or Ec 214.

Ec 375. Macroeconomic Theory and Policy.
3 hours. 3 ①
Intermediate macroeconomic theory. National income accounting. Employment theory and determination of aggregate demand. Prerequisite: Ec 115 or Ec 201,202 or Ec 214.

Ec 380. Survey of Quantitative Economics.
3 hours. 3 ①
Mathematics and statistics used in analysis of economic problems and applications to economic theory and measurement. Prerequisite: Ec 203; Mth 51 or 107.

Ec 401. Research.
Terms and hours to be arranged.

Ec 402. Independent Study.
Terms and hours to be arranged.

Ec 403. Thesis.
Terms and hours to be arranged.

Ec 405. **Reading and Conference.** (g)
Terms and hours to be arranged. Graduate credit limited to 9 hours.

Ec 406. **Projects.**
Terms and hours to be arranged.

†Ec 407. **Seminar.** (g)
Terms and hours to be arranged.

Ec 408. **Workshop.** (g)
Terms and hours to be arranged.

†Ec 411,412,413. **Monetary and Banking Theory.** (g)
3 hours each term. 3 ①
Nature and functions of money; commercial banking; the money market; monetary, credit, and central banking theory; domestic and international impacts of monetary policy; nonbank financial institutions; foreign banking systems and international banking agencies. Prerequisite: Ec 203.

Ec 414. **Regional Economics.** (g)
3 hours. 3 ①
Determination of level of economic activity within a region. Techniques of regional analysis: location theory, intersectorial flow analysis, input-output analysis, economic base theory. Prerequisite: Ec 203.

Ec 415. **Urban Economics.** (g)
3 hours. 3 ①
Implications of agglomeration on the economic base, housing and land use patterns, transportation, the public economy, and social disorganization. Prerequisite: Ec 203.

Ec 421. **Economic Fluctuations.** (g)
3 hours. 3 ①
Economic activity viewed in historical perspective; fluctuations and cycles; prosperity and depression; measurement and control. Prerequisite: Ec 203.

Ec 425. **Labor Problems.** (g)
3 hours. 3 ①
Sources and nature; labor movement history and objectives; union organizations; public regulation of unions; collective bargaining procedures; collective bargaining contracts. Prerequisite: Ec 203.

Ec 426. **Labor Legislation.** (g)
3 hours. 3 ①
Basis of labor law; legality of unions and their activities; labor injunctions; unions and antitrust laws; the Norris-LaGuardia Act; the National Labor Relations Act and its amendments; the N.L.R.B. and unfair labor acts; cases interpreting labor laws. Prerequisite: Ec 203.

Ec 427. **Labor Economics.** (g)
3 hours. 3 ①
Wage determination; distribution theory as applied to wages; employment theory; economic insecurity and public policy; social security. Prerequisite: Ec 203.

Ec 429,430,431. **Public Finance.** (g)
3 hours each term. 3 ①
Survey of government taxing, spending, borrowing with emphasis on current issues of theory and practice at federal, state, and local levels; shifting and incidence; fiscal policy for stability and growth. Prerequisite: Ec 203.

Ec 440,441,442. **International Economics.** (g)
3 hours each term. 3 ①
International trade; international financial arrangements; trade restrictions; capital movements; exchange rates; international economic organizations and financial institutions; comparative growth. Prerequisite: Ec 203.

† Applicable toward a graduate major in agricultural economics, School of Agriculture.

Ec 445,446. **Economic Development.** (g) 3 hours each term. 3 ①
Theories and policies for economic development in both the developing and developed parts of the world. Prerequisite: Ec 203.

Ec 448. **Economic Survey of Latin America.** (g)
3 hours. 3 ①
Evolution of economic systems in Latin America; contemporary organizational forms; institutional and technological problems; international economic relations. Prerequisite: Ec 203.

Ec 450,451. **Comparative Economic Systems.** (g)
3 hours each term. 3 ①
Contemporary economic systems; capitalism, socialism, communism. Prerequisite: Ec 203.

Ec 453. **Soviet Economics.** (g)
3 hours. 3 ①
Soviet economic history and structure; economic calculation and performance; money and finance; trends and prospects. Prerequisite: Ec 203.

Ec 454. **Economic History of Modern Europe.** (g)
3 hours. 3 ①
The industrialization of Europe; origin and development of economic institutions; implications for the industrialization of underdeveloped areas. Prerequisite: Ec 203.

Ec 458,459. **Microeconomic Theory** (g)
3 hours each term. 3 ①
Decision making in an enterprise economy. Price and output under various market structures; welfare economics. Prerequisite: Ec 357.

Ec 461. **Industrial Organization.** (g)
3 hours. 3 ①
Industrial and financial dimensions of U. S. business and their implications for economic efficiency, economic power, and social control. Prerequisite: Ec 203.

Ec 462. **Economics of Public Control.** (g) 3 hours. 3 ①
Government and the economy; historical and theoretical basis and implications for economic performance. Prerequisite: Ec 203.

Ec 470. **History of Economic Thought.** (g) 3 hours. 3 ①
Theory dealing with socio-economic problems. Prerequisite: Ec 201,202,203.

†Ec 476,477. **Macroeconomic Theory and Policy.** (g)
3 hours each term. 3 ①
National income and product accounts; theory of aggregate demand, employment, price level, economic growth; monetary and fiscal policy; current economic problems. Prerequisite: Ec 375.

†Ec 480,481,482. **Mathematical Economics.** (g)
3 hours each term. 3 ①
Quantitative methods of economic research; economic programing; input-output analysis. Prerequisite: Ec 203; Mth 111 or 163.

Ec 483. **Econometrics.** (g)
3 hours. 3 ①
Theory and application of statistical and mathematical methods to problems of economics; model building and testing of demand, production, and macroeconomic hypotheses. Prerequisite: Mth 112; two terms of statistics; Ec 457,476.

Ec 487,488. **American Economic History.** (g)
3 hours each term. 3 ①
Economic development of U. S. from colonial times to present. Prerequisite: Ec 203.

† Applicable toward a graduate major in agricultural economics, School of Agriculture.

Ec 499. **Topics in Economic Analysis.** (g) 4 hours. 4 ①
Theory of production; market structure, conduct, and performance; theory of national income determination; the monetary system; monetary and fiscal policy. Prerequisite: senior standing.

Graduate Service Courses
See also courses marked (g) above.

Ec 512,513. **Economic History and Development.**
3 hours each term. 3 ①
Historical development of industrial economies; sources of historical change; structural characteristics; long-term growth trends.

Ec 514,515,516. **Contemporary Economic Thought.**
3 hours each term. 3 ①
Twentieth century economics; value theory, welfare economics, imperfect competition; institutionalism; theory of employment, money, national income, economic fluctuations; growth; innovations in methodology. Prerequisite: 475,476,477, or equivalent.

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.

ENGLISH

The Department of English offers instruction in literature and writing to meet the needs of students (1) who seek the cultural and intellectual values of the undergraduate major, (2) who plan to teach English in the elementary and secondary schools, (3) who plan to pursue graduate work in English, and (4) who desire the broadening influence of humanistic studies. In addition to completing university and school requirements for graduation, the English major must complete university language requirements for the B.A. degree; complete one year of Shakespeare, one year of either Survey of English Literature or World Literature, and a total of 27 hours in upper division courses in the department, including 9 hours in literature before 1800 and 9 hours in literature since 1800; and must include History of Western Civilization.

Preparation for High School Teaching in Oregon. For certification as a teacher of English, the student must include in his program the subject-matter requirements of the Oregon State Department of Education. (See School of Education for requirements.)

1. The basic certificate, granted after four years of college work, requires the completion of a *basic norm:* 63 term hours, including the 45 hours of the English major and additional hours, distributed among advanced expository writing, American and world literature, development and structure of the English language, and speech. Developmental reading must be included as part of the professional education preparation.

The requirements for the basic certificate may be met by the completion of a major in English plus the following courses: literary analysis for teachers (Eng 488); advanced expository writing (Wr 316 or 317 or 411); structure of the English language (Eng 491); American literature (either Eng 254 or 255); world literature (this requirement may be met by Eng 107, 108, 109, World Literature, if chosen as the major survey course; or if not so chosen, by 3 term hours selected from Eng 354, 355, 356, Continental European Literature or from Eng 411, 412,

413, Development of the Drama); plus 3 term hours of speech. For developmental reading, see Ed 350. Advanced expository writing and speech may be counted in the Arts and Letters distribution of the School of Humanities and Social Sciences.

2. For a standard certificate, granted after five years of college work, the student must complete a standard norm: 93 term hours including, in addition to the *basic norm* requirement, work in literary criticism and advanced writing or linguistics.

(See also School of Education.)

COURSES IN LITERATURE

Lower Division Courses

Eng 101,102,103. Survey of English Literature.
3 hours each term. 3 ①
English literature presented in chronological sequence: *Eng 101:* From Beowulf to Milton; *Eng 102:* From Milton through Coleridge; *Eng 103:* From Byron to the present.

Eng 104,105,106. Introduction to Literature.
3 hours each term. 3 ①
Study of types of literature for greater understanding and enjoyment. *Eng 104:* primary emphasis on fiction; *Eng 105:* on drama; *Eng 106:* on poetry.

Eng 107,108,109. World Literature.
3 hours each term. 3 ①
The great plays, poems, and novels of western civilization. *Eng 107:* The Classic World; Hebrew, Greek, Roman, and Christian to St. Augustine. *Eng 108:* The Renaissance to the Age of Reason; Dante to Voltaire. *Eng 109:* The Romantic Revolt; Goethe to Gide.

Eng 201,202,203. Shakespeare.
3 hours each term. 3 ①
The major plays.

Eng 253,254,255. Survey of American Literature.
3 hours each term. 3 ①
Readings from American literature with emphasis on major writers. *Eng 253:* colonial and early national literature to Hawthorne and Melville; *Eng 254:* Emerson to Henry James; *Eng 255:* Henry Adams to the present.

Eng 256. Literature of the Black Man in America. 3 hours. 3 ①
Study of literary production of America and elsewhere reflecting the contribution of black writers to our literary heritage.

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

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

Upper Division Courses

Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

Some 400-level courses are offered in alternate years. See SCHEDULE OF CLASSES.

Eng 345. Methods and Materials of Literary Criticism.
3 hours. 3 ①
Critical analysis and evaluation of literary texts, based on the principles of literary judgment. Prerequisite: junior standing.

Eng 354,355,356. Continental European Literature.
3 hours each term. 3 ①
Continental European literature in translation, chiefly French, German, and Russian, from approximately 1870 to the present.

Eng 374. The Short Story.
3 hours. 3 ①
Survey of the short story; reading and analysis of masterpieces of the form.

Eng 394,395,396. Twentieth-Century Literature.
3 hours each term. 3 ①
Twentieth-century American and British fiction, drama, and poetry.

Eng 401. Research.
Terms and hours to be arranged.

Eng 402. Independent Study.
Terms and hours to be arranged.

Eng 403. Thesis.
Terms and hours to be arranged.

Eng 405. Reading and Conference. (g)
Terms and hours to be arranged.

Eng 406. Projects.
Terms and hours to be arranged.

Eng 407. Seminar. (g)
Terms and hours to be arranged.

Eng 408. Workshop.
Terms and hours to be arranged.

Eng 411,412,413. Development of the Drama. (g)
3 hours each term. 3 ①
Eng 411: Reading and analyzing plays ancient and medieval. *Eng 412:* Renaissance and Neo-classical. *Eng 413:* Romantic and modern. Prerequisite: 9 hours of literature.

Eng 414,415,416. Literary Criticism.
(g) 3 hours each term. 3 ①
Theory and practice of chief literary critics from Plato to the present. Prerequisite: 18 hours of literature.

Eng 417,418,419. The English Novel.
(g) 3 hours each term. 3 ①
Selected English novels from the eighteenth century to the present. *Eng 417:* Richardson through Austen; *Eng 418:* Scott through Eliot; *Eng 419:* Conrad through Greene. Prerequisite: 18 hours of literature.

Eng 425,426,427. Early English Literature. (g)
3 hours each term. 3 ①
Old and Middle English literature with an introduction to the language. Emphasis primarily on Chaucer. Prerequisite: 9 hours of literature.

Eng 430,431,432. Literature of the Renaissance. (g)
3 hours each term. 3 ①
Thought and literary types from late fifteenth century to early seventeenth, exclusive of Shakespeare. Prerequisite: 9 hours of literature.

Eng 436,437,438. Advanced Shakespeare. (g)
3 hours each term. 3 ①
Intensive study of selected plays. Prerequisite: Eng 201,202,203 or equivalent.

Eng 440,441,442. Seventeenth-Century Literature. (g)
3 hours each term. 3 ①
Poetry and prose from 1603 through the Restoration. Prerequisite: 9 hours of literature.

Eng 445. Milton. (g)
3 hours. 3 ①
The major poems of John Milton, with principal emphasis on *Paradise Lost.* Prerequisite: 9 hours of literature.

Eng 450,451,452. Eighteenth-Century Literature. (g)
3 hours each term. 3 ①
Poetry and prose of the century as they relate to social, political, aesthetic, and scientific ideas of the period. Prerequisite: 9 hours of literature.

Eng 454,455. Individual Authors.
3 hours each term. 3 ①
Major English authors as listed in the *Schedule of Classes.* Prerequisite: 9 hours of literature.

Eng 460,461,462. Literature of the Romantic Period. (g)
3 hours each term. 3 ①
Prose and poetry from Wordsworth and Coleridge to Keats and Shelley; ideas and aesthetics of period. Prerequisite: 9 hours of literature.

Eng 463,464,465. Literature of the Victorian Period. (g)
3 hours each term. 3 ①
The nonfictional prose and poetry of the later nineteenth century from Carlyle, Tennyson, Browning, and Arnold through Pater and the writers of the 1890's. Prerequisite: 9 hours of literature.

Eng 481,482,483. Major American Writers. (g)
3 hours each term. 3 ①
Intensive study each term of two or three major authors such as Hawthorne, Emerson, Whitman, Melville, James, Twain, Dickinson, Frost, Eliot, Hemingway, Faulkner. Prerequisite: 9 hours of literature.

Eng 487. Children's Literature. (g)
3 hours. 3 ①
Reading material suitable for elementary grades and criteria used in selecting books for children.

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

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

Eng 491. The Structure of English. (g)
3 hours 3 ①
New analytic and descriptive methods applied to English grammar. Prerequisite: senior standing.

Eng 495,496,497. The Democratic Tradition in Literature. (g)
3 hours each term. 3 ①
The ideas of democracy as reflected in English and American literature. Prerequisite: 9 hours of literature.

AUXILIARY COURSES

Lower Division Courses

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

Eng 115. Effective Reading.
3 hours any term. 3 ①
To develop better comprehension and greater speed in reading. Offered in summer term.

Eng 116. Vocabulary Building.
3 hours any term. 3 ①
Vocabulary improvement through reading, study of roots and prefixes, with frequent progress tests. Open to freshmen and sophomores only.

COURSES IN WRITING

Lower Division Courses

Wr 10. Corrective English.
No credit. 3 ①
Refresher course in English fundamentals. Offered in summer term.

[1]**Wr 111,112,113. English Composition.**
3 hours each term. 3 ①
Readings in literature with frequent written compositions emphasizing clarity and accuracy. Courses must be taken in sequence.

[2]**Wr 121,222,323. English Composition.**
3 hours any term. 3 ①
Introduction to methods of exposition; rudiments of the research paper and techniques of argument and persuasion; the elements of style. Wr 121 prerequisite to Wr 222; Wr 222 prerequisite to Wr 323.

Wr 214. Business English.
3 hours any term. 3 ①
Current practices in producing clear, concise business letters with appropriate emphasis on psychology and salesmanship. Prerequisite: Wr 113 or Wr 222.

Wr 230. Effective Writing.
3 hours. 3 ①
Open only to students who place low on the comprehensive English examination required by some schools. Prerequisite: Wr 113 or Wr 222.

Wr 233,234,235. Advanced Writing.
3 hours each term. 3 ①
Study and practice at a more advanced level than freshman composition. Prerequisite: Wr 113 or Wr 222.

[3]**Wr 241,242,243. Introduction to Imaginative Writing.**
3 hours each term. 3 ①
Wr 241: general consideration of style and the writing of fiction: *Wr 242:* the criticism and fundamentals of short story writing: *Wr 243:* the criticism and writing of poetry. Prerequisite: consultation with the instructor.

Upper Division Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

Wr 316. Advanced Expository Writing.
3 hours any term, 2 terms. 3 ①
Study and writing of exposition. Prerequisite: Wr 113 or Wr 222.

[3]**Wr 324. Short Story Writing.**
3 hours any term, 3 terms. 3 ①
Study and writing of the short story. Prerequisite: Wr 113 or Wr 222.

Wr 327. Technical Report Writing.
3 hours any term. 3 ①
The various skills and forms used in technical communication. Prerequisite: Wr 113 or Wr 222.

[3]**Wr 341. Poetry Writing.**
3 hours any term, 3 terms. 3 ①
Study and writing of verse. Prerequisite: Wr 113 or Wr 222.

[1] Available only to students in certain nondegree programs by prearrangement with the Department of English.

[2] A student is expected to take Wr 121 as a freshman, Wr 222 as a sophomore, and Wr 323 as a junior. The term in which a student takes Wr 121, 222, and 323 is determined alphabetically. See *Schedule of Classes.* Upon approval of the dean of his school and prearrangement with the Department of English a student may substitute Wr 316 or Wr 327 for Wr 323.

[3] Students wishing to enroll in Wr 241,242 243,324 or 341 must make prior arrangement with the instructor.

Wr 401. Research.
Terms and hours to be arranged.

Wr 402. Independent Study.
Terms and hours to be arranged.

Wr 403. Thesis.
Terms and hours to be arranged.

Wr 404. Writing and Conference. (g)
Terms and hours to be arranged.

Wr 406. Projects.
Terms and hours to be arranged.

Wr 407. Seminar. (g)
Terms and hours to be arranged.

Wr 408. Workshop.
Terms and hours to be arranged.

Wr 411. English Composition for Teachers. (g) 3 hours. 3 ①
For students expecting to teach English.

GEOGRAPHY

The Department of Geography, a joint department of the School of Humanities and Social Sciences and the School of Science, offers courses with social science credit designed to serve three purposes: (a) the general education needs of students majoring in other curricula, (b) the subject norm requirements for social studies teachers, and (c) a geography concentration option for divisional majors in social sciences.

The following courses are recommended for a geography concentration within the framework of the divisional social science major:

Lower Division: Economic Geography (Geog 107), Introduction to Physical Geography (Ggs 227), Maps and Map Interpretation (Ggs 261), Principles of Economics (Ec 201,202,203), and one course in mathematics.

Upper Division: Systematic Cultural Geography (Geog 321,322,323), Geography of Transportation (Geog 480), Geography of Manufacturing (Geog 481), Urban Geography (Geog 482), Techniques of Regional Analysis (Geog 483), and a minimum of one course in statistics.

Students contemplating graduate work are urged to take an appropriate foreign language.

An undergraduate major, graduate majors in physical and resource geography, and technical supporting courses are offered through the School of Science.

Lower Division Courses

Geog 105,106,107. Introductory Geography. 3 hours each term. 3 ①
Principles and structure of geography; world regional geography; economic geography.

Upper Division Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

Geog 313. Geography of the Pacific Northwest. 3 hours. 3 ①
Human and economic geography of Pacific Northwest with special reference to Oregon. Prerequisite: Geog 107 or consent of instructor.

Geog 321,322,323. Systematic Cultural Geography. 3 hours each term. 3 ①
Geog 321: Agency of man in environmental alteration and landscape change. *Geog 322:* Spatial aspects of man's cultural traits and imprints on the earth. *Geog 323:* Analysis of cultural landscapes, settlement taxonomy, and typology. Prerequisite: Geog 107.

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.

Geog 328. Geography of Latin America. 3 hours 3 ①
Regional analysis of the Latin American nations; industrial and commercial development and potentialities. Prerequisite: Geog 107.

Geog 329. Geography of North America. 3 hours any term. 3 ①
Regional analysis of Anglo-America with particular emphasis on economic and settlement geography. Prerequisite: Geog 107.

Geog 331. Geography of Asia.
3 hours. 3 ①
Asiatic countries including the island fringe; human, cultural, and economic conditions; national economies and world relationship; implications for present and future. Prerequisite: Geog 107.

Geog 332. Geography of Africa.
3 hours. 3 ①
African nations and colonies; human, cultural, and economic conditions; national economies and world relationships; implications. Prerequisite: Geog 107.

Geog 405. Reading and Conference. (g)
Terms and hours to be arranged.

Geog 427. Geography of the Soviet Union. (g) 3 hours. 3 ①
Resources, peoples, economic activities, regions, and world position of the Soviet Union. Prerequisite: 9 hours of geography.

Geog 428,429,430. Europe. (g)
3 hours each term. 3 ①
Cultural and physical processes that have shaped man's organization and use of Europe; analysis of spatial evidences of man's developments; significance of Europe in the world's cultural-economic patterns: Geog 428: Historical geography. Geog 429; Cultural geography. Geog 430: Economic geography. Prerequisite: Geog 323.

Geog 480. Geography of Transportation. (g)
4 hours. 3 ① 1 ②
Concepts, principles, and underlying bases of areal exchange emphasizing the movement of goods and forms of transportation. Spatial interaction is examined through models and graph theory. Prerequisite: Geog 323.

Geog 481. Geography of Manufacturing. (g)
4 hours. 3 ① 1 ②
The location of manufacturing activity. Empirical and theoretical examinations of the determinants of location, including intraurban location. Techniques of measurement of areal associations and relationships in manufacturing. Prerequisite: Geog 323.

Geog 482. **Urban Geography.** (g)
4 hours. 3 ① 1 ②
Relationships between city and region; concepts of number, size, arrangement, function, and structure of urban centers; the role of urban centers in dispensing goods and services; and urban economic base. Prerequisite: Geog 323.

Geog 483. **Techniques of Regional Analysis.** (g)
4 hours winter. 3 ① 1 ②
Measurement and univariate analysis of spatial components that give identity and structure to regions; multivariate analysis of relationships and associations of combinations of regional components. Prerequisite: 12 hours of upper division geography; 1 term of statistics.

HISTORY

The Department of History offers an undergraduate major for students interested in a synthesis of the humanistic experience and the social relationships of man in the several eras of his civilized development. A knowledge of the history of the world's civilizations, past and present, is fundamental as background for the social sciences and humanities. It is of special value to students of law, journalism, and business. It is indispensable for liberal education conceived as the intellectual training of free men and women prepared for intelligent and informed participation or leadership in their society, vocation, and profession.

Courses are designed to serve a multiple clientele: those students of inquiring mind who are challenged by the dialogue between culture, science, and technology in mankind's history; those who are considering professional schools or graduate work in history; those who wish to meet the certification requirements for teachers of social studies in the schools; or those who elect history in conjunction with primary curricular emphasis in other fields.

In addition to completing university and school requirements for graduation, the student must complete university language requirements for the B.A. degree. Within the framework of these requirements the student's major program will be worked out with his adviser. Students interested in high school teaching may have their programs planned to satisfy state certification requirements.

Departmental Requirements: (42 hours)

24 upper division hours, including at least 9 hours of 400-level courses.

History 101,102,103, History of Western Civilization or, with consent of adviser, 15 hours of upper division European history, including courses both before and after 1500.

Year sequence in United States history.

No fewer than 8 hours of upper division courses in each of two fields selected from the following: (1) Europe Before 1500, (2) Europe After 1500, (3) United States, (4) Far East, (5) Latin America.

At least one term of seminar (Hst 407).

Lower Division Courses

Hst 101,102,103. **History of Western Civilization.**
3 hours each term. 3 ①
History of man; his governmental, economic, social, religious, intellectual, and aesthetic activities in Europe, Asia, and Americas. Special effort made to relate past to contemporary events and institutions.

Hst 224,225,226. **History of American Civilization.**
3 hours each term. 3 ①
Rise and development from beginning to present; 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.

Hst 265,266. **The History of the Black Man in the United States.**
4 hours each term. 4 ①
The forces and personalities that have shaped the history of the Black Man in the United States. *Hst 265:* African beginnings to the close of Reconstruction; *Hst 266:* Close of Reconstruction to the present.

Upper Division Courses

Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

Hst 304,305,306. **English History.**
3 hours each term. 3 ①
Political, economic, social, intellectual, and religious developments since 1485; evolution from Empire to Commonwealth and Britain's part in transition.

Hst 311,312. **The Ancient World.**
4 hours each term. 4 ①
Political, economic, social, and cultural history of the ancient world from beginning of Greek civilization to dissolution of the Roman Empire. *Hst 311:* History of Greece; *Hst 312:* History of Rome.

Hst 321,322,323. **The Middle Ages.**
3 hours each term. 3 ①
Cultural, political, and economic history of the Middle Ages.

Hst 331,332,333. **Early Modern Europe.**
3 hours each term. 3 ①
Renaissance, reformation, scientific revolution, absolute monarchy, the age of reason.

Hst 341,342,343. **Europe Since 1789.**
4 hours each term. 4 ①
Political, economic, social, and intellectual developments since the French Revolution. *Hst 341:* 1789-1890. *Hst 342:* 1890-1939. *Hst 343:* 1939-present.

Hst 350,351. **Modern Latin America.**
4 hours each term. 2 ① 1 ②
History of the republics of Middle and South America, emphasizing the reaction to imperialism and the growth of nationalism and internationalism.

Hst 391,392. **The Far East.**
4 hours each term. 4 ①
History, civilization, and political, economic, cultural, and social problems of modern China, Japan, India, Korea, South Asia, and the Pacific Islands.

Hst 401. **Research.**
Terms and hours to be arranged.

Hst 402. **Independent Study.**
Terms and hours to be arranged.

Hst 403. **Thesis.**
Terms and hours to be arranged.

Hst 405. **Reading and Conference.** (g)
Terms and hours to be arranged.*

Hst 406. **Projects.**
Terms and hours to be arranged.

Hst 407. **Seminar.** (g)
Terms and hours to be arranged.*

Hst 437,438. **History of Modern Germany.** (g)
4 hours each term. 4 ①
Political, economic, social, and intellectual developments in the nineteenth and twentieth centuries. *Hst 437:* 1815-1914. *Hst 438:* 1914-present. Prerequisite: Hst 341,342,343.

Hst 447,448,449. **History of Russia.** (g)
3 hours each term. 3 ①
Origins of the Russian state; development of the tsarist empire; revolutionary movement since 1861. Prerequisite: Hst 101,102,103.

Hst 450. **History of Soviet Political and Economic Institutions.** (g)
3 hours. 3 ①
The Communist Party; state and public administration; State planning commission and public corporations; cooperatives, in theory and structure. Prerequisite: Hst 101,102,103; 9 hours of upper division history, political science, or economics.

Hst 452. **Jeffersonian and Jacksonian Democracy.** (g)
4 hours. 4 ①
American political, economic, religious, and social development during the early and middle national era with emphasis on the formation and growth of political parties, territorial expansion and western settlement, and the beginnings of sectional conflict. Prerequisite: Hst 224,225,226.

Hst 453. **Civil War and Reconstruction.**
(g) 4 hours. 4 ①
Origins of the war and of the critical postwar era from the 1830's to the 1880's. Special attention given to the changing historiography of the period. Prerequisite: Hst 224, 225,226.

Hst 454. **Progressivism and the New Deal.** (g)
4 hours. 4 ①
Nature, programs, spirit, and objectives of the twentieth-century reform movements down to World War II; relationships of reform movements to the welfare state examined. Prerequisite: Hst 226.

Hst 455. **Contemporary United States.**
(g) 4 hours. 4 ①
Developments since 1939 which have promoted fundamental and profound shifts in American life, in particular the phenomenon of growing public and private questioning of the meaning and direction of American life in a world in revolutionary transition. Prerequisite: Hst 224,225,226.

Hst 460,461,462. **American Thought and Culture.** (g)
3 hours each term. 3 ①
American thought, ideals, and institutions; contribution to American culture by schools, newspapers, magazines, motion pictures, radio, art, literature, television, and philosophy. Prerequisite: Hst 224,225,226.

* Graduate credit under Hst 405 and 407 may not total more than 9 hours.

Hst 474,475. American Diplomatic History. (g)
4 hours each term. 4 ①
American diplomatic relations from the nation's founding to 1898 and from 1898 to the present. Prerequisite: Hst 224,225,226.

Hst 476,477. The American Frontier. (g)
3 hours each term. 3 ①
Advance of American settlement across successive frontiers in Continental United States and the contributions made by this movement to American political, economic, social, and cultural institutions. *Hst 476:* The Colonial and Trans-Appalachian Frontier; *Hst 477:* The Trans-Mississippi Frontier. Prerequisite: Hst 224,225,226.

Hst 478. History of Pacific Northwest. (g) 3 hours. 3 ①
Growth and development of Oregon, Washington, and Idaho from Indian times to present, with emphasis on political, economic, social, cultural changes. Prerequisite: Hst 224, 225,226, or equivalent.

Hst 484,485,486. Early History of the American People. (g)
3 hours each term. 3 ①
The economic, political, social, religious, and intellectual development of colonial North America to the first administration of George Washington. Prerequisite: Hst 224,225,226.

Hst 491. Japan Since 1854. (g)
4 hours. 4 ①
Japan's emergence from isolation to the position of a world power. Prerequisite: Hst 391,392 or equivalent.

Hst 492. China in the Twentieth Century. (g)
4 hours. 4 ①
Revolutionary China from Confucian to Communist. Prerequisite: Hst 391,392.

JOURNALISM

The Department of Journalism offers a major program leading to a Bachelor of Arts or a Bachelor of Science degree in Technical Journalism with a minor in either agriculture, home economics, or forestry.

In addition, the School of Humanities and Social Sciences offers a divisional major in Humanities with an emphasis in journalism which leads to either a Bachelor of Arts or a Bachelor of Science degree.

Journalism also may be taken as an area of concentration in the professional Home Economics Communications program of the School of Home Economics, or as a minor in general agriculture in the agricultural business and agricultural technology curriculum options of the School of Agriculture.

A Basic Norm in journalism for a teaching certificate is offered by the department through the School of Education.

Elementary courses in journalism furnish a background in communications media and introduce all students to the fundamentals of newswriting and editing. These courses also enable students to benefit from work on the *Barometer*, the student newspaper, and other University publications.

The Technical Journalism degree program offers preparation for editorial positions on business, trade, industrial, technical, and other specialized publications as well as for writing and reporting assignments on newspapers, magazines, radio and television stations and public relations agencies. Special emphasis is placed on understanding and in-depth reporting of the scientific-technical implications within our society.

In addition to School and University requirements, majors in technical journalism must complete the following departmental and technical minor course requirements:

Departmental Requirements ..... 40 hours
Core block, 28 hours in specific courses
Specialization block, 12 hours from 14 courses

Technical Minor Requirements ..... 27-36 hours
Option in agriculture, forestry, or home economics.

For more detailed information, contact the Journalism Department.

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 serve on editorial staffs of student publications. Must be taken in sequence.

J 121. Journalism Laboratory.
1 hour any term.
Given only in coordination with J 112 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 112.

J 223. Editorial Writing.
3 hours. 3 ①
Writing editorials; policy and ethics; makeup of editorial pages of trade journals and newspapers. Prerequisite: J 112.

Upper Division Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

J 317. Special Feature Articles.
3 hours. 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 112.

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

J 319. Technical Reporting.
3 hours. 3 ①
Editing popular and scientific hulletins; preparing reports and writing articles for scientific publications; preparing radio manuscripts. Prerequisite: J 112.

J 333. Industrial-Business Publications.
3 hours. 1 ③
Introduction to industrial editing; principles and problems of editing company publications, industrial, business, and other specialized magazines. Prerequisite: J 214, 334. Consent of instructor required.

J 334. Photo-Journalism.
3 hours 2 ① 1 ②
Planning, taking, and processing pictures for newspapers, magazines, and television. Prerequisite: J 214.

J 335. Mechanics of Publishing.
3 hours. 2 ① 1 ②
Printing processes; typographic development and display; type identification; paper and ink; copy fitting and estimating; design, layout, and processing of materials for publication. Prerequisite: J 214.

J 351. Journalism Projects.
2 hours each term, 3 terms.
1 ① 1 ②
Newswriting, copyediting, feature-writing, and technical-writing principles; experience on student publications; articles for trade and technical publications or material for general publications. Consent of instructor required. Prerequisite: J 214.

J 393. Contemporary Technical Journalism.
3 hours. 3 ①
Role, functions, and responsibilities of mass and specialized media in interpreting science and its relationship to government. Advanced technical reporting and discussions of financial support of science; applications of science to military technology and other government-sponsored programs, medical research, and industry. Prerequisite: J 319.

J 402. Independent Study.
Terms and hours to be arranged.

J 405. Reading and Conference. (g)
Terms and hours to be arranged.

J 406. Projects.
Terms and hours to be arranged.
Required of seniors majoring in technical journalism. Individual projects relating to the student's technical field. Should be taken as a block. Prerequisite: senior standing in technical journalism.

J 407. Seminar. (g)
Terms and hours to be arranged.

J 431. Broadcast Journalism. (g)
3 hours. 2 ① 1 ②
Philosophy and principles of broadcast news reporting; current operating practices in writing, editing, and presenting news for broadcast; use of audio and video tape, wire services, facsimile, film in news reporting by radio and television. Prerequisite: J 112; Sp 262.

J 450. Press and Society. (g)
3 hours. 3 ①
Organization, operation, functions, duties, and responsibilities of the press and mass communications. Role of consumers of journalism.

J 455. Supervision of School Publications. (g)
3 hours. 3 ①
Teacher as adviser in guiding student publications, with consideration given to technical aspects of the school newspaper and yearhook. Prerequisite: J 214.

LANDSCAPE ARCHITECTURE

The objective of the Department of Landscape Architecture is to provide efficient and effective instruction in the processes and procedures relative to en-

vironmental design while at the same time giving fullest possible recognition to the implications of political, social, economic, and anthropological forces that determine the nature of the American culture. The Bachelor of Arts Degree in Humanities, with the area of concentration in Landscape Architecture, is recommended to achieve this objective and provide as well an adequate background for graduate study in either Landscape Architecture or Urban Planning.

See HORTICULTURE for a four-year curriculum in Landscape Construction and Maintenance.

Lower Division Courses

LA 280. Landscape Design Theory.
3 hours fall or spring. 2 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 290,291. Landscape Design I.
3 hours each term. 3 ③
Application of theory to environmental planning and design. Prerequisite: LA 280.

Upper Division Courses

LA 326,327,328. Plant Materials.
3 hours each term. 2 ① 1 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
Gardens as an outgrowth of living conditions from early Egyptian to modern American times.

LA 359,360,361. Maintenance and Construction.
3 hours each term. 3 ②
Maintenance of private and public landscape; landscape construction problems. Prerequisite: LA 291. PT 321 may be taken concurrently with LA 359.

LA 390,391,392. Landscape Design II.
3 hours each term. 3 ②
A continuation of environmental planning and design; problems of greater complexity and broader scope. Prerequisite: LA 280,291.

LA 426,427,428. Plant Composition.
2 hours each term. 1 ② 1 ②
Aesthetic and environmental aspects of plant materials; planting plans and specifications. Prerequisite: LA 290, 328.

LA 490,491,492. Landscape Design III.
4 hours each term. 2 ③
A synthesis of all procedures and practices of planning and design in the development of comprehensive plans and specifications. Prerequisite: LA 361, 392.

MODERN LANGUAGES

The Department of Modern Languages offers instruction in Chinese, French, German, Italian, Portuguese, Russian, and Spanish. The courses of study offered provide the student with an opportunity to develop audio-lingual proficiency as well as reading and writing skills in the languages listed, and at the same time afford an insight into language as a basic manifestation of human culture, as well as an introduction to the literatures and civilizations of the major languages. The several programs of the department are as follows:

1. ***Modern Language Major: French, German, and Russian.*** Departmental requirements leading to the Bachelor of Arts degree in French, German, and Russian, in addition to institutional and school graduation requirements, are 54 hours beyond the first-year course to include 39 upper division hours distributed as follows: 9 hours of intermediate composition and conversation and 9 hours in survey of literature in the major language, plus 21 hours elected in literature, pronunciation and phonetics, composition and conversation, civilization or linguistics, including at least 9 hours on the 400 level, as approved by the student's adviser.

Lower division requirements include 15 hours in the second-year and conversation courses of the major language.

2. ***Modern Language Major: Spanish.*** Departmental requirements leading to the Bachelor of Arts degree in Spanish, in addition to institutional and school graduation requirements, are 54 hours beyond First-Year Spanish to include Span 342,343 (Survey of Spanish Literature) and Span 348,349 (Intermediate Spanish Composition and Conversation) and a minimum of 6 hours on the 400 level as approved by the student's adviser.

3. ***Non-European Culture Requirement.*** This distribution requirement of the School of Humanities and Social Sciences shall be met with courses taken in a second modern language or in a non-European culture as approved by the student's adviser. See SCHOOL OF HUMANITIES AND SOCIAL SCIENCES, *Curricula.*

4. ***Russian Studies.*** The department offers the Russian language and literature courses fulfilling the requirements of the interdepartmental major in Russian Studies. See RUSSIAN STUDIES.

5. ***Humanities.*** Language and literature courses meeting the distribution and concentration requirements for the B.A. degree in Humanities are offered by the department. See SCHOOL OF HUMANITIES AND SOCIAL SCIENCES, *Curricula.*

6. ***Modern Language Education.*** For future teachers, the department offers courses meeting the certification requirements of the Secondary Education Basic Norm and the Elementary Education Area of Concentration in French, German, Russian and Spanish. See SCHOOL OF EDUCATION.

7. ***Graduate Studies.*** The Department of Modern Languages offers graduate work only for minors on advanced degrees. In addition, courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit and may be used to constitute one of the three fields acceptable for the Master of Arts Degree in General Studies. See GRADUATE SCHOOL.

8. ***Language Requirements.*** The department offers instruction meeting the various graduation and degree requirements of the institution, its schools, and their several departments.

Language Laboratory

A language laboratory provides an opportunity for supervised instruction and supplementary practice and drill in accordance with the newest developments in language teaching methods. Collateral tapes and recordings at appropriate levels of language instruction are provided for both class use and individual study.

Placement

Students who enter Oregon State University with previous language training in another institution and wish to continue their study of the language are required to take a language proficiency examination to determine placement level.

Advanced Placement Program. Students who have taken the college-level Advanced Placement course in a modern language in high school and who have satisfactorily completed the College Entrance Board Advanced Placement Examination during their senior year may, upon admission to freshman standing, be granted advanced placement or credit in modern language courses in accordance with their examination scores.

GERMAN

Lower Division Courses

GL 15,16,17. Scientific German for Graduate Students.
No credit, summer only. 5 ②
For graduate students who need to develop a basic competence in the scientific aspects of the language. Emphasis on translation from German to English. Third term requires lengthy translation project to demonstrate level of proficiency achieved. No auditors; students with senior standing may be admitted.

GL 50,51,52. First-Year German.
4 hours each term. 4 ①
Pronunciation, grammar, reading, and conversation. For students with no previous training in German. Engineering students and others may, with consent of instructor, enroll for 3 hours each term.

GL 53,54. First-Year German.
6 hours each term, winter and spring. 6 ①
Two-term sequence covering work of GL 50, 51,52. For students who wish to begin German in the winter term.

GL 101,102,103. Second-Year German.
3 hours each term. 3 ①
Grammar review, composition, and reading of modern German authors. Oral use of the language. Prerequisite: GL 50,51,52 or GL 53, 54.

GL 111,112,113. German Conversation.
2 hours each term. 2 ①
Intensive course at second-year level. Taken independently of or concurrently with GL 101,102,103. Prerequisite: GL 50,51,52 or GL 53,54.

Upper Division Courses

Courses numbered 300-399 are open to lower division students.
Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

GL 311,312,313. **Directed Reading in German.**
2 hours each term. 2 ①
Supervised intensive reading in selected German texts to develop reading and comprehension skills. Recommended as a pre-literature course. Prerequisite: two years of college German or equivalent.

GL 320,321,322. **Scientific German.**
3 hours each term. 3 ①
Recommended to students interested in science or medicine. Articles in science, surgery, history of medicine, and current clinical literature are read. Consent of instructor required.

GL 331. **German Pronunciation and Phonetics.**
3 hours. 3 ①
Fundamentals of German pronunciation and diction. Phonetic analysis of German sounds, German intonation and tone patterns. Supervised practice with individual use of recording equipment.

GL 334,335,336. **Intermediate German Composition and Conversation.**
3 hours each term. 3 ①
Practice in speaking and writing the language; conducted in German. Required of German majors. Prerequisite: GL 101,102,103; GL 111,112,113.

GL 340,341. **German Culture and Civilization.**
3 hours each term. 3 ①
Aesthetic and historical presentation of modern civilization with due emphasis on its cultural, political, and social aspects. Prerequisite: two years of college German.

GL 343,344,345. **Survey of German Literature.**
3 hours each term. 3 ①
Masterpieces of various periods through the nineteenth century. Required of German majors. Prerequisite: GL 101,102,103, or equivalent.

GL 401. **Research.**
Terms and hours to be arranged.

GL 402. **Independent Study.**
Terms and hours to be arranged.

GL 403. **Thesis.**
Terms and hours to be arranged.

GL 405. **Reading and Conference.** (g)
Terms and hours to be arranged.

GL 407. **Seminar.** (g)
Terms and hours to be arranged.

GL 411,412,413. **Age of Goethe.** (g)
3 hours each term. 3 ①
Philosophical and literary currents of eighteenth and early nineteenth century; attention to important writers of period with Goethe's life and work as focal points. Prerequisite: 3 years of college German.

GL 416. **The German Novelle.** (g)
3 hours. 3 ①
History and theory of the genre; selections from Goethe, the Romantics, the period of "buergerlicher Realismus," and the modern age; critical analysis; reports and term paper. Prerequisite: 3 years of college German.

GL 421,422,423. **German Literature of the Twentieth Century.** (g)
3 hours each term. 3 ①
Representative prose, poetry, and drama of contemporary German writers and those of the recent past; dominant literary currents in German letters since 1900. Prerequisite: GL 101,102,103, or equivalent.

GL 424,425,426. **Advanced German Composition and Conversation.**
2 hours each term. 2 ①
Systematic review of grammar; historical survey of German language; translation of modern literary texts into German; writing of original compositions. Conducted in German. Prerequisite: GL 336.

GL 430,431. **German Poetry.** (g)
3 hours each term. 3 ①
The study of German poetry, particularly lyric poetry, from the Middle Ages to the present, with readings from all major writers. Special emphasis on the *Lied*, ballad, and contemporary lyric poetry. *GL 430:* Middle Ages to 1800. *GL 431:* 1800 to present. Prerequisite: GL 343,344,345.

ORIENTAL LANGUAGES

Chinese

Lower Division Courses

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

ROMANCE LANGUAGES

French

Lower Division Courses

RL 50,51,52. **First-Year French.**
4 hours each term. 4 ①
Pronunciation, grammar, reading, and conversation. For students with no previous training in French. Engineering students and others may, with consent of instructor, enroll for 3 hours each term.

RL 53,54. **First-Year French.**
6 hours each term, winter and spring. 6 ①
Two-term sequence covering the work of RL 50,51,52. For students who wish to begin French in the winter term.

RL 101,102,103. **Second-Year French.**
3 hours each term. 3 ①
Grammar review, composition, and reading of modern French authors; oral use of the language. Prerequisite: RL 50,51,52 or RL 53, 54.

RL 114,115,116. **French Conversation.**
2 hours each term. 2 ①
Intensive course at the second-year level. Taken independently of or concurrently with RL 101,102,103. Prerequisite or concurrent: RL 101 or equivalent.

Upper Division Courses

Courses numbered 300-399 are open to lower division students.
Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

RL 307,308,309. **Directed Reading in French.**
2 hours each term. 2 ①
Supervised intensive reading in selected French texts to develop reading and comprehension skills. Recommended as a preliterature course. Prerequisite: two years of college French or equivalent.

RL 311,312,313. **Survey of French Literature.**
3 hours each term. 3 ①
Masterpieces of various periods through the nineteenth century. Required of French majors. Prerequisite: two years of college French or equivalent.

RL 314,315,316. **Intermediate French Composition and Conversation.**
3 hours each term. 3 ①
Extensive practice in speaking and writing the language. Conducted in French. Required of French majors. Prerequisite: RL 103; RL 116.

RL 328,329. **French Culture and Civilization.**
3 hours each term. 3 ①
Development of cultural life of the French people from ancient times to present as reflected in history, art, architecture, music, literature, philosophy, science, and social institutions of France. Prerequisite: two years of college French or equivalent. May be taken concurrently with RL 102,103.

RL 331,332. **French Pronunciation and Phonetics.**
2 hours each term. 2 ①
Intensive study of French pronunciation and diction; close phonetic analysis of French sounds; French intonation and tone patterns. Supervised practice, with individual use of recording equipment. Prerequisite: two years of college French or equivalent; may be taken concurrently with RL 102,103.

RL 401. **Research.**
Terms and hours to be arranged.

RL 402. **Independent Study.**
Terms and hours to be arranged.

RL 403. **Thesis.**
Terms and hours to be arranged.

RL 405. **Reading and Conference.** (g)
Terms and hours to be arranged.

RL 407. **Seminar.** (g)
Terms and hours to be arranged.

RL 411,412,413. **Seventeenth-Century French Literature.** (g)
3 hours each term. 3 ①
A study of the prose, poetry and drama of seventeenth century France and of the dominant literary movements and theories of the classical period. Conducted in French. Prerequisite: RL 311,312,313, or equivalent.

RL 417,418,419. **Nineteenth-Century French Literature** (g)
3 hours each term. 3 ①
Representative prose and poetry of nineteenth-century French writers and dominant literary movements between the French Revolution and World War I. Conducted in French. Prerequisite: RL 311,312,313, or equivalent.

RL 423,424,425. **Twentieth-Century French Literature.** (g)
3 hours each term. 3 ①
Representative prose, poetry, and drama of contemporary French writers and those of the recent past; dominant literary currents in French letters since 1900. Conducted in French. Prerequisite: RL 311,312,313, or equivalent.

RL 467,468,469. **Advanced French Composition and Conversation.**
2 hours each term. 2 ①
Systematic review of grammar, intensive vocabulary drill; oral reports and original presentations in French; analysis of writing styles and techniques; writing of original composition. Conducted in French. Prerequisite: RL 316.

Italian

Lower Division Courses

RL 70,71,72. **First-Year Italian.**
4 hours each term. 4 ①
Pronunciation, grammar, reading, and conversation. Engineering students and others may, with consent of instructor, enroll for three hours each term.

RL 104,105,106. **Second-Year Italian.**
3 hours each term. 3 ①
Grammar review, composition, and reading of modern Italian authors. Oral use of the language. Prerequisite: RL 70,71,72.

Portuguese

Lower Division Courses

RL 80,81,82. First-Year Portuguese: Brazilian.
4 hours each term. 4 ①
Pronunciation, grammar, reading, and conversation. For students with no previous training in Spanish. Engineering students and others may, with consent of instructor, enroll for 3 hours each term.

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

Spanish

Lower Division Courses

Span 61,62. First Year Spanish.
5 hours each term. 5 ①
Emphasizes development of comprehension and speaking skill, reading, and writing. Laboratory assignments. Must be taken in sequence.

Span 108,109. Second-Year Spanish.
4 hours each term. 4 ①
Further development of comprehension, speaking, reading, and writing skills. Contemporary Hispanic authors. Laboratory assignments. Must be taken in sequence. Prerequisite: Span 62 or placement.

Span 209. Oral and Written Spanish.
4 hours. 4 ①
Continued development of all four language skills. Expansion of vocabulary and review of fundamental concepts of grammar. Prerequisite: Span 109 or placement.

Span 219. Spanish Conversation.
4 hours. 4 ①
Designed to improve facility in oral communication. Assignments in laboratory. May be taken independently or concurrently with Span 209 or Span 250. Prerequisite: Span 109 or placement.

Span 250. Introduction to Spanish Phonology.
3 hours. 3 ①
Supervised practice of Spanish sounds and intonation patterns with individual use of recording equipment. Also laboratory assignments. Required for modern language education majors. Prerequisite: Span 109 or placement.

Upper Division Courses

Courses numbered 300-399 are open to lower division students. Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

Span 318,319. Introduction to Hispanic Literature.
4 hours each term. 4 ①
Covers literary works of Spain and Spanish America in the various genres with emphasis on internal criticism. Prerequisite: Span 209 or placement.

Span 338. Peninsular Culture and Civilization.
4 hours. 4 ①
Historical development and contemporary aspects of the culture of the peoples of Spain. Conducted in Spanish. Prerequisite: Span 209 or placement.

Span 340. Iberoamerican Culture and Civilization.
4 hours. 4 ①
The civilizations and cultures of Iberoamerica. Conducted in Spanish. Prerequisite: Span 209 or placement. Offered alternate years.

Span 342,343. Survey of Spanish Literature.
5 hours each term. 5 ①
Literary history and readings in the drama, prose, fiction, and poetry of Spain with emphasis on the major writers. *Span 342:* Medieval, Renaissance, and Golden Age; *Span 343:* Neoclassicism to twentieth century. Required for Spanish major. Prerequisite: Span 209 or placement.

Span 348,349. Intermediate Spanish Composition and Conversation.
4 hours each term. 4 ①
Review of grammar; writing of compositions; extensive practice in speaking. Must be taken in sequence. Required for Spanish major. Prerequisite: Span 209 or placement.

Span 350. Advanced Spanish Phonology.
3 hours. 3 ①
Recognition, production, and transcription of the Spanish sound system. Emphasis on the supersegmental features, intonation, stress, juncture. Prerequisite: Span 250.

Span 401. Research.
Terms and hours to be arranged.

Span 402. Independent Study.
Terms and hours to be arranged.

Span 403. Thesis.
Terms and hours to be arranged.

Span 405. Reading and Conference. (g)
Terms and hours to be arranged.

Span 407. Seminar. (g)
Terms and hours to be arranged.

Span 442,443. Twentieth-Century Spanish Literature. (g)
4 hours each term. 4 ①
Representative Spanish prose, poetry, and drama from the Generation of 1898 to the present. Prerequisite: Span 343. Offered alternate years.

Span 445,446. Spanish-American Literature.
4 hours each term. 4 ①
Masterpieces of the several national literatures of Spanish America; literary movements. Prerequisite: Span 209 or placement. Offered alternate years.

Span 462,463. Advanced Spanish Composition and Conversation.
3 hours each term. 3 ①
Original compositions; debate and platform speaking in Spanish; tranlation of modern literary texts into Spanish. Prerequisite: Span 349 or placement. Offered alternate years.

SLAVIC LANGUAGES

Russian

Lower Division Courses

SL 50,51,52 First-Year Russian.
4 hours each term. 4 ①
Pronunciation, grammar, reading, and conversation.

SL 101,102,103. Second-Year Russian.
3 hours each term. 3 ①
Grammar review, composition, and reading of modern Russian authors; oral use of the language. Prerequisite: SL 50,51,52.

SL 111,112,113. Russian Conversation.
2 hours each term. 2 ①
Intensive course at the second-year level. Taken independently of or concurrently with SL 101,102,103. Prerequisite: SL 50,51,52.

Upper Division Courses

Courses numbered 300-399 are open to lower division students.
Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

SL 311,312,313. Survey of Russian Literature.
3 hours each term. 3 ①
Masterpieces of various periods, particularly the nineteenth and twentieth centuries. Required of Russian majors. Prerequisite: SL 101,102,103.

SL 314,315,316. Intermediate Russian Composition and Conversation.
3 hours each term. 3 ①
Extensive practice in speaking and writing the language; conducted in Russian. Required of Russian majors. Prerequisite: SL 101,102, 103; SL 111,112,113.

SL 317,318,319. Directed Reading in Russian.
2 hours each term. 2 ①
Supervised intensive reading in selected Russian texts to develop reading and comprehension skills. Recommended as a preliterature course. Prerequisite: two years of college Russian or equivalent.

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

SL 330. Russian Pronunciation and Phonetics.
3 hours. 3 ①
Fundamentals of Russian pronunciation and diction; close phonetic analysis of Russian sounds; Russian intonation and tone patterns. Supervised practice, with individual use of recording equipment.

SL 401. Research.
Terms and hours to be arranged.

SL 402. Independent Study.
Terms and hours to be arranged.

SL 403. Thesis.
Terms and hours to be arranged.

SL 405. Reading and Conference. (g)
Terms and hours to be arranged.

SL 407. Seminar. (g)
Terms and hours to be arranged.

SL 421,422,423. Modern Russian Literature. (g)
3 hours each term. 3 ①
Major artistic figures in short story, drama, and poetry. Special attention to close textual analysis of each work. Prerequisite: three years of college Russian.

SL 461,462,463. Advanced Russian Composition and Conversation.
3 hours each term. 3 ①
Systematic review of grammar; oral reports; translation of modern literary texts into Russian; writing of original compositions. Conducted in Russian. Prerequisite: SL 316.

Linguistics

Upper Division Courses

ML 451. General Linguistics.
3 hours. 3 ①
Language systems; comparative philology; historical, descriptive, and structural linguistics; semantics; phonetics and phonemics. Prerequisite: 9 hours upper division French, German, or Spanish.

ML 452. **Romance Linguistics.**
3 hours. 3 ①
Evolution and development; comparative phonology and morphology. Prerequisite: ML 451; 9 hours upper division romance languages.

ML 453. **Germanic Linguistics.**
3 hours. 3 ①
Evolution and development; comparative and structural linguistics, especially German and English; phonology and morphology. Prerequisite: ML 451; 9 hours upper division Germanic Languages.

MUSIC

The Department of Music offers a major program leading to the Bachelor of Arts or Bachelor of Science degree with areas of concentration in applied music, music history and literature, and theory and composition. In cooperation with the School of Education it offers a curriculum leading to the completion of the Basic Norm for teaching music on the Secondary School level, and a music concentration on the Elementary School level. See SCHOOL OF EDUCATION.

Freshmen considering music as a possible major or minor field should register for Mus 111, 112, 113 and should consult with the Chairman as early as possible to make tentative plans for a suitable program in accordance with abilities and previous musical training. The sophomore year is not too late for a decision if during that year the student is enrolled in the appropriate courses.

Students interested in high school music teaching may have their programs planned to satisfy state certfiication requirements.

Departmental requirements at the lower division level are: Music Theory (Mus 112, 113; 211, 212, 213), Introduction to Music and its Literature (Mus 221, 222, 223), 6 hours of applied music, and 3 hours in musical organizations.

Upper division requirements are: History of Music (Mus 361, 362, 363), 12 hours of music requirements for the specific concentration, musical organizations, 10 hours of electives in music, and a recital or research project.

Prerequisite for admission to the major in music are: Mus 112, 113, with a grade of C in each part of the final examination (including sight-singing and keyboard harmony), and participation in one of the musical organizations or ensembles.

Library. A large collection of music books, scores, and records is housed in the Education and Fine Arts section of Kerr Library where a number of listening rooms are available. These facilities may be used by any member of the student body at times designated by the music librarian.

Musical Organizations. Choral and instrumental ensembles, open to all students in the university by audition, are trained and conducted by members of the department staff. Interested students should apply for membership at the Music Department office or contact the conductor of the ensemble in which they are interested. Announcements for auditions for all organizations are made at the beginning of fall term.

These ensembles include the University Chorus, the Choralaires, Women's Chorus, the Madrigal Singers, the University Symphony Orchestra, the Chamber Orchestra, the Marching Band, the University Symphonic Band, and the Varsity Band.

Applied Music. Private lessons in organ and instruments of the band and orchestra, and private and class lessons in piano and voice carry one hour of credit for one lesson per week. See following schedule of fees.

Scholarships

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

Regulations and Fees

Students should 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 will be charged for one hour of daily practice per credit hour of applied music. Students are expected to practice in rooms provided.

Music majors may apply for waiver of applied music fee upon completion of Music 112 and 113, or the equivalent.

The schedule of music fees is as follows:

	Per term
APPLIED MUSIC (private lessons): Piano, Voice, Organ, Strings, Winds, and Percussion	
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
PRACTICE ROOM RENTAL—with piano:	
One hour a day, per term	$ 5.00
Two hours a day, per term	$ 9.00
Three hours a day, per term	$12.00
PRACTICE ROOM RENTAL—without piano:	
One hour a day, per term	$ 3.00
Two hours a day, per term	$ 6.00
Three hours a day, per term	$ 9.00
ORGAN RENTAL:	
One hour per day, per term	$10.00

Lower Division Courses

Mus 111. **Rudiments of Music.**
4 hours 5 ①
Music fundamentals, scales, key relationships, intervals, triads, with emphasis on ear training, sightsinging, and keyboard. Ability to read music advisable.

Mus 112,113. **Music Theory I.**
4 hours each term. 5 ①
Harmonization of various triads 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. Prerequisite: Mus 111 or qualifying examination.

Mus 181. **Class Lessons in Voice.**
1 hour any term, three terms. 1 ①
Elementary instruction for beginners.

Mus 182. **Class Lessons in Piano.**
1 hour any term, three terms. 1 ①
Elementary instruction for beginners.

*Mus 183. **Chamber Ensemble: Madrigal Singers.**
1 hour any term, six terms. 3 ①
Study and performance of early and contemporary madrigal literature. Prerequisite: audition.

*Mus 184. **Chamber Ensemble: String.**
1 hour any term, six terms. 1 ①
Performance of chamber music for string instruments. Prerequisite: audition.

*Mus 185. **Chamber Ensemble: Woodwind.**
1 hour any term, six terms. 1 ①
Performance of chamber music for woodwind instruments. Prerequisite: audition.

*Mus 186. **Chamber Ensemble: Brass.**
1 hour each term, six terms. 1 ①
Performance of chamber music for brass instruments. Prerequisite: audition.

*Mus 187. **Chamber Ensemble: Percussion.**
1 hour each term, six terms. 1 ①
Performance of chamber music for percussion instruments. Prerequisite: audition.

*Mus 188. **Chamber Ensemble: Miscellaneous.**
1 hour each term, six terms. 1 ①
Performance of chamber music for mixed instrumental and vocal ensembles.

Mus 190. **Applied Music.**
1 or 2 hours each term, three terms.
Individual instruction in piano, organ, voice, and instruments of band and orchestra. Term hours on basis of number of lessons per week (one or two half-hour periods). Attendance at class sessions and recitals required. Special fees.

Mus 195. **Marching Band.**
2 hours fall, two terms. 3 ① 1 ②
Open to men by audition.

Mus 196. **Symphonic Band.**
1 hour winter and spring, 4 terms.
2 ① 1 ②
Concert Band and Varsity Band. Open to men and women by audition.

Mus 197. **Chorus: University Chorus.**
1 hour each term six terms. 3 ①
Open to all students by audition. Limited to 80 members.

Mus 197. **Chorus: Choralaires.**
1 hour each term, six terms. 3 ①
Open to all students by audition. Concert choir, limited to 60 members.

Mus 197. **Chorus: Women.**
1 hour each term, six terms. 3 ①
Open to all women by audition.

Mus 198. **Orchestra: University Symphony Orchestra.**
1 hour each term, six terms. 1 ② 1 ①
Open to all students by consent of conductor.

Mus 199. **Chamber Orchestra.**
1 hour each term, six terms. 1 ② 1 ①
A select ensemble of 35-40 players; performances of works for small orchestra from the sixteenth century to the present day. Open to all students by consent of conductor.

* A maximum of 6 hours of credit may be earned in Mus 183-188.

Mus 201. Music Appreciation.
3 hours. 3 ①
A beginner's course in listening to music.

Mus 202. Survey of Music History.
3 hours. 3 ①
For nonmajors. The development of western music from the middle ages to the present. Prerequisite: Mus 201 or 113.

Mus 203. Great Composers.
3 hours. 3 ①
For nonmajors. A study of the life and works of one of the great composers (Bach, Mozart, Brahms, etc.) (See SCHEDULE OF CLASSES). Prerequisite: Mus 201 or 113.

Mus 211,212,213. Music Theory II.
3 hours each term. 3 ①
A continuation of the harmonic materials of music with emphasis on chromatic harmony, advanced modulation, and style. An integrated course including written work, analysis, and aural comprehension. Prerequisite: Mus 113.

Mus 214,215,216. Keyboard Harmony.
1 hour each term. 1 ①
Keyboard application of harmonic principles being studied concurrently in Music Theory II; exercises in diatonic and chromatic harmony, modulation, figured bass realization, transposition and improvisation. Prerequisite: Mus 113 or equivalent. Required of all music majors and specialists in music education.

Mus 221,222,223. Introduction to Music and its Literature.
3 hours each term. 3 ①
Survey of standard concert and operatic literature of the eighteenth, nineteenth, and twentieth centuries with emphasis on listening for basic stylistic concepts. Prerequisite: Mus 113.

Mus 290. Applied Music.
1 or 2 hours each term, three terms.
Continuation of 190 on a more advanced level. Prerequisite: 3 hours of Mus 190 or 181-182.

Upper Division Courses

Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

Mus 311,312,313. Counterpoint.
2 hours each term. 2 ①
Study, through analysis and writing, of the basic contrapuntal principles of the sixteenth, eigtheenth, and twentieth centuries. Prerequisite: Mus 213 or equivalent.

Mus 317. Teaching of Music: Elementary School. 3 hours. 3 ①
Survey of methods and materials used in teaching vocal music in schools. Prerequisite: Mus 113.

Mus 323. Conducting.
2 hours. 2 ①
Basic baton techniques. Prerequisite: Mus 113.

Mus 324,325. Choral Conducting.
2 hours each term. 2 ①
Advanced baton techniques, score reading, principles of developing choral excellence. Practical experience conducting campus organizations. Prerequisite: Mus 323.

Mus 326,327. Instrumental Conducting.
2 hours each term. 2 ①
Advanced baton techniques, score reading, principles of developing band and orchestra excellence. Practical experience conducting campus organization. Prerequisite: Mus 323.

Mus 331,332,333. Form and Analysis.
2 hours each term. 2 ①
Elements of form; stylistic analytical techniques, including harmonic, melodic, rhythmic, and structural practices, applied to compositions from representative periods and media. Prerequisite: Mus 213. Offered alternate years.

Mus 361,362,363. History of Music.
3 hours each term. 3 ①
Development of music in relation to social, economic, and political influences from the time of early Christian chant to the late Baroque. The final portion of this course is concerned with a summary of late eighteenth- and nineteenth-century compositional techniques, and an introduction to twentieth-century music. Prerequisite: Mus 223.

Mus 371. Music for Elementary Teachers. 4 hours. 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 372. Music for Elementary Teachers. 3 hours. 5 ①
Experiences in teaching the various music activities found in the elementary school. Prerequisite: Mus 371.

***Mus 383. Chamber Ensemble: Madrigal Singers.**
1 hour each term, six terms. 3 ①
Prerequisite: any six terms of Mus 183-188.

***Mus 384. Chamber Ensemble: String.**
1 hour any term, six terms. 1 ①
Prerequisite: any six terms of Mus 183-188.

***Mus 385. Chamber Ensemble: Woodwind.**
1 hour any term, six terms. 1 ①
Prerequisite: any six terms of Mus 183-188.

***Mus 386. Chamber Ensemble: Brass.**
1 hour any term, six terms. 1 ①
Prerequisite: any six terms of Mus 183-188.

***Mus 387. Chamber Ensemble: Percussion.**
1 hour any term, six terms. 1 ①
Prerequisite: any six terms of Mus 183-188.

***Mus 388. Chamber Ensemble: Miscellaneous.**
1 hour any term, six terms. 1 ①
Prerequisite: any six terms of Mus 183-188.

Mus 390. Applied Music.
1 or 2 hours each term, three terms.
Continuation of 290 on a more advanced level. Prerequisite: qualifying examination.

Mus 391. Instrumental Techniques: Strings.
2 hours. 2 ①
Basic instruction in stringed instruments. For music majors and specialists in music education.

Mus 392. Instrumental Techniques: Woodwinds.
2 hours. 2 ①
Basic instruction in woodwind instruments. For music majors and specialists in music education.

Mus 393. Instrumental Techniques: Brass.
2 hours. 2 ①
Basic instruction in brass instruments. For music majors and specialists in music education.

Mus 394. Instrumental Techniques: Percussion.
2 hours. 2 ①
Basic instruction in percussion instruments. For music majors and specialists in music education.

* A maximum of 6 hours of credit may be earned in Mus 383-388.

Mus 395. Marching Band.
2 hours fall, two terms. 3 ① 1 ②
Prerequisite: two terms of Mus 195.

Mus 396. Symphonic Band.
1 hour winter and spring, four terms. 3 ①
Prerequisite: four terms of Mus 196.

Mus 397. Chorus: University Chorus.
1 hour each term, six terms. 3 ①
Prerequisite: six terms of Mus 197.

Mus 397. Chorus: Choralaires.
1 hour each term, six terms. 3 ①
Prerequisite: six terms of Mus 197.

Mus 398. Orchestra: University Symphony Orchestra.
1 hour each term, six terms. 1 ② 1 ①
Prerequisite: six terms of Mus 198.

Mus 399. Chamber Orchestra.
1 hour each term, six terms. 1 ② 1 ①
Prerequisite: six terms of Mus 199.

Mus 401. Research.
Terms and hours to be arranged.

Mus 402. Independent Study.
Terms and hours to be arranged.

Mus 403. Thesis.
Terms and hours to be arranged.

Mus 405. Reading and Conference. (g)
Terms and hours to be arranged.

Mus 406. Projects. (g)
Terms and hours to be arranged.

Mus 407. Seminar. (g)
Terms and hours to be arranged.
See *Schedule of Classes* for specific topics.

Mus 408. Workshop. (g)
Terms and hours to be arranged.

Ed 407. Seminar.
3 hours. 3 ①
See SCHOOL OF EDUCATION.

Ed 408o. Special Secondary Methods.
3 hours.
See SCHOOL OF EDUCATION.

Mus 411. Choral Arranging. (g)
3 hours. 3 ①
Arranging for choral organizations, including special problems in writing for younger choruses. Prerequisite: Mus 213. Offered alternate years.

Mus 414. Band Arranging. (g)
3 hours. 3 ①
Ranges and capabilities of instruments; principles of scoring for concert band, marching band, and smaller combinations of instruments. Prerequisite: Mus 213. Offered alternate years.

Ed 416o. Student Teaching: Secondary.
9 to 15 hours.
See SCHOOL OF EDUCATION.

Mus 417. Orchestration. (g)
3 hours. 3 ①
Ranges and capabilities of instruments; principles of scoring for modern symphony orchestra; problems of writing for younger orchestras. Prerequisite: Mus 213. Offered alternate years.

Mus 421. **Composition I.** (g)
3 hours. 3 ①
Principles of melodic construction and musical design. Written work in small forms and conventional tonal idioms. Prerequisite: Mus 213. Offered alternate years.

Mus 422. **Composition II.** (g)
3 hours. 3 ①
Written work in larger forms; techniques of twentieth-century composition. Prerequisite: Mus 421. Offered alternate years.

Mus 441,442,443. **Advanced Conducting.** (g)
3 hours each term. 3 ①
Advanced techniques of conducting—both choral and instrumental. Baton technique, interpretation, study of major scores. Prerequisite: Mus 325 or 327.

Mus 444. **Choral Literature for Public Schools.** (g)
3 hours. 3 ①
Repertory of choral groups in secondary schools; literature for girls' and boys' glee clubs, and the mixed choir. Analysis and performance in class. Program planning. Prerequisite: Mus 325 or equivalent. Offered alternate years.

Mus 445. **String Literature for Public Schools.** (g)
3 hours. 3 ①
Repertory of orchestra and string groups in elementary and secondary schools; "method" series; program planning. Prerequisite: Mus 327 or equivalent. Offered alternate years.

Mus 446. **Wind Instrument Literature for Public Schools.** (g)
3 hours. 3 ①
Repertory for bands and other wind-instrument groups in elementary and secondary schools; "methods" series; program planning. Prerequisite: Mus 327 or equivalent. Offered alternate years.

Mus 447. **Vocal Literature.** (g)
3 hours. 3 ①
Solo vocal literature from the Renaissance to the present. Prerequisite: Mus 223. Offered alternate years.

Mus 448. **Keyboard Literature.** (g)
3 hours. 3 ①
Study of representative literature of selected master composers from the pre-Bach period to the present. Illustrative performances by students and faculty. Prerequisite: Mus 223. Offered alternate years.

Mus 449. **Orchestral Literature.** (g)
3 hours. 3 ①
Survey of orchestral music from the Baroque period to the present; emphasis on standard repertoire. Prerequisite: Mus 223. Offered alternate years.

Mus 453. **The Opera.** (g)
3 hours. 3 ①
Composers, libretti, styles; emphasis on current operatic repertoire. Assigned reading and listening. Prerequisite: Mus 223. Offered alternate years.

Mus 461. **Chamber Music Literature.** (g)
3 hours. 3 ①
Chamber music from Haydn to present; emphasis on music in the standard literature. Prerequisite: Mus 223. Offered alternate years.

Mus 490. **Applied Music.**
1 or 2 hours each term, three terms.
Continuation of 390 on a more advanced level. Prerequisite: 3 hours of Mus 390.

PHILOSOPHY

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

The departmental major offers a program leading to the degree of B.A. or B.S. as defined by institutional requirements.

Departmental Requirements: (45 hours)
a. 12 hours in the history of philosophy (Courses devoted to an historical figure in philosophy are acceptable.)
b. 9 hours in contemporary philosophy
c. 6 hours of upper-division ethics
d. 3 hours of logic
e. At least one term of seminar (Phl 407).

Lower Division Courses

Phl 201. **Problems of Philosophy.**
3 hours. 3 ①
Some of the persistent problems of philosophy.

Phl 203. **Elementary Logic.**
3 hours. 3 ①
Nature of valid inference; analysis, criticism, and construction of some fundamental forms of argument.

Phl 205. **Elementary Ethics.**
3 hours. 3 ①
Critical study of alternative standards for judging the rightness or wrongness of conduct.

Phl 207. **Elementary Political Philosophy.**
3 hours. 3 ①
Analysis of political theories and concepts.

Phl 215,216,217. **History of Western Philosophy.**
4 hours each term. 3 ① 1 ①
Western philosophy from the pre-Socratic Greeks to twentieth century. Phl 201 recommended.

Upper Division Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

Phl 308. **Survey of Asian Philosophy.**
3 hours. 3 ①
The traditional and contemporary philosophies of India, China, and Japan; significance of these philosophies for Western Man. Phl 201 recommended.

Phl 311,312,313. **Great Figures in Philosophy.**
4 hours each term. 3 ① 1 ①
Systematic study of the work of a major philosopher each term; normally the work of Plato, Hume, or Kant will be dealt with. Phl 201, and Phl 301, 302, or 303 recommended.

Phl 315,316. **History of American Philosophy.**
4 hours each term. 3 ① 1 ①
American philosophy and philosophical movements from the Puritans to recent developments. *Phl 315:* Philosophical thinking in America before 1880, including Jonathan Edwards, Benjamin Franklin, Thomas Jefferson, R. W. Emerson, the St. Louis Hegelians, and other idealistic schools. *Phl 316:* Evolutionism, Pragmatism, Personalism, New Realism, Logical Positivism, and Linguistic Analysis.

Phl 321,322. **Symbolic Logic.**
3 hours each term. 3 ①
Sentential logic, Predicate logic, and elementary Metalogic. Prerequisite: for *Phl 321:* Phl 203; for *Phl 322:* Phl 321.

Phl 331,332,333. **Contemporary Philosophy.**
3 hours each term. 3 ①
Pragmatism, Process Philosophy, Positivism, Linguistic Analysis, Phenomenology, and Existentialism. Phl 201, and Phl 301, 302, or 303 recommended.

Phl 341,342. **Ethics.**
3 hours each. 3 ①
Phl 341: Classical Ethical Theories: critical examination of selected classical works. Prerequisite: Phl 205. *Phl 342:* Ethical Analysis: significant developments in ethical theory. Prerequisite: Phl 341.

Phl 348. **Philosophy of Religion.**
3 hours. 3 ①
Religious concepts of reality and human nature; ideas of God; problems of faith and reason; religious language and symbolism; religious concepts of man and history. Phl 201 recommended.

Phl 351. **Theory of Knowledge.**
4 hours. 3 ① 1 ①
Significant theories concerning knowledge; analysis of important concepts and problems including rationalism, empiricism, skepticism, perception, induction, belief, etc. Prerequisite: Phl 201.

Phl 360. **Aesthetics.**
4 hours. 3 ①
Investigation of selected classical and modern philosophical theories about the nature and value of art and of aesthetic experience. Prerequisite: 3 hours of philosophy.

Phl 402. **Independent Study.**
Terms and hours to be arranged.

Phl 405. **Reading and Conference.** (g)
Terms and hours to be arranged.

Phl 407. **Seminar.** (g)
Terms and hours to be arranged.

Phl 421. **Advanced Logic.** (g)
3 hours. 3 ①
Metalogic and specific topics in advanced logic. Prerequisite: Phl 321,322.

Phl 431,432. **Topics in Contemporary Philosophy.** (g)
3 hours each term. 3 ①
Intensive examination of the work of a specific contemporary philosopher or of a specific contemporary philosophical problem; e.g., Wittgenstein, Moore, determinism, perception, and others. Prerequisite: 6 hours of upper division philosophy.

Phl 446. **Philosophy of Education.** (G)
3 hours. 3 ①
Current philosophical methods in application to educational problems.

Phl 470,471. **Philosophy of Science.** (g)
3 hours each term. 3 ①
Nature and structure of scientific concepts, theories, and laws; revolutions in science and their causes; influences of science and philosophy on each other. Phl 201 recommended.

Phl 475. **Philosophy of Mathematics.**
(g) 4 hours. 3 ①
Philosophical analysis of mathematics: its nature, fundamental concepts, and foundations; significant writings in the field. Prerequisite: Phl 322 or equivalent. Phl 431 recommended.

POLITICAL SCIENCE

Undergraduate instruction in political science is designed to provide (1) systematic understanding of political life for the non-major, and (2) preparation for professional and specialized careers.

Undergraduate majors take course work in the Core and upper division work including at least one area of concentration. The Core provides a survey of political science and serves as a foundation for advanced work in the department. Concentrations afford the student an opportunity for study in depth in at least one Basic Field of Study within the discipline. A major in political science consists of a minimum of 40 hours with a minimum of 10 from the Core.

Core courses
PS 101,201,203,205

Basic Fields of Study

American Government and Politics
Concentration A: PS 309, 310, 313, 326, 423
Concentration B: PS 334, 418, 487, and SS 411

Public Law and Public Administration
Concentration A: PS 317, 318, 319, 422, 480, 483
Concentration B: PS 411, 412, 413, 423, 480

Political Theory and Political Behavior
Concentration A: PS 350, 351, 433, 464
Concentration B: PS 311, 429, and SS 411

Comparative Government and International Relations
Concentration A: PS 330, 331, 332, 344, 346, 360, 438, 463
Concentration B: PS 417, 418, 419, 420, 422, 438, 443

PS 402,403,405,406, and 407 may be included in any concentration with departmental approval.

Lower Division Courses

PS 101. Introduction to Modern Politics.
5 hours. 5 ①
Modern political systems; ideas, institutions, leadership, patterns of stability, change and development from selected western and non-western polities. Topics ranging from primitive to post-nation-state styles of political behavior. Open to freshmen and sophomores.

PS 201. American National Government.
5 hours. 5 ①
American constitutional system, political process, and organization of national government.

PS 203. American State and Local Governments.
5 hours. 5 ①
Position, organization, and functions of American governments at the state and local levels, as well as contemporary problems and trends. Prerequisite: PS 201.

PS 205. International Relations.
5 hours. 5 ①
Nature of the international system and analysis of factors affecting the international environment.

Upper Division Courses

Courses numbered 400-499 and designated (g) or (G) may he taken for graduate credit.

PS 309. Legislative Politics.
3 hours. 3 ①
Role and functions of legislator and legislative bodies and their vital position in a political system predicated upon the principle of popular sovereignty. Prerequisite: PS 203.

PS 310. Presidential Politics.
3 hours. 3 ①
Office, powers, and politics of the American Presidency, with reference to other executive offices in American government; emphasis on the Presidency as of centripetal importance and effect in American politics. Prerequisite: PS 203.

PS 311. Introduction to Political Analysis.
5 hours. 5 ①
Primarily designed for political science majors and other social science students interested in the theoretical problems of political analysis. Analyses of selected theoretical writings, concepts and methodology, stressing various approaches to the study of politics. Prerequisite: PS 101 or 201.

PS 313. State Governments and Politics.
3 hours. 3 ①
Importance of states in total governmental process; functions, including education, welfare, law enforcement, protection of natural resources, and regulation of business and labor; roles of individual citizens, pressure groups, political leaders, administrators, and legislators in shaping state government. Prerequisite: PS 203.

PS 317,318,319. American Constitutional Law.
5 hours each term. 5 ①
PS 317: the judical process; powers of the courts, Congress, and President; nation-state relationship. *PS 318:* national powers, with emphasis upon commerce, tax, war, and treaty powers. *PS 319:* civil liberties; civil, political, and social rights of individuals. Prerequisite: PS 201.

PS 325. American Political Process.
5 hours. 5 ①
Political parties and elections; the electorate and voting behavior; electoral system; exercise of the suffrage; extent and consequences of voter participation. Prerequisite: PS 203.

PS 326. Pressure Groups.
3 hours. 3 ①
The nature, sources, strategy, and tactics of group power; ramifications for a democratic society. Prerequisite: 10 hours of political science.

PS 330. Government and Politics of Asia: China, Japan, and Korea.
5 hours. 5 ①
Prerequisite: PS 101; junior standing.

PS 331. Government and Politics of Asia: Southeast Asia.
5 hours. 5 ①
Prerequisite: PS 101; junior standing.

PS 332. Government and Politics of South Asia.
3 hours. 3 ①
Prerequisite: PS 101; junior standing.

PS 334. Public Policy Problems.
5 hours. 5 ①
The substantive content, administrative problems, and political strategies in such areas and national programs as poverty and welfare, race and rights, jobs and automation technology, defense and foreign affairs. Prerequisite: PS 201.

PS 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 344. Political Systems of Western Europe.
5 hours. 5 ①
Comparative analysis of contemporary institutions of governmental power in Western Europe; political tradition, process, stability and change, subsystems of leadership, political integration, and interest formation. Prerequisite: PS 101.

PS 346. The Soviet Political System.
5 hours. 5 ①
Background, formation, and development of the Soviet political system; the sources, problems, and patterns of political power in the USSR today. Prerequisite: PS 101.

PS 350. Classical Political Thought.
5 hours. 5 ①
Major political theorists through the eighteenth century. Prerequisite: two of the following: PS 101,201,205; junior standing.

PS 351. Modern Political Thought.
5 hours. 5 ①
Major political theorists of the nineteenth and twentieth centuries. Prerequisite: PS 350.

PS 360. Government and Politics of Latin America.
5 hours. 5 ①
Basic institutional arrangements; major pressure groups, political parties, the military, and possibilities for revolution and/or reform. Prerequisite: junior standing.

PS 402. Independent Study.
Terms and hours to be arranged.

PS 403. Thesis.
Terms and hours to be arranged.

PS 405. Reading and Conference. (g)
Terms and hours to be arranged.

PS 406. Projects. (g)
Terms and hours to be arranged.

PS 407. Seminar. (g)
Terms and hours to be arranged.

PS 411,412. 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. Prerequisite: PS 201.

PS 413. Problems and Issues in Public Administration. (g)
3 hours. 3 ①
Individual and group behavior in an administrative environment; change and adaptation; the administrator and policy development; reorganization; organizational research; application to current problems. Prerequisite: PS 201,411,412.

PS 417. Concepts of International Relations. (g)
3 hours. 3 ①
Basic theories and approaches to International Relations. Prerequisite: PS 205.

PS 418. **American Foreign Policy.** (g)
3 hours. 3 ①
Principles, purposes, processes of policy-making; an analysis and evaluation of procedural and substantive aspects of American foreign policy. Prerequisite: PS 201 or 205.

PS 419. **International Relations of Asia.** (g) 3 hours. 3 ①
Selected foreign policies of Asian States; relations with each other and with the world community; special reference to U. S. interests and policies. Prerequisite: PS 205 and one of the following: PS 330,331,332, or 417.

PS 420. **International Organization.** (g)
3 hours. 3 ①
Interstate interaction and organization; historical, legal, structural, and theoretical analysis; the United Nations system. Prerequisite: PS 417.

PS 422. **International Law.** (g)
3 hours. 3 ①
Theories and historical development of international law, problems in development; classic cases. Prerequisite: PS 417.

PS 423. **Municipal Government.** (g)
3 hours spring. 3 ①
Organization, functions, and problems of city governments. Prerequisite: PS 203.

PS 429. **Political Behavior.** (g)
5 hours. 5 ①
Individual and group aspects; social and psychological factors in politics; consideration of available research on voting behavior, ideology, extreme belief and affiliation, leadership, participation, personality factors, public opinion and group influences. Prerequisite: PS 325,326.

PS 433. **American Political Thought.** (g) 5 hours. 5 ①
Political values and theoretical systems in the American tradition. Prerequisite: PS 201; junior standing.

PS 438. **Soviet Foreign Policy.** (g)
3 hours. 3 ①
Principles, background, evolution, and processes of Soviet foreign policy; aspects of change and continuity in major areas of policy and doctrine. Prerequisite: PS 346 or Hst 449 or HST 450.

PS 443. **Problems of International Relations.** (g)
3 hours. 3 ①
Systematic treatment of selected problems and aspects of International Relations. Prerequisite: PS 417.

PS 463. **Contemporary Problems in Latin America.** (g)
4 hours. 4 ①
Latin-American political issues and their consequences; problems involving law, order, justice, authority, and legitimacy. Prerequisite: PS 360.

PS 464. **Problems and Issues of Contemporary Political Thought.** (g)
4 hours. 4 ①
Major issues arising out of the philosophy of the nineteenth and twentieth centuries; political "isms" of the modern world. Prerequisite: PS 351.

PS 480. **Administrative Law.** (g)
5 hours. 5 ①
Basic administrative law; control of administrative agencies; powers, limitations, and remedies. Prerequisite: PS 201.

PS 483. **Contemporary Problems of American Constitutional Law.** (g)
3 hours. 3 ①
Contemporary issues and problems in the area of public law. Prerequisite: 6 hours from PS 317,318,319.

PS 487. **The Policy Process.** (g)
5 hours. 5 ①
The decision-making process, models, and systems in selected major policy fields. Simultaneous enrollment in SSc 411 is recommended for class research projects. Prerequisite: Two of the following: PS 311,325,326.

PSYCHOLOGY

The Department of Psychology offers a major program leading to a baccalaureate in General Psychology. Psychology courses also meet the needs of students desiring a knowledge of psychology as a part of their general education or professional background and prepare students for graduate training in psychology and other related fields.

Candidates for the B.S. or B.A. degree in psychology are required, in addition to University and School requirements, to complete the following:

Lower Division: General Psychology (Psy 200 or 201,202) and Behavior Analysis (Psy 221) *or* Human Development (Psy 311), *or* Human Adjustment (Psy 314).

Upper Division: Experimental Psychology (Psy 321,322,323), Advanced General Psychology (Psy 413), 18 upper division hours in psychology, and approved statistics courses (minimum of 6 hours).

Psy 200 or 201-202 are prerequisite to all courses except Psy 111. Senior or graduate standing is required for all 400 (g) courses. Statistics 311 is strongly recommended, where not required, for all upper division courses.

Lower Division Courses

Psy 111. **Personal Development.**
3 hours. 3 ①
Self-understanding and development; emphasis upon habits, attitudes, emotional problems, and efficient learning techniques. Open only to freshmen.

Psy 200. **General Psychology.**
5 hours. 5 ①
Scientific study of behavior and experience. Prerequisite: sophomore standing.

Psy 201,202. **General Psychology.**
3 hours each term. 3 ①
Scientific study of behavior and experience. Two-term sequence, with Psy 221,311,314, or 321 forms year sequence. Prerequisite: sophomore standing; Psy 201 for Psy 202.

Psy 221. **Behavior Analysis.**
3 hours. 2 ① 1 ②
Experimental method applied to the study of psychological processes and applications in areas such as measurement, perception, learning, personality, and human relations. Development of skills in reading of psychological literature and in collection, analysis, and reporting of psychological data. Prerequisite: Psy 200 or equivalent.

Upper Division Courses

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

Psy 311. **Human Development.**
3 hours. 3 ①
Principles; developmental patterns in psychomotor maturation, perception, language, motivation, emotional behavior, intelligence, and social behavior; developmental measurements of behavior. Prerequisite: Psy 200.

Psy 312. **Human Differences.**
3 hours. 3 ①
Psychological differences identified as differentiating humans; their significance for social, economic, and political decision making. Prerequisite: Psy 200 or equivalent.

Psy 314. **Human Adjustment.**
3 hours. 3 ①
Human adjustment processes; motivation, perception. learning, communication, and cultural requisites as related to effective living. Prerequisite: Psy 200.

Psy 321,322,323. **Experimental Psychology.**
4 hours each term. 3 ① 1 ③
Philosophical foundations; measurement; psychophysics; psychometrics; design of experiments; collection, analysis, organization, presentation, and reporting of data; evaluation of reported research; applications of psychological research methods to problems in areas such as learning, perception, social, and personality. Prerequisite: 5 hours of psychology (other than Psy 111); St 311 or 451 or Mth 113. With instructor's approval Statistics may be satisfied concurrently.

Psy 330. **Human Factors in Engineering.** 3 hours. 3 ①
Factors affecting human performance in man-machine systems; research methods in applied experimental psychology; capabilities and limitations of human operator. Prerequisite: Psy 200.

Psy 361. **Group Dynamics.**
3 hours. 2 ②
Experience through the participative group method to increase self-understanding and to promote sensitivity to group processes and interpersonal interactions. Prerequisite: Psy 314.

Psy 401. **Research.** (g)
Terms and hours to be arranged.

Psy 402. **Independent Study.**
Terms and hours to be arranged.

Psy 403. **Thesis.**
Terms and hours to be arranged.

Psy 405. **Reading and Conference.** (g)
Terms and hours to be arranged.

Psy 406. **Projects.** (g)
Terms and hours to be arranged.

Psy 407. **Seminar.** (g)
Terms and hours to be arranged.

Psy 408. **Workshop.** (g)
Terms and hours to be arranged.

Psy 411. **Philosophical Foundations of Psychology.** (g)
4 hours. 4 ①
Philosophical traditions as contributors to modern sociology, emphasizing scientific aspects of psychological theories. Prerequisite: Psy 200 or Psy 202.

Psy 413. **Advanced General Psychology.** (g) 3 hours. 3 ①
Psychological theories and systems as related to contemporary general psychology and to specific areas of research and theory construction; individual differences, motivation, perception, learning, and personality development. Prerequisite: 3 hours of junior-level work in psychology.

Psy 414. **Learning and Motivation.** (g)
3 hours. 3 ①
Theoretical and experimental literature of learning and motivation as related to rote learning, motor skills, conditioning, discrimination, problem solving, memory, and social learning. Consideration of applied aspects of learning and motivation in programed learning, systems training, retention and relearning, incentive schedules, and creativity. Prerequisite: Psy 221 or 321.

Psy 415. Perception. (g)
3 hours. 3 ①
Fundamental concepts of sensation and perception. Research and theory of perception in relation to learning, motivation, social phenomena. Prerequisite: Psy 221 or 321.

Psy 419. Language and Thought. (g)
3 hours. 3 ①
Psychological research and theories of thought and language processes; language in communication, problem-solving, reasoning, originality, scientific and mathematical behavior; psycholinguistics, measurement of meaning, cultural factors in perception and learning of language. Prerequisite: Psy 221 or 321.

Psy 421. Psychological Assessment: Principles and Methods. (g)
3 hours. 3 ①
Application of psychological methods to the study of the individual; theoretical and statistical rationale of test construction and interpretation; problems involved in the prediction of human behavior. Prerequisite: St 311 or equivalent.

Psy 423. Psychological Assessment: Group Testing. (g)
3 hours. 3 ①
Group tests of intelligence, special aptitudes, proficiency, interests, values, and personality used in personal and vocational counseling or in personnel selection; methods of developing and validating specific tests; underlying theories and interpretation; use in counseling. Prerequisite: Psy 421.

Psy 424. Psychological Assessment: Individual Testing. (g)
3 hours. 3 ①
The nature and composition of intelligence. Major emphasis upon the administration, scoring, and interpretation of Stanford-Binet Intelligence Scale (1960 revision) and Wechsler Intelligence Scales for Children and Adults. Prerequisite: Psy 421.

Psy 426. History and Systems of Psychology. (g)
3 hours. 3 ①
Rise and development of major psychological concepts and methods, origins of the schools of psychology, and emphasis upon contemporary theory and applications of philosophy of science to psychology. Prerequisite: Psy 321 or Psy 413.

Psy 431. Human Factors: Design Principles.
3 hours 3 ①
Psychological factors and research methods used in equipment and man-machine system design. Input, output, and central processes of human activity as related to illumination, displays, communications, atmospheric conditions, space, health, stress, and safety. Prerequisite: Psy 321.

Psy 432. Human Factors: Systems Development.
3 hours. 3 ①
Factors affecting operator performance in design of man-machine systems: human capabilities and limitations, equipment and task design, personnel selection and classification, individual and team training, job aids and procedures, proficiency measurement, and system performance evaluation. Prerequisite: Psy 321.

Psy 435. Personality Theories. (g)
4 hours. 4 ①
Various theories of personality and specific applications; reading of original works; Freud, Adler, Lewin, Allport, social-psychological, stimulus-response and other theories. Prerequisite: Psy 413 or 426.

Psy 442. Attitude and Opinion Methodology. (g)
3 hours. 3 ①
Examination and experience in the use of techniques employed in the study of attitudes and opinions. Prerequisite: Psy 321.

Psy 446. Industrial Psychology. (g)
3 hours. 3 ①
Human relations in business, industry, the military, government, and other institutions; personnel selection, placement, and training; human engineering. Prerequisite: Psy 205 or 221 or 311 or 314 or 321.

Psy 451. Physiological Psychology. (g)
3 hours. 3 ①
Physiological bases of behavior; neurophysiological correlates of perception, learning, motivation, and sensory processes. Prerequisite: Psy 221 or Psy 321 or Z 332.

Psy 452. Physiological Psychology Laboratory. (g)
2 hours. 2 ③
Methods and techniques used in physiological psychology; electrophysical recording, use of drugs, and general operative techniques, including surgical techniques for implantation of chronic stimulation and recording electrodes. Prerequisite or corequisite: Psy 451.

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 470. Animal Psychology. (g)
3 hours. 3 ①
Problems in animal behavior; relation of animal research to general psychological processes such as learning, perception, and motivation; application of experimental methods to investigations of species-specific behavior. Prerequisite: Psy 221 or 321.

Psy 471. Animal Psychology Laboratory. (g)
2 hours. 2 ③
Methods and techniques used in the experimental study of animal behavior; use of classical and instrumental conditioning techniques; study of imprinting, and use of electrical and electronic systems in the study of behavior. Prerequisite or corequisite: Psy 470.

Psy 481. Pre-practicum in Psychological Services. (g)
3 hours. 2 ① 1 ③
Evaluation of counseling interview transcripts; observation and analysis of interviews; practice in interview write-up; case analyses. Practice in the integration of occupational information, test materials, and psychological theories of occupational choice for individual cases. Consent of instructor required. Prerequisite: Psy 423.

Psy 482. Practicum in Psychological Services. (g)
3 hours. 2 ① 1 ③
Experience in use of psychological and related methods in counseling, under close supervision, with individuals at adolescent and adult levels. Consent of instructor required. Prerequisite: Psy 481 or equivalent.

Psy 485. Counseling and Psychotherapy. (g)
3 hours. 3 ①
Principles, attitudes, and techniques in counseling and psychotherapy applicable in a wide variety of settings and agencies; current issues, research, and selected case studies. Prerequisite: Psy 421.

RELIGIOUS STUDIES

The Department of Religious Studies offers a major program leading to the Bachelor of Arts degree. The department conceives of religion as a field of humanistic study to be approached in a scholarly, objective, and critical manner. It regards such study as an essential part of liberal, humane learning and seeks to assist students in understanding the role religion plays in human existence. One of the most important contributions of the Department of Religious Studies to the Humanities consists of courses which examine complex interaction between religion and culture. Various courses deal with the literature, history, philosophy, and psychology of religion. Special attention is directed to contemporary religious movements and to non-Western religious thought. The instruction is nonsectarian and seeks an open analysis of all points of view.

Courses are designed to provide a general orientation to the field of religion for the undergraduate student as well as more advanced courses for those who wish to pursue professional careers where a study of religion would be useful, such as psychology, sociology, history, teaching, law, medicine, the ministry, and religious education.

Lower Division Courses

R 101. Introduction to Religious Studies.
3 hours. 3 ①
Major religious perspectives concerning God, man, and the world; religious knowledge; evil; relation of religion to secular ideologies and value systems.

R 204,205,206. Western Religious Thought.
3 hours each term. 3 ①
History of the main Jewish and Christian traditions from the Old Testament to contemporary religious expressions.

R 211. The Old Testament and Its Historical Background.
3 hours. 3 ①
Times and conditions which produced Old Testament; religion of Israel with critical survey of sources.

R 212. The New Testament and Its Historical Background.
3 hours. 3 ①
Time and conditions out of which New Testament writings came; problems that gave rise to Christian movement.

R 231. The American Religious Heritage.
3 hours. 3 ①
Development of main religious groups in America: Catholicism, Judaism, Protestantism; role of religion in American life.

See also Eng 275. The Bible as Literature, under ENGLISH.

R 241. Perspectives in Religious Ethics.
3 hours. 3 ①
Ethical teachings of the major religious traditions. Religious perspectives on contemporary issues: sex, race, politics, and others.

Upper Division Courses
Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

R 301,302,303. Religions of Mankind.
3 hours each term. 3 ①
Comparative study of religions that command a large following today. *R 301:* Primitivism, Hinduism, Buddhism. *R 302:* Confucianism, Taoism, Islam. *R 303:* Judaism, Christianity.

R 331,332,333. Contemporary Religious Thought.
3 hours 3 ①
Examination of the major religious problems and thinkers of the twentieth century.

R 341. The Historical Traditions of the Old Testament.
3 hours. 3 ①
A historical-critical examination of the traditions involved in the historical books of the Old Testament. Prerequisite: R 211.

R 351. The Synoptic Literature.
3 hours. 3 ①
An historical-critical examination of the traditions about Jesus in Matthew, Mark, and Luke. Prerequisite: R 212.

R 370. Religion and Education.
3 hours. 3 ①
Historical relationship of church to education; situation in America; the church and the university community; faith and learning.

R 402. Independent Study.
Terms and hours to be arranged.

R 405. Reading and Conference.
Terms and hours to be arranged.

R 407. Seminar.
Terms and hours to be arranged.

R 411,412,413. Religion and Culture.
3 hours each term. 3 ①
Relationship of religion to society, the arts, and science.

R 425. The Existential Self and Religion.
3 hours. 3 ①
Existentialist views of the self in relation to the world, other selves, and religious experience. Prerequisite: three hours of religion or philosophy.

R 427. Process Philosophy and Religion.
3 hours. 3 ①
Basic themes; God, creativity, time, evolution, and freedom; major attention to the thought of Whitehead. Prerequisite: three hours of religion or philosophy.

R 463. Psychology of Religion. (g)
3 hours. 3 ①
Human nature and behavior as seen by psychology and by religion; selfhood, motivation, conscience, freedom, faith, doubt; psychotherapy and religion.

SOCIOLOGY

The Department of Sociology offers undergraduate programs leading to the Bachelor of Arts or Bachelor of Science degree in Sociology. Courses are offered to meet the needs of (1) students majoring in Sociology, (2) students concentrating on Sociology in the Social Science degree program, and (3) students choosing such courses as a part of other degree programs or desiring a comprehensive understanding of human societies.

Sociology focuses attention on the essential factors in group life which are responsible for the nature of the organization and relationships in human groups and on the impact of such organization and relationships on human behavior.

For a B.A. or B.S. degree in sociology the requirements, in addition to those established for the University and the school, include the following:

Lower division: General Sociology (Soc 204,205,206)

Upper division: Introduction to Social Research (Soc 327), Sociological Theory (Soc 354), Seminar (Soc 407), Social Psychology (Soc 473), additional sociology courses (minimum of 21 hours).

Courses in Sociology

Lower Division Courses

Soc 204,205,206. General Sociology.
3 hours each term. 3 ①
Structure and functioning of human groups. Soc 206 stresses application of basic concepts to the analysis of problems in group life. Soc 204 is prerequisite to Soc 205, Soc 206. 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.

Upper Division Courses

Upper class standing is required for all 400 courses. Courses numbered 400-499 and designated (g) may be taken toward a graduate minor.

Soc 312. Sociology of the Family.
3 hours. 3 ①
Historical development of the family as an institution; its structure and functions; changes in process. Prerequisite: Soc 204 or 212.

Soc 325. Sociological Measurement.
3 hours. 3 ①
Levels and problems of measurement in sociological research; statistical tests and measures: types, criteria for selection, computation, and interpretation with respect to sociological variables. Prerequisite: Soc 204.

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: Soc 205.

Soc 329. Applied Methods of Social Research. 3 hours. 3 ①
Application of methods and techniques in sociology for collection, processing, and analysis of data. Class members contribute to and implement research during course. Prerequisite: Soc 325,327.

Soc 341. Demography.
3 hours. 3 ①
Numbers and quality of human populations; basic factors affecting growth rates and composition; trends, policies, and problems. Prerequisite: Soc 204 or 212.

Soc 354. Sociological Theory.
3 hours. 3 ①
Theory relating to group life; social and philosophical bases for sociological theory. Prerequisite: Soc 205.

Soc 361. Social Organization.
3 hours. 3 ①
Structural aspects of social groups with emphasis on institutions, formal organizations, and bureaucracies. Prerequisite: Soc 205.

Soc 401. Research.
Terms and hours to be arranged.

Soc 402. Independent Study.
Terms and hours to be arranged.

***Soc 405. Reading and Conference.** (g)
Terms and hours to be arranged.

***Soc 407. Seminar.** (g)
Terms and hours to be arranged.

Soc 411. Juvenile Delinquency. (g)
3 hours. 3 ①
A social phenomenon; causes and social consequences; corrective and preventive programs. Prerequisite: Soc 206; junior standing.

Soc 412. Criminology and Penology. (g)
3 hours. 3 ①
History of crime and the treatment of criminals; causes and effects of crime; current theories. Prerequisite: Soc 206; junior standing.

Soc 421. Social Change. (g)
3 hours. 3 ①
The nature, types, causes, and consequences; major theories. Prerequisite: Soc 205; junior standing.

Soc 427. Social Movements. (g)
3 hours. 3 ①
Study of processes whereby social movements are formed to attempt to bring about social change; the consequences of various procedures used to change society; the consequences of the organizational structure and ideologies of social movements. Prerequisite: Soc 205; junior standing.

Soc 430. Theory of Small Groups. (g)
3 hours. 3 ①
Current theoretical works dealing with small group behavior from the standpoints of interactional processes, structure, and function. Prerequisite: Soc 205; junior standing.

Soc 434. Social Stratification. (g)
3 hours. 3 ①
Bases; social mobility; significance of stratification in American society. Prerequisite: Soc 205; junior standing.

Soc 436. Collective Behavior. (g)
3 hours. 3 ①
Causes, characteristics, and consequences of such behavior as exhibited in crowds, mobs, publics or as related to crazes, rumors, or panics. Prerequisite: Soc 205; junior standing.

Soc 437. Sociology of Race Relations. (g) 3 hours. 3 ①
Relations between racial, ethnic, and religious groups analyzed in sociological terms; factors causing changes in the relationships. Prerequisite: 6 hours of sociology or of sociology and psychology; junior standing.

Soc 456. Industrial Sociology. (g)
3 hours. 3 ①
Sociology of work relations; industrial worker and his community; industry and society. Prerequisite: Soc 205; junior standing.

Soc 461. Sociology of Religion. (g)
3 hours. 3 ①
Religion as a social institution; relation between religion and cultural evolution, other social institutions, and general social conditions. Prerequisite: Soc 205; junior standing.

Soc 465. Political Sociology. (g)
3 hours. 3 ①
Political theories of change, theories of voting behavior, socio-political movements, revolutions, and modernization; analysis of the concepts of power and authority; decision makers and the decision-making process. Prerequisite: Soc 205.

* Graduate credit for Soc 405 and Soc 407 must not total more than 9 hours.

Soc 468. **Sociology of Urban Life.** (g)
3 hours. 3 ①
The modern city; its history, structures, functions, and problems. Prerequisite: Soc 205; junior standing.

Soc 469. **Sociology of Rural Life.** (g)
3 hours. 3 ①
Rural institutions and communities in a changing society. Prerequisite: Soc 205; junior standing.

Soc 471. **Contemporary Sociological Theory.** (g)
3 hours. 3 ①
A study of contemporary sociological theory relating to the principal areas of specialization in the field. Prerequisite: Soc 354; junior standing.

Soc 473,474. **Social Psychology.** (g)
3 hours each term. 3 ①
Soc 473: Human behavior, individual and social adjustments in terms of prevailing social systems. *Soc 474:* Supporting research contributions. Prerequisite for 473: Soc 206; junior standing. For 474: Soc 327,473; junior standing.

Soc 475. **Community Organization.** (g)
3 hours. 3 ①
The community: its social structure, functioning, and development. Prerequisite: Soc 205; junior standing.

Soc 490. **Educational Sociology.** (g)
3 hours. 3 ①
Contributions of sociology to the understanding of educational philosophies, values, and practices. Prerequisite: 6 hours of sociology or sociology and psychology; junior standing.

SPEECH COMMUNICATION

Oregon State University offers B.A. and B.S. degrees in Speech.

Speech courses are designed to provide students with an understanding of both theoretical and practical aspects of the study of human oral communication as a liberal art, a social science, a background for further study, or a preprofessional experience.

Majors in speech, in addition to the School and University requirements, must complete the 18-credit-hour speech core (Sp 111 Fundamentals; Sp 201, 202 Survey of Oral Communications; Sp 370 Phonetics; Sp 420 Meaning and Communication), a proficiency examination or its equivalent, and 27 to 36 hours in public speaking and group communication, communication disorders, speech education, radio-television, or theater. In addition, individually planned programs may be approved.

Cocurricular speech activities are open to all students regardless of major or academic training; these include:

THE UNIVERSITY THEATER

RADIO STATION KBVR-FM

TV PROGRAMMING-PRODUCTION, KBVR-TV

FORENSIC ACTIVITIES (competitive and noncompetitive speaking)

MODEL UNITED NATIONS

SPEECH AND HEARING CLINIC

Research programs, both graduate and undergraduate, are open to selected students interested in participating as subordinate investigators in studies dealing with small-group behavior, language perception, instructional television, theater, and other areas.

Lower Division Courses

Sp 90. **Corrective Speech.**
1 hour any term, three terms. 2 ①
Designed specifically for students having organic and/or functional speech disorders; group meetings of class, supplemented by clinical periods devoted to individual evaluation and treatment.

Sp 91. **Speech for Foreign Students.**
2 hours. 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.

Sp 111,112,113. **Fundamentals of Speech.** 3 hours each term. 3 ①
Sp 111: Interpersonal Speech Communication. Basic concepts; role of speaker, message construction, listening behavior, feedback in interviews, conversation, manuscript reading, discussions, platform speaking. *Sp 112: Public Speaking.* Creative speaker-audience communication; emphasis on expository public speaking. *Sp 113: Persuasive Speaking.* Processes of persuasive speaking; rhetoric and psychology of oral communication; theory and laboratory experience. Prerequisite: for *Sp 113,* Sp 111 or 112.

Sp 120. **Voice and Articulation.**
3 hours. 3 ①
Expressiveness, intelligibility, pronunciation, projection, quality; principles and techniques of improvement; physics and physiology of voice production; personal adjustment; introduction to phonetics.

Sp 121,122. **Interpretation.**
3 hours each term. 3 ①
Analysis and presentation of printed materials; emotional reactions that give color and interest; expressive vocal and bodily responses; pantomime; characterization; interpretative techniques. Must be taken in sequence.

Sp 147. **Introduction to the Theater.**
3 hours. 3 ①
A survey of the origins, history, nature, elements and styles of drama together with an analysis of the function of the artists and craftsmen in the theater. Prerequisite to all Theater Arts courses except as specifically noted.

Sp 160. **Introduction to the Motion Picture.**
3 hours. 2 ① 1 ②
Development of the motion picture from prephotographic eras to the present. Individuals responsible for major advances in theory and technique studied. Representative films viewed for discussion and analysis.

Sp 201,202. **Survey of Oral Communication.**
4 hours each term. 4 ①
Nature, functions, impact, and problems of oral communication; its developmental, aesthetic, physiological, psychological, and sociological bases. *Sp 201:* roles of senders and receivers. *Sp 202:* the message and process. Need not be taken in sequence.

Sp 231. **Conduct of Meetings.**
3 hours. 3 ①
Planning and leading open forums; committee, business, and other public or organizational meetings. Parliamentary procedure.

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. Consent of instructor required.

Sp 241. **Introduction to the Broadcast Mass Media.**
3 hours. 3 ①
Survey of the nature and structure of the American system of broadcasting: the government, the networks and stations, advertisers and agencies, and the public. Program types and methods of programing. Social and cultural impact of the electronic mass media.

Sp 242. **Recreational Use of Drama.**
3 hours. 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. Prerequisite: recreation major or minor or consent of instructor.

Sp 243. **Puppetry.**
3 hours. 3 ①
History; adapting plays, stories, and historical events for puppet dramatization; manipulating puppets and marionettes; application to television.

Sp 244. **Scenecrafts.**
3 hours. 2 ① 2 ③
Constructing scenery and stage properties; practical experience in backstage procedures, and scene painting.

Sp 245. **Stage Lighting.**
2 hours. 2 ① 1 ③
Fundamentals of electricity as used in stage lighting; color and light; light instruments and control systems: theory and practice of lighting stage productions. Prerequisite: Sp 244.

Sp 247. **Stage Make-up.**
3 hours. 3 ①
Basic principles and theory; laboratory experience in all phases of theatrical make-up.

Sp 248. **Fundamentals of Acting.**
3 hours. 3 ①
Acting theories and techniques; play and role analysis. Emphasis is on modern realistic and representational styles.

*Sp 250. **Speech and Theater Workshop.** 1 to 3 hours each term, maximum 6 hours.
Principles of acting, dramatic production, public speaking, and broadcasting; laboratory experience; separate sections for public address and forensics, radio-television and theater. Consent of instructor required.

Sp 262. **Radio, Television, Film Speaking.**
3 hours. 2 ① 1 ②
Theory and technique of personal communication through the media of radio, television, and film. Adapting principles and practices of oral communication to the electronic mass media. Audio and video tape recording and playback of laboratory projects under closed circuit conditions. Prerequisite: Sp 111.

Sp 267. **Basic Television.**
3 hours. 2 ① 1 ②
Equipment and lighting, including the camera, the TV switcher, video tape recording equipment, microphones, lighting instruments. Intensive practice in studio and control room operations. Laboratory experience includes serving as operational personnel for television productions.

* A maximum of 6 hours of credit may be earned in Mus 383-388.

Sp 275. **Principles of Forensics.**
3 hours. 3 ①
Theory and rationale of debate; expository, extempore, and after-dinner speaking; oratory and other forms of forensic discourse.

Upper Division Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

Sp 311. **Advanced Interpretation.**
3 hours. 3 ①
Interpretative theory and programing; materials for oral interpretation; experimentation in presentational forms. Prerequisite: Sp 122.

Sp 321. **Reasoning and Evidence in Controversy.**
3 hours. 3 ①
Concepts and processes of argumentation, cogency in oral communication, systems of logic, critical analysis of contemporary efforts to convince, construction and presentation of cases. Prerequisite: Sp 111 and sophomore standing.

Sp 322. **Persuasion.**
3 hours. 3 ①
Attention, suggestion, motivation, and reason in persuasive discourse; problems and ethics of altering behavior, changing belief and inducing social control through the spoken word; consideration of ideas, delivery and language style in analyzing and practicing persuasive speaking. Prerequisite: Sp 113 and sophomore standing.

Sp 323. **Group Discussion Processes.**
3 hours. 3 ①
Dynamics of discussion; group thinking, and decision making; interpersonal relations; types of leadership, study of discussion through laboratory practice and analysis. Prerequisite: Sp 111.

Sp 327. **History and Criticism of American Public Address.** 3 hours. 3 ①
Bases of speech criticism; study of great American speakers; relation of their speaking to the history of ideas, and to political, social and religious movements. Prerequisite: Sp 111 or 112; Sp 113.

Sp 330,331,332. **History of Theater Arts.**
3 hours each term. 3 ①
The rise and development of the composite arts of the theater in their cultural and social context. *Sp 330:* Origins to 1500. *Sp 331:* 1500 to 1870. *Sp 332:* 1870 to present. Prerequisite: Sp 147.

Sp 346. **Scene and Stage Design.**
3 hours. 2 ① 2 ③
Physical theater; auditoriums and stages; scene designs; stage settings and design techniques. Prerequisite: Sp 147, Sp 244.

Sp 348. **Advanced Acting.**
3 hours. 3 ①
The demands made upon the actor by the non-realistic modes of drama. Character in relation to style from the poetic, both classical and modern, to the anti-theater of the absurdists. The voice and body of the role. Prerequisite: Sp 248.

*Sp 350. **Speech and Theater Workshop.**
1 to 3 hours each term, maximum 6 hours.
Advanced work in acting, dramatic production, public speaking, and broadcasting; laboratory experience; separate sections for public address and forensics, radio-television, and theater. Prerequisite: 3 term hours of Sp 250.

* A maximum of 12 hours may be earned in courses designated by an asterisk with no more than 6 hours in either broadcasting, forensics, or theater.

Sp 354. **Fundamentals of Play Direction.**
3 hours. 3 ①
History, theories and techniques of directing; play selection and analysis, study of the audience. Practical experience is provided both in class and Laboratory Theater. Prerequisite: Sp 147, Sp 248.

Sp 361. **Professional Radio Announcing.**
3 hours. 2 ① 1 ②
Theory and practice. The announcer and station operations and structure. Laboratory practice in the activities of the announcer: reading of copy, the musical program, the talk program, the interview, newscasting. Prerequisite: Sp 111, 262.

Sp 362. **Radio Program Production.**
3 hours. 3 ①
Basic principles, including the use of microphones, sound and music, and tape editing. Program planning. The production of feature programs. Prerequisite: Sp 241.

Sp 363. **Radio and Television Writing.**
3 hours. 3 ①
Writing for the electronic mass media. Special emphasis on writing continuity, copy, and narration. Also the writing of radio feature programs and narrative and descriptive television programs. Prerequisite: Sp 362 and Sp 367.

Sp 366. **Creative Projects in Radio-Television.**
3 hours.
Projects in programing, production, or writing for radio or television, or for related fields of the electronic mass media. The student will work independently, under the direction of a faculty advisor. Prerequisite: Sp 241 and Sp 362 or Sp 363, or 367 or consent of instructor.

Sp 367. **Television Program Production.**
4 hours. 3 ① 1 ②
The nature of visual communication through television; principles and techniques of developing and producing television program.

Sp 368. **Broadcast Media Programing.**
4 hours. 3 ① 1 ②
The philosophies, principles, and practices of broadcast media programing. Methods of audience analysis and measurement. Prerequisite: Sp 241.

Sp 370. **Phonetics.**
3 hours. 3 ①
The science of speech sounds as elements of language and the application of this science to oral communication.

Sp 371. **Speech Science.**
3 hours. 3 ①
Anatomy, psychology, and physics of speech; examination of key research on the scientific bases of speech.

*Sp 375. **General Forensic Speaking.**
1 hour each term, six terms.
Advanced work in general forensic speaking. Prerequisite: Sp 274.

*Sp 378. **Debate.**
1 hour each term, three terms.
Advanced work in debate. Prerequisite: Sp 277.

Sp 401. **Research.**
Terms and hours to be arranged.

* A maximum of 12 hours may be earned in courses designated by an asterisk with no more than 6 hours in either broadcasting, forensics, or theater.

Sp 402. **Independent Study.**
Terms and hours to be arranged.

Sp 403. **Thesis.**
Terms and hours to be arranged.

Sp 405. **Reading and Conference.** (g)
Terms and hours to be arranged.[1]

Sp 406. **Projects.**
Terms and hours to be arranged.

Sp 407. **Seminar.** (g)
Terms and hours to be arranged.[1]

Sp 408. **Workshop.** (g)
Terms and hours to be arranged.[1]

Sp 414. **Speech in the Secondary School.**
(g) 3 hours. 3 ①
History, philosophy, literature, and current practices in curricular and extracurricular speech programs of secondary schools. Prerequisite: 9 hours of upper division speech courses.

Sp 420. **Meaning and Communication.**
(g) 3 hours. 3 ①
Theory of speech as communication; barriers and pathologies of oral communication; character of meaning, logic, symbols, and values in oral communication; models of communication and their application to speech behavior. Prerequisite: Sp 111,201,202, or 203.

Sp 423. **Communication and Leadership in Small Group Discussion Processes.** (g)
3 hours. 3 ①
Theories of leadership and communication and their particular application to the formal and informal small group discussion process. Prerequisite: Sp 323; Psy 361.

Sp 429. **Theories of Rhetoric.** (g)
3 hours. 3 ①
History and philosophy of rhetorical principles. Prerequisite: 9 hours of speech.

J 431. **Broadcast Journalism.** (See JOURNALISM.)

Sp 451. **Instructional Uses of Television.** (g) 3 hours. 3 ①
Adaptation of audio-visual principles of communication to presentation of informational materials by television; uses of sound, film, music, graphics, and related aids. Prerequisite: Sp. 367.

Sp 454. **Advanced Play Directing.**
3 hours. 3 ①
Role of the director as "artist-in-chief" of dramatic productions with an emphasis on selecting and adapting historical as well as avant-garde plays for modern production. Prerequisite: Sp 354.

Sp 464,465. **History of Theater Architecture and Design.** (g)
3 hours each term. 3 ①
History and development of the architecture, scenic design, and visual aspects of the theater. *Sp 464:* Origins to 1650. *Sp 465:* 1650 to the present. Prerequisite: Sp 147.

Sp 467. **Television Directing.** (g)
3 hours. 2 ① 1 ②
Theory and practice of television directing; translation of concepts, ideas, emotions, and attitudes into visual and aural imagery; nature and structure of visual and aural imagery. Prerequisite: Sp 367.

[1] Graduate credit under Sp 405,407,408 must not total more than 9 hours.

Sp 472. **Experimental Phonetics.** (g)
3 hours. 2 ① 1 ②
Techniques and methods in analysis, synthesis, perception, and measurement of voice and speech. Laboratory period required. Prerequisite: Sp 371.

Sp 481,482,483. **Speech Pathology.** (g)
3 hours each term. 3 ①
Symptoms, causes, and treatment of speech disorders. For students intending to qualify as speech clinicians. *Sp 481:* Functional articulatory defects, delayed speech, emotional disorders. *Sp 482:* Organic disorders; deviations due to congenital malformation, injury, deafness, and neurological impairment. *Sp 483:* More serious or prolonged disorders, including stuttering. Prerequisite: Sp 370,371.

Sp 484,485,486. **Clinical Methods in Speech Correction.** (g)
3 hours each term. 3 ①
Practical experience in handling cases, including taking of case history, making diagnosis, and giving remedial treatment. Prerequisite: Sp 481,482.

Sp 487,488,489. **Audiology.** (g)
3 hours each term. 3 ①
Auditory function, hearing impairment, and education or re-education of persons with hearing loss. *Fall:* Fundamentals of acoustics, anatomy and physiology of the ear, types and causes of hearing loss, speech involvements. *Winter:* Techniques and interpretation of auditory tests such as pure tone and speech audiometry. *Spring:* Psychology of the acoustically impaired, speech and auditory training, school and vocational problems. Prerequisite: Sp 370,371.

Sp 490. **Lip Reading.** (g)
3 hours. 3 ①
Theories and methods of speech reading and auditory training, their part in education and rehabilitation of deaf and hard-of-hearing children and adults; lip reading methods.

Sp 493. **Principles and Techniques of Speech Correction.** (G)
3 hours. 3 ①
Nature, causes, diagnosis, and treatment of speech defects of children and adolescents. Primarily for classroom teachers.

School of Science

FACULTY

As of January 1970

JOHN M. WARD, Ph.D., Dean, School of Science.
FRANCOIS A. GILFILLAN, Ph.D., Dean Emeritus, School of Science.
JOHN D. LATTIN, Ph.D., Assistant Dean, School of Science.
THERAN D. PARSONS, Ph.D., Assistant Dean, School of Science.
GRAYDON T. CREWS, Ed.D., Student Personnel Adviser, School of Science.

Emeritus Professors ATWOOD, GILFILLAN, GILKEY, and MCWHORTER in Botany; CALDWELL, KURTH, LOGAN, and MEHLIG in Chemistry; CHAMBERLAIN, MARTIN, MOTE, and SCULLEN in Entomology; BEER in General Science; ALLISON, HODGE, and PACKARD in Geology; BAKKUM, KIRKHAM, and MILNE and Assistant Professor HERRMANN in Mathematics; BOLLEN in Microbiology; GARMAN, MORGAN, VINYARD, and YUNKER in Physics; GORDON and WULZEN in Zoology.

Atmospheric Sciences: Professor HEWSON (department chairman).
Associate Professors: DECKER, LOWRY.
Assistant Professors: OLSSON, PETERSON, THOMPSON.

Biochemistry and Biophysics: Professors NEWBURGH (department chairman), BECKER, BISHOP, EVANS, ISENBERG, LOOMIS, MACDONALD, PARKS, TERRIERE, VAN HOLDE, WANG, WESWIG.
Associate Professors: BAISTED, BUHLER, GAMBLE, REED, TINSLEY.
Assistant Professors: ANDERSON, BEAUDREAU, DYSON, FANG, JOHNSON, KIGER, MORRIS, WHANGER.

Botany: Professors SHAY (department chairman), BISHOP, CHAMBERS, CHILCOTE, CORDEN, EVANS, HANSEN, HORNER, JENSEN, LEACH, PHINNEY, ROTH, SMITH, VAUGHAN, WARD, YOUNG.
Associate Professors: ALLEN, BRANDT, DENISON, MCINTIRE, MOORE, POWELSON.
Assistant Professors: DENNIS, QUATRANO, ZOBEL.
Instructors: JOHNSTON, OBERMIRE.

Chemistry: Professors CHRISTENSEN (department chairman), DECIUS, FREEMAN, FREDERICKS, FREUND, HEDBERG, KICE, MARVELL, NORRIS, PARSONS, SCHMITT, SCOTT, SLABAUGH, WANG, WILLIAMS.
Associate Professors: DANIELS, HAWKES, KRUEGER, REESE, YOKE.
Assistant Professors: DEKOCK, GLEICHER, LOVELAND, NIBLER, PIEPMEIER, THIES, SHARMA.
Instructors: FRECH, GUNDERSEN, KNUTSEN, NEWKIRK, OSBORN, WATNE.

Entomology: Professors RITCHER (department chairman), KRANTZ, LATTIN, OMAN, RUDINSKY, STEPHEN, SWENSON, TERRIERE, THOMPSON.
Associate Professors: ANDERSON, BROOKES, DICKASON, GOULDING, NAGEL.

General Science: Professors CREWS, FOX, HUMPHREY, KIMELDORF, TROUT, WILLIAMSON.
Associate Professors WILLIS (department chairman), CRAVEN, ELLETT, NACHTWEY, VAN DYKE.
Assistant Professors: CARNEGIE, LYFORD, MCKENZIE, MILNE, MORRIS, OSLER, SPENCER.
Instructors: FILIPY, JOHNSON, MCCARTHY, PEARSON, SHAPEERO, WEAVER.

Geography: Professors HIGHSMITH (department chairman), HEINTZELMAN, JENSEN, NORTHAM, RUDD.
Assistant Professors: BARD, FRENKEL, HANSEN, MARESH, MUCKLESTON.

Geology: Professors BOUCOT (department chairman), TAUBENECK.
Associate Professors: FIELD, BOSTWICK, ENLOWS, OLES.
Assistant Professors: JOHNSON, TAYLOR, WRIGHT.
Instructors: GRIFFIN, JARMAN.

Mathematics: Professors CARTER (acting department chairman), ANSELONE, ARNOLD, BODVARSSON, FIREY, GOHEEN, KAPLAN, LONSETH, NARASIMHAN, OBERHETTINGER, PAPADOPOULOS, POOLE, SIMONS, J. W. SMITH, K. T. SMITH, STALLEY, STONE, YOUNG.
Associate Professors: BALLANTINE, BROWN, CARLSON, GOLDSTEIN, GUENTHER, GUTHRIE, LARRIVEE, NEWBERGER, SAUNDERS, WILSON.
Assistant Professors: CHOW, DAVIS, ECKEL, FLAHERTY, FLOOD, FRANZEN, GODARD, HERTLING, JORGENSEN, LEE, LINDSTROM, OVERHOLSER, PETERSEN.
Instructors: BACHELOR, BRENNE, CURL, FRANK, GLASSMIRE, KNOSHAUG, MURRAY, PARSONS, RACHELE.

Microbiology: Professors ELLIKER (department chairman), ANDERSON, MORITA, PARKS, PILCHER, SANDINE.
Associate Professor: FRYER.
Assitant Professors: KLEIN, PARKINSON, STEENBERGEN.
Instructor: KLEEMAN.

Oceanography: Professors BYRNE (department chairman), BODVARSSON, BURT, CURL, FROLANDER, HEDGPETH, MORITA, OSTERBERG, PATTULLO, VAN ANDEL.
Associate Professors: KULM, MCCAULEY, NESHYBA, PARK, PEARCY, PYTKOWICZ, RITTENHOUSE, SMALL, SMITH.
Assistant Professors: BEARDSLEY, CALDWELL, CAREY, COUCH, DYMOND, FORSTER, FOWLER, GONOR, HEATH, HEINRICHS, MESECAR, MILLER, MOORE, NEAL, POND, RENFRO, STRONG.

Physics: Professors BRADY (acting department chairman), BURCH, CUTLER, EASTERDAY, SCHECTER.
Associate Professors: BOEDTKER, DAVIS, DRAKE, FAIRCHILD, FONTANA, MADSEN, RICHERT, SWENSEN, WASSERMAN.
Assistant Professors: AU, CRAIG, FESSENDEN, FLETCHER, GRIFFITHS, GRILLOT, KELLEY, WISE.

Statistics: Professors CALVIN (department chairman), BRUNK, HUNTER, OVERTON, PETERSEN.
Associate Professors: GUTHRIE, PIERCE.
Assistant Professors: BOWMAN, HARTMANN, LAND, MULLOOLY, RAMSEY, ROWE, SEELY, THOMAS, YATES.
Instructor: MORGAN.

Zoology: Professors DORNFELD (department chairman), HILLEMANN, KRUEGER, PRATT, PRITCHARD, STORM.
Associate Professors: ALVARADO, CONTE, DAWSON, HARRIS, HISAW, OWCZARZAK, ROBERTS, WIENS.
Assistant Professors: GONOR, KERLEY, MORRIS.
Instructors: VOTH, WALKER.

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.

Honors Program

The Honors Program, which has been active in the School of Science since 1959, is coordinated with programs in other Schools and administered by the Director of the University Honors Program. (See page 28). Information concerning eligibility and application forms may be obtained from the Director. Each department in the School of Science will supply information concerning the departmental requirements in the Honors Program.

Grouping of Departments

With the explosive growth of science, beginning in the years following World War II and stimulated in the late 1950's, the activities of the School of Science at Oregon State University have become so diversified and extensive that the school has been informally divided into three sections:

Physical and Mathematical Sciences

The departments of Chemistry, Mathematics, Physics, Biochemistry and Biophysics, and Statistics aim (1) to provide a liberal training for students whose interests and capabilities enable them to pursue studies in these areas, (2) to stimulate the creativity through research of graduate students and more capable undergraduate students, and (3) to serve the University by providing instruction for students from other departments and schools whose training requires some knowledge of the physical environment and use of the methods of mathematics and statistics.

Biological Sciences

Opportunities at Oregon State University for the study of biological or life sciences at both the undergraduate and graduate levels are extensive. Students elect major programs in the departments of Botany, Entomology, Microbiology, or Zoology; or combination programs through the departments of General Science and Science Education. The several curricula provide for supporting work in mathematics and the physical sciences. Courses in biological oceanography, radiation biology, biochemistry, biophysics, and statistics, offered respectively in the departments of Oceanography, General Science, Biochemistry and Biophysics, and Statistics, may be included as electives in biological curricula. A special program is offered jointly by the Schools of Science and Agriculture for a graduate major or minor in Genetics. (See GRADUATE SCHOOL.)

Recent rapid extension of knowledge in the physical sciences has found immediate application in biological research and has permitted a burst of progress in the biological sciences. Courses at OSU are designed to provide thorough grounding in biological systems as rapidly as the student becomes able to accommodate them. Although meaningful progress in this direction may be made at the undergraduate level, complete accommodation often requires graduate study.

Earth Sciences

All branches of science are related in some way to the earth, but those specific divisions which deal with the earth directly are grouped under the general title EARTH SCIENCES. The divisions recognized for the purpose of specialized training are: Geography, Geology and Paleontology, Meteorology, and Oceanography. Students interested in undergraduate and advanced training in these areas have excellent opportunity through the comprehensive course offerings.

Special Programs

SPECIAL PROGRAMS in the School of Science provide: (1) opportunities of study in either broad or specialized curricula which involve two or more of the traditional departmental subject areas, (2) curricula for preprofessional programs which in most cases are supervised by committees representing the principal departments concerned, and (3) training for science teachers. Special Programs include General Science; Science Education; preprofessional programs in Dentistry, Dental Hygiene, Medicine, Medical Technology, Nursing, Veterinary Medicine.

Curricula in Science

Curricula are offered leading to the degree of Bachelor of Arts (B.A.), Bachelor of Science (B.S.), Master of Arts (M.A.), Master of Science (M.S.), and Doctor of Philosophy (Ph.D.). (See GRADUATE SCHOOL for statement of requirements for advanced degrees.)

General notes concerning school and institutional requirements for B.A. and B.S. degrees are listed below:

a. In recognition of the need for a balanced general education for those planning professional careers in science, none of the curricula in the School of Science requires more than 60% of the course hours to be in areas of science and in no instance is more than 40% of the work required in a single area; thus, in addition to receiving a firm foundation in the basic sciences, the student has liberal opportunity to elect courses in other fields.

b. All undergraduates must, unless exempt, complete the following work prior to the senior year; five terms of physical education, one term of hygiene, one year of English composition.

c. Each School of Science curriculum requires the student to meet the following minima: (1) one year of approved biological science; (2) one year of approved physical science; (3) one year of approved humanities; and (4) one year of approved social science. The one year requirement in each area is normally satisfied by completion of 3 courses for a minimum of 9 term hours of credit. To apply on requirement, all courses must be approved by both the major department and the Dean of Science.

d. For graduation, each student in the School of Science is required to maintain a minimum 2.00 GPA in his major field as well as to meet OSU institutional requirements. Some science curricula have requirements in excess of this minimum.

e. Unless otherwise indicated terms and hours for Research, Thesis, Reading and Conference, and Seminar are to be arranged.

ATMOSPHERIC SCIENCES

Graduate programs only are available in the atmospheric sciences. The M.A., M.S., and Ph.D. are offered with specialization in atmospheric physics, including radar meteorology and cloud and precipitation physics, in air pollution meteorology, in biometeorology, and in synoptic meteorology. The following undergraduate programs are recommended: that leading to the B.S. in Physics-Atmospheric Physics offered by the physics department, or one of the bachelor's programs in chemistry, engineering, or mathematics.

Atmospheric sciences may be chosen as a minor by graduate students majoring in other fields. Introductory courses are offered for students wishing a broad introduction to weather and climate.

BIOCHEMISTRY AND BIOPHYSICS

A major curriculum in biochemistry and biophysics is offered at the graduate level. Graduate students may work toward a master's or doctor's degree with specialization in either biochemistry or biophysics. Undergraduate majors in biochemistry and biophysics are offered in cooperation with the chemistry or physics department respectively. Undergraduate courses are also provided for those majoring in other fields.

Students working toward advanced degrees in other areas may elect minors in biochemistry or biophysics.

BOTANY

Undergraduate majors: general botany with emphasis, if desired, on one of the fields of the graduate majors.

Graduate majors: anatomy, cytology, ecology, forest pathology, genetics, morphology, mycology, nematology, palynology, plant pathology, plant virology, phycology, physiology, physiology of parasitism, systematic botany.

Freshman Year	Hours
General Chemistry (Ch 204,205,206)	15
Mathematics (Mth 110,111,112)	12
English Composition (Wr 121)	3
Approved courses in humanities or social sciences	9
Physical education	3
Officer education or other electives	6

Sophomore Year	
Organic Chemistry (Ch 226,227,228,229)	10
Biology (Bi 211,212,213)	15
English Composition (Wr 222)	3
Physical Education	3
Botany (Bot 321)	4
Approved courses in humanities or social sciences	9
Officer education or other electives	4

Junior Year	Hours
General Physics (Ph 201,202,203)	12
English Composition (Wr 323)	3
General Ecology (Bi 370)	5
Cell Physiology (Bi 360)	3
Cell Physiology Laboratory (Bi 361)	2
Genetics (Bi 341)	3
Genetics Laboratory (Bi 342)	2
Statistics (St 451)	3
Electives	15

Senior Year	
Upper division botany (Bot 331,341,371)	13
Foreign Language	9–12
Seminar	3
Botany courses in one field of graduate majors	9–13
Electives	7-14

CHEMISTRY

Undergraduate majors: chemistry (with emphasis, if desired, on one of the fields of the graduate majors), biochemistry.

Graduate majors: analytical chemistry, inorganic chemistry, organic chemistry, physical chemistry, nuclear and radiation chemistry.

Common Freshman Year	Hours
General Chemistry (Ch 204,205,206)	15
Mathematics (Mth 110,111,112)	12
English Composition (Wr 121)	3
[1]Selected required courses	9
Physical education	3
[2]Elective	3

Common Sophomore Year	
Organic Chemistry (Ch 334,335,336)	9
Organic Chemistry Lab (Ch 337,338)	4
Analytical Chemistry (Ch 320)	4
Wr 222	3
Mathematics (Mth 113,211,321)	12
General Physics (Ph 211,212,213)	12
Physical education	3
[1]Selected required courses or [2]Elective	4

Common Junior Year	
Analytical Chemistry (Ch 421,422 or 432)	8
Organic Chemistry Laboratory (Ch 339)	2
Physical Chemistry (Ch 440,441,442)	9
Wr 323	3
[1]Selected required courses	18-21
[3]Electives	11–8

Senior Year	
Approved upper division chemistry (Courses having prerequisite of 3 years of chemistry)	9
Experimental Physical Chemistry (Ch 443, 444,445)	6
Inorganic Chemistry (Ch 411,412)	6
[1]Selected required courses	9
[3]Electives	18

MAJOR IN BIOCHEMISTRY

See Common Freshman, Sophomore, Junior Years

Senior Year	Hours
Experimental Physical Chemistry (Ch 443, 444,445)	6
Biochemistry (BB 490,491,492,493,494,495)	15
Inorganic Chemistry (Ch 411,412)	6
[1] Selected required courses	9
[3]Electives	12

[1] Required courses which may be taken in any order include:
(a) Approved humanities courses (9 hours).
(b) Approved social science courses (9 hours).
(c) Approved biology courses (9 hours). Students having one year of biological science in high school may, by petition, reduce this requirement to 5 term hours.
(d) German, GL 50,51,52 (12 hours).

[2] Officer Education may be elected in the Freshman and Sophomore years. If not, students may take the elective courses at a later time.

[3] Students planning to major in chemistry are strongly advised to include Introductory Modern Physics (Ph 311,312,313), 9 hours. Those planning to major in biochemistry must include 9 hours of approved life sciences.

COMPUTER SCIENCE

Interdisciplinary programs in Computer Science are offered by departments in the Schools of Science and Engineering, both at the graduate and undergraduate levels. A curriculum leading to the B.S. in Engineering (Computer Science) is available through the Department of Electrical and Electronics Engineering (see page 132). Undergraduate majors in Mathematics may elect a computer science option from among those provided for the B.S. or B.A. degree in Mathematics. This option is designed to provide courses in the general areas of numerical analysis, systems programing, and mathematical design of computer systems. M.S. and Ph.D. programs with specialization within one of the many areas of computer-related research are available through Mathematics, Statistics, and Electrical and Electronics Engineering.

The Computer Center provides facilities for implementing interdisciplinary curricula and programs in Computer Science. The facilities of the Computer Center include several computers and associated units to support a variety of instructional, computational, and research activities. A Control Data Corporation 3300 computer system provides the primary support. A system of remotely located "on-line" consoles is undergoing continuing development to extend the services of this computer. Smaller machines available for instruction, computing services, and research include a PDP-8 and an ATHENA. A University-designed and constructed computer, NEBULA, is also available. In addition, the School of Engineering Simulation Laboratory has an EAI 690 Analog/Hybrid Computing System. Several analog computers are also available for use in instructional programs.

ENTOMOLOGY

Undergraduates wishing to specialize in entomology should take the entomology option listed under the curriculum for the Department of Zoology.

Graduate majors: entomology, applied entomology, forest entomology, systematic entomology, acarology, aquatic entomology, veterinary entomology, insect physiology, insect toxicology, plant virus transmission, insect ecology, and insect pathology.

GENERAL SCIENCE

Undergraduate majors: General Science with options in biological science, physical science, or earth science.

Graduate majors: Biological science, physical science, or earth science; or radiation biology, radiological physics, radiological health, history of science.

BIOLOGICAL SCIENCE OPTION

Freshman Year	Hours
General Chemistry (Ch 204,205,206)	15
Mathematics (Mth 110,111,112)	12
Approved humanities or social science	9
English Composition (Wr 121)	3
Physical education	3
Electives	6

Sophomore Year	
Organic Chemistry (Ch 226,227,228,229)	10
Biology (Bi 211,212,213)	15
Approved humanities or social science	9
English Composition (Wr 222)	3
Physical education	3
Electives	8

Junior Year	
Physics (Ph 201,202,203)	12
General Ecology (Bi 370)	5
Cell Physiology (Bi 360)	3
Cell Physiology Laboratory (Bi 361)	2
Genetics (Bi 341)	3
Genetics Laboratory (Bi 342)	2
English Composition (Wr 323)	3
Departmental requirements, electives	18

Senior Year	
Approved upper division courses in biology	12
History of Science (GS 411,412 or 413)	6
Philosophy of Science (Phl 470 or 471)	3
Seminar (GS 407)	1
Electives	26

OTHER DEPARTMENTAL OPTIONS

Common Freshman Year	Hours
General chemistry	9–15
Approved mathematics	12
English Composition (Wr 121)	3
Foreign language	12
Physical education	3
Electives	3–9

Common Sophomore Year	
Biological science	12–15
General Physics (Ph 201,202,203)	12
English Composition (Wr 222)	3
Approved humanities courses	6
Physical education and hygiene	3–4
Electives	8–12

Physical Science

Junior Year	Hours
Mathematics through Mth 211	4–12
Approved sequence in upper division physical science	9–12
English Composition (Wr 323)	3
Approved social science courses	9
Electives	12–23

Senior Year	
Approved courses in upper division physical science	12–15
History of Science (GS 411,412, or 413)	6
Philosophy of Science (Phl 470 or 471)	3
Seminar (GS 407)	1
Electives	24–26

Earth Science

Junior Year	Hours
Geology (G 201,202,203,204,205,206)	12
Meteorology (AtS 101)	1
Approved sequence in upper division earth science	9–12
English Composition (Wr 323)	3
Approved courses in social sciences	9
Electives	11–14

Senior Year	
Approved courses in upper division earth science	12–15
History of Science (GS 411,412 or 413)	6
Philosophy of Science (Phl 470 or 471)	3
Seminar (GS 407)	1
Electives	24–26

GEOGRAPHY

Undergraduate major: Geography
Graduate major and minor: physical geography or resource geography

Freshman Year	Hours
English Composition (Wr 121)	3
Approved courses in physical or biological sciences	9-12
Approved courses in social science	9
Mathematics (Mth 111)	4
Introduction to Physical Geography (Ggs 227)	5
Physical education	3
Officer education or other electives	12-15

Sophomore Year	
English Composition (Wr 222)	3
Approved courses in humanities	9
Maps and Map Interpretation (Ggs 261)	3
Approved courses in biological or physical sciences	9-12
Systematic Cultural Geography (Geog 321,322,323)	9
Physical education	3
Officer education or other electives	9-12

Junior Year	
English Composition (Wr 323)	3
Physical Geography (Ggs 327,328,329)	12
Cartography (Ggs 360)	4
Techniques of Field Research (Ggs 361)	5
Statistics (St 311,312)	6
Electives	18

Senior Year	
Geographic Photinterpretation (Ggs 413)	3
World Resources (Ggs 421,422,423)	9
Courses in Economic Geography (Geog 480,481, or 482)	8
Approved upper division sequence other than geography	9
Electives	19

GEOLOGY

Undergraduate and graduate majors: Geology, Paleontology.
Graduate majors: area geology, economic geology, structural geology, petrology, sedimentology, stratigraphy, invertebrate paleontology, micropaleontology, palynology.

MAJOR IN GEOLOGY

Freshman Year	Hours
English Composition (Wr 121)	3
Approved courses in humanities and social sciences	6
Geology (G 201,202,203)	9
Geology laboratory (G 204,205,206)	3
General Chemistry (Ch 201,202,203)	9
Mathematics (Mth 111)	4
Physical education	3
Officer education and other electives	11

Sophomore Year	
English Composition (Wr 222)	3
Mineralogy and Rock Study (G 312,313, 314)	12
Approved courses in humanities and social sciences	6
General Physics (Ph 201,202,203)	12
Physical education	3
Officer education and other electives	12

Junior Year	Hours
English Composition (Wr 323)	3
Structural Geology (G 321)	4
Geomorphology (G 322)	4
Photogeology (G 323)	4
Approved courses in humanities and social sciences	6
Field Methods (G 380)	3
Electives	24

An approved field course of at least 9 credit hours required for graduate training.

Senior Year	
Petrography (G 412,413,414)	12
Seminar (G 407)	3
Paleontology or other biological sciences	9-12
Electives	21-24

MAJOR IN PALEONTOLOGY

Students majoring in paleontology follow the geology curriculum but substitute zoology for physics.

MATHEMATICS

Undergraduate majors: mathematics with emphasis on any of the fields of the graduate majors; actuarial mathematics, computer science, secondary teaching.

Graduate majors: analysis, algebra, geometry, applied mathematics, computer science.

Freshman Year	Hours
Mathematics (Mth 110,111,112)	12
Approved courses in biological sciences	9
English Composition (Wr 121)	3
Physical education	3
Officer education or other elective	21

Sophomore Year	
Mathematics (Mth 113,211,311)	12
Approved social science courses	9
Approved physical science courses	9
English Composition (Wr 222)	3
Physical education	3
Officer education or other electives	12

Junior Year	
Upper division mathematics	18
Approved humanities courses	9
English Composition (Wr 323)	3
Electives	18

Senior Year	
Approved senior mathematics sequence	9
Electives	39

MICROBIOLOGY

Undergraduate majors: microbiology or environmental microbiology.
Graduate majors: microbial physiology, molecular biology, microbial genetics, virology, pathogenic microbiology, soil microbiology, industrial microbiology, food and dairy microbiology, marine and fresh water microbiology.

Freshman Year	Hours
General Chemistry (Ch 204,205,206)	15
Mathematics (Mth 110,111,112)	12
Approved humanities or social sciences	9
English Composition (Wr 121)	3
Physical education	3
Electives	6
	48

Sophomore Year	
Organic Chemistry (Ch 226,227,228,229)	10
Biology (Bi 211,212,213)	15
Quantitative Analysis (Ch 234)	4
General Microbiology (Mb 304)	5
English Composition (Wr 222)	3
Approved humanities or social science	3
Physical education	3
Electives	5
	48

Junior Year	Hours
General Microbiology (Mb 305 or 306 as approved by adviser)	4 or 5
General Physics (Ph 201,202,203)	12
English Composition (Wr 323)	3
Elementary Physical Chemistry (Ch 340)	3
Approved humanities or social science	6
[1]Approved upper division microbiology	15
Electives	3 or 4
	48

Senior Year	
[1]Approved upper division microbiology	11
Seminar (Mb 407)	3
Electives (mathematics, modern language, chemistry, and biology for those planning for advanced studies in microbiology)	34
	48

ENVIRONMENTAL MICROBIOLOGY

Freshman Year	Hours
English Composition (Wr 121)	3
General Chemistry (Ch 204,205,206)	15
Mathematics (Mth 60)	2
Approved courses in humanities or social sciences	9
Physical education	3
Electives	16
	48

[1] Approved biological science, biochemistry, and biophysics courses may be substituted for upper division microbiology.

Sophomore Year

Organic Chemistry (Ch 226,227,228,229)	10
General Biology (Bi 211)	5
Quantitative Analysis (Ch 234)	4
General Microbiology (Mb 304,306)	10
English Composition (Wr 222)	3
Approved courses in humanities or social sciences	9
Physical education	3
Electives	4
	48

Junior Year

General Physics (Ph 201,202,203)	12
English Composition (Wr 323)	3
[1]Approved upper division microbiology	15
Electives	18
	48

Senior Year

Seminar (Mb 407)	3
[1]Approved upper division microbiology	15
Electives	30
	48

[1] Recommended courses include Mb 430,431, 440,442,444, and 450.

OCEANOGRAPHY

Oceanography grants only graduate degrees with specialization in the fields of physical, geological, geophysical, chemical, or biological oceanography, or in geophysics. Preparation should include: (1) a bachelor's degree in one of the following: a physical or biological science, mathematics, or engineering; (2) mathematics through calculus; (3) general chemistry; and (4) general physics.

Students working for a bachelor's degree in one of the other departments of the School of Science can register for a full year's upper division work in oceanography if their program permits.

PHYSICS

Undergraduate majors: physics (with emphasis, if desired, in one of the allied fields (atmospheric physics, biophysics, geophysics, physical oceanography, or science administration).

Graduate majors: Atomic physics, nuclear physics, particle physics, solid state physics, theoretical physics.

Freshman Year *Hours*

Physics I (Ph 221,222,223) *or* General Physics I (Ph 211,212,213)	15–12
Calculus (Mth 111,1112,113)	12
General Chemistry (Ch 201,202,203) or General Chemistry (Ch 204,205,206)	9–15
English Composition (Wr 121)	3
Approved courses in humanities or social sciences	6
Physical education	3
Officer education or other electives	3–0

Sophomore Year

Physics II (Ph 321,322,323) .... or General Physics II (Ph 311,312,313)	12-9
Calculus of Several Variables (Mth 211)	4
Applied Differential Equations (Mth 321, 322)	8
Approved sequence in biological sciences	9
English Composition (Wr 222)	3
Approved courses in humanities and social sciences	6
Physical education	3
Officer education or electives	3

Junior Year

Approved courses in physics	12–21
Approved electives	9–0
English Composition (Wr 323)	3
Approved courses in humanities or social sciences	6
Electives	18

Senior Year

Approved courses in physics	12–21
Approved electives	18–9
Electives	18

Graduation Requirement in Physics:
24 hours of 400-level physics courses.

Students interested in **pure physics** and planning to go on to do graduate work in physics are encouraged to take Ph 424, 425, 426, 431, 432, 433, 451, 452, 481, 482, 483, and additional courses in mathematics and foreign languages.

Students interested in **atmospheric physics, biophysics, geophysics, or physical oceanography** are encouraged to take in addition to the 24 hours of approved 400-level physics courses, as many as possible of the courses listed below:

(a) *Atmospheric physics:* Ch 440, 441, 442; AtS 302, 303, 412, 421, 422, 441, 471.
(b) *Biophysics:* Ch 334, 335, 336, 337, 440, 441, 442, 443, 444, 445; BB 331, 332, 333.
(c) *Geophysics:* G 201, 202, 203, 204, 205, 206; Oc 461, 471, 480.
(d) *Physical Oceanography:* G 201, 202, 203, 204, 205, 206, Oc 461, 471, 480.

CURRICULUM IN ENGINEERING PHYSICS

Students electing the program in engineering physics should register in the School of Engineering.

SCIENCE EDUCATION

Preparation for prospective teachers of biological and physical sciences 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 of 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 program see SCHOOL OF EDUCATION pages 120 and 121.

STATISTICS

A major curriculum in statistics is offered at the graduate level only, although undergraduate courses are provided for those majoring in other fields. Graduate students may work toward a master's or doctor's degree with specialization in the areas of theory of statistics, operations research, biometry, experimental design, sampling techniques, and applied statistics.

Students working toward advanced degrees in other areas may elect minors in statistics, biometry, or operations research. Students majoring in statistics may minor in biometry or operations research.

ZOOLOGY

Undergraduate major: Zoology

Graduate majors: anatomy and embryology, physiology, invertebrate zoology, parasitology, cellular biology, genetics, natural history, and ecology.

Freshman Year *Hours*

General Chemistry (Ch 204,205,206)	15
Mathematics (Mth 110,111,112)	12
English Composition (Wr 121)	3
Approved courses in humanities or social sciences	9
Physical education	3
Officer education or other electives	6

Sophomore Year

Organic Chemistry (Ch 226,227,228,229)	10
Biology (Bi 211,212,213)	15
English Composition (Wr 222)	3
Approved courses in humanities or social sciences	9
Physical education	3
Officer education or other electives	8

Junior Year

English Composition (Wr 323)	3
Genetics (Bi 341,342)	5
General Ecology (Bi 370)	5
Cell Physiology (Bi 360,361)	5
[1]Physics (Ph 201,202,203)	12
Modern language	9-12
Electives	6-9

Senior Year

Invertebrate Biology (Z 351)	5
Vertebrate Biology (Z 371)	5
Developmental Biology (Z 425, 426)	5
[2]Required Zoology Options	8–10
Electives	23–25

Entomology Option

Junior Year

English Composition (Wr 323)	3
Genetics (Bi 341,342)	5
General Ecology (Bi 370)	5
Cell Physiology (Bi 360,361)	5
[1]Physics (Ph 201,202,203)	12
Modern language	9-12
General Entomology (Ent 314)	4
Electives	2-5

Senior Year

Invertebrate Zoology (Z 451,452)	10
Developmental Biology (Z 425)	5
Statistics	3
Entomology (Ent 416,450,475)	11
Electives (including 3-4 hours of botany)	19

[1] Students with an adequate background in physics are encouraged to substitute BB 331,332, 333.

[2] Senior year zoology options: One course required from each of following two groups: *Group I:* Z 324, 325, 326, 461. *Group II:* Z 431, 432, 434, 435.

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

The School of Science offers a three-year predental curriculum which satisfies 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 three-year curriculum may qualify for a bachelor's degree from Oregon State after one year at dental school. A combined predental and pharmacy curriculum is available through the School of Pharmacy.

Counselors for predental students are Dr. A. W. Pritchard, professor of zoology, chairman; Dr. H. D. Reese, associate professor of chemistry; Dr. D. J. Griffiths, assistant professor of physics; Dr. Ken Johnson, D.M.D., and Dr. Frank C. Morris, D.M.D.

THREE-YEAR PREDENTAL CURRICULUM

Freshman Year	Hours
General Chemistry (Ch 204,205,206)	15
Anal Geometry and Calculus (Mth 110, 111,112)	12
English Composition (Wr 121)	3
Approved humanities or social sciences	9
Physical education	3
Officer education or other electives	6

Sophomore Year	
Organic Chemistry (Ch 226,227,228,229)	10
Biology (Bi 211,212,213)	15
English Composition (Wr 222)	3
Approved humanities or social sciences	9
Physical education	3
Officer education or other electives	9

Junior Year	
Comparative Vert Embryology (Z 324)	4
Genetics (Bi 341)	3
General Physics (Ph 201,202,203)	12
Quantitative Analysis (Ch 234)	4
English Composition (Wr 323)	3
Electives	22

Senior Year

Students may choose to enter dental school after their junior year. Those who do not should plan their senior year in consultation with a predental advisor. Stress should be placed on acquiring proficiency in a major field of interest within the sciences. The following is a list of suggested upper division science courses from which to select hours to complete the school requirement for 24 upper division hours in science: Histology (Z 461), Cell Physiology (Bi 360,361), Animal Physiology (Z 431,432 or Z 431,435), Microbial Physiology (Mb 550), General Ecology (Bi 370), Developmental Biology (Z 425), Radiation Biology (GS 451,542,543), Introduction to Statistics (St 311,312), X-Ray Technology (GS 461,462,463), Biophysics (BB 331, 332,333), Physical Chemistry (Ch 423,424, 425).

Dental Hygiene

Students wishing to combine the two-year dental hygiene program at the University of Oregon Dental School with one designed to meet requirements for a bachelor's degree may attend OSU the freshman and senior years, or for two years following completion of dental school training. The first option is recommended and forms the basis for the following curriculum.

Counselor for predental hygiene students is DR. A. W. PRITCHARD, Professor of Zoology.

DENTAL HYGIENE CURRICULUM

Freshman Year	Hours
English Composition (Wr 121)	3
Approved biological science sequence	9-12
Sequence in general chemistry	9–12
Approved courses in social science	9
Physical education	3
Electives	3-9

Sophomore and Junior Years (Dental School)	Hours
Dental hygiene program	102

Senior Year	
Upper division science courses	10-15
Approved courses in humanities	9
Electives	22-29

Medicine and Medical Technology

The School of Science offers a premedical curriculum preparing for entrance into standard medical schools. A combined premedical and pharmacy curriculum is available through the School of Pharmacy.

The medical college admission test of the Association of American Medical Colleges is given each spring and fall 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. R. H. ALVARADO, Associate Professor of Zoology, Chairman; DR. R. R. BECKER, Professor of Biochemistry; Dr. F. W. DECKER, Associate Professor of Physics; DR. R. L. GOULDING, Associate Professor of Entomology; LEWIS J. KRAKAUER, M.D.

PREMEDICAL CURRICULUM

The curriculum prescribed below satisfies the entrance requirements of standard medical schools in the United States. The University of Oregon Medical School requires at least three academic years of preparatory work (138 term hours exclusive of credit in military science) for admission. However, the majority of entering medical students have had four years of preparatory work.

Freshman Year	Hours
English Composition (Wr 121)	3
General Chemistry (Ch 204,205,206)	15
Mathematics (Mth 110,111,112)	12
Humanities or social science	9
Physical education	3
Electives	6

Sophomore Year	
English Composition (Wr 222)	3
Organic Chemistry (Ch 226,227,228,229)	10
General Physics (Ph 201,202,203)	12
Biology (Bi 211,212,213)	15
Humanities or social science	6
Physical education	3

Junior Year	
English Composition (Wr 323)	3
Quantitative Analysis (Ch 234)	4
Comparative Vertebrate Embryology (Z 324)	4
Genetics (Bi 341)	3
Humanities or social science	3
Foreign language	12
Electives	19

Senior Year

Students who undertake a four-year program should plan their senior year in consultation with a premedical adviser. Of the 48 hours to be taken during the senior year, 24 hours should be selected from the following courses or approved equivalents: Comparative Histology (Z 461), Physiology (Z 431,432, or Z 434,435), Parasitology (Z 456), General Ecology (Bi 370), Cell Physiology (Bi 360,361), Statistical Inference (St 421,422,423), Radiation Biology (GS 451,542,543), X-Ray Technology, (GS 461,462, 463), Biophysics (BB 331,332,333), Applied Differential Equations (Mth 321,322,323), Physical Chemistry (Ch 440,441,442 or Ch 423, 424,425).

Foreign language is not specifically required for admission to the University of Oregon Medical School; however, several medical schools have such a requirement. Students anticipating research in the medical sciences are advised to acquire a basic knowledge of German and French. Knowledge of a major foreign language is also recommended as a part of the cultural training of all prospective physicians.

At least 25 percent of all chemistry credit must be for laboratory work. Organic chemistry must include the chemistry of both aliphatic and aromatic compounds. Biochemistry will not satisfy the chemistry requirements.

Major in Science at Oregon State

The prospective medical student is urged to pursue a four-year program. Upon completion of the curriculum prescribed above, the student will be eligible for a Bachelor of Science degree in General Science or, if the appropriate courses are taken as electives, in a specific discipline such as chemistry, zoology, or mathematics.

Students enrolled in the curriculum prescribed above may enter medical school after their junior year. Before entering, the student should satisfy all requirements for senior standing and any other degree requirements which cannot be satisfied at the medical school. The first year of medical school may be counted in lieu of fourth year of undergraduate residence. Hours (48-hour maximum) taken during the first year of medical school will apply toward a general science major. Medical school biochemistry may be applied toward a major in chemistry, and physiology toward a degree in zoology. Most medical schools require that students have a bachelor's degree before beginning the third year there.

MEDICAL TECHNOLOGY

The first three years of the curriculum in medical technology as given in regular courses at Oregon State University satisfy the new minimum requirements of the American Society of Clinical Pathologists. The fourth year includes additional courses needed to qualify for the B.S. degree in medical technology. These are offered at the University of Oregon Medical School. The counselors for students pursuing this curriculum are Professor K. S. Pilcher of the Department of Microbiology, and Associate Professor F. L. Hisaw, Jr. of the Department of Zoology. A combined medical technology and pharmacy curriculum is available through the School of Pharmacy.

The following curriculum is suggested as meeting the new requirements of the American Society of Clinical Pathologists for admission to approved training schools which became effective January 1, 1962. All approved schools of medical technology now require three years of college work and some a bachelor's degree. 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.

Students who wish to take a longer period of time to fulfill medical technology requirements may do so with approval of the adviser.

Freshman Year	Hours
General Chemistry (Ch 204,205,206)	15
English Composition (Wr 121)	3
General Zoology (Z 201,202,203)	9
Mathematics for Biological, Management, and Social Sciences (Mth 161 or Mth 110)	4
Physical education	2
General Hygiene (PE 160)	2
Approved electives	13

Sophomore Year	
General Microbiology (Mb 304,305)	9
Organic Chemistry (Ch 334,335,336,337, 338)	13
Abridged General Physics (Ph 111,112)	6
English Composition (Wr 222)	3
Approved humanities courses	9
Physical education	3
Approved electives	5

Junior Year	
Quantitative Analysis (Ch 234)	4
Pathogenic Microbiology (Mb 430,431)	5
Physiology (Z 431,432)	8
English Composition (Wr 323)	3
Approved social science courses	9
Approved science and other electives	19

Senior Year
Medical School

Medical technology 50

Mb 432, 433, Immunology and Serology and Ch 340, Elementary Physical Chemistry are recommended electives.

NURSING

Oregon State offers the one year of prenursing required for entrance into the University of Oregon School of Nursing in Portland. Director of the School is Miss

Jean E. Boyle; adviser of students in the prenursing program is Miss Guhli Olson.

Freshman Year	Hours
English Composition (Wr 111,112,113)	9
Literature (Eng 101,102,103 or 104,105, 106 or 107,108,109)	9
General Chemistry (Ch 104,105,106 or Ch 201,202,203 or Ch 204,205,206)	9–15
Speech (Sp 111)	3
Nutrition (FN 225)	3
Electives (history, language, social science, anthropology, and Backgrounds for Nursing (Nur 111) recommended)	12
Physical education	3

VETERINARY MEDICINE

The School of Science offers a two-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 two-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. Curriculum and electives must be adapted to meet the specific requirements for admission into the chosen professional school of veterinary medicine.

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 advisers for preveterinary students on this campus are Drs. K. J. Peterson and J. R. Harr.

PREVETERINARY CURRICULUM

Freshman Year	Hours
Mathematics (Mth 111)	4
English Composition (Wr 111,112,113)	9
General Chemistry (Ch 204,205,206)	15
General Zoology (Z 201,202,203)	9
Approved humanities and social science courses	6
Physical education	3
Officer education or other electives	3
Sophomore Year	
General Physics (Ph 201,202,203)	12
Organic Chemistry (Ch 226,227,228,229)	10
Comparative Vertebrate Embryology (Z 324)	4
General Botany (Bot 201,202)	8
Approved humanities and social science courses	12
Physical education	3
Officer education or other electives	3

Courses in Science

ATMOSPHERIC SCIENCES

The study of the atmosphere has, in recent years, been conducted on a broader base than formerly. At one time it was thought that all the significant processes were physical in nature and that they occurred in the lower atmosphere. It is now known that important chemical processes occur in the natural atmosphere as well as in contaminated portions, that the atmosphere influences and is influenced by various biological organisms, and that the atmosphere is important in many engineering problems, as in wind loading of structures, control of air pollution, the re-entry of space vehicles into the high atmosphere, and in other ways. Thus, there are, in addition to atmospheric physics, other subdisciplines such as atmospheric chemistry, atmospheric biology or biometeorology, engineering meteorology, and aeronomy, the science of the high atmosphere. Because of this broadening, it is becoming customary to refer to this more comprehensive group of disciplines as the atmospheric sciences rather than meteorology.

There are numerous employment opportunities for graduates with strong atmospheric sciences backgrounds in the Federal Government, in industry, in university teaching, in research, and as private consultants. The more responsible positions generally require the M.A., M.S., or Ph.D.

Lower Division Course

AtS 101. 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.

Upper Division Courses
Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

AtS 302. Basic Meteorology.
3 hours fall. 3 ①
Elementary statics, thermodynamics, and dynamics of the atmosphere; phase changes of water; the general circulation. Prerequisite: Ph 201 or 211.

AtS 303. Basic Meteorology.
3 hours winter. 3 ①
Weather and motion systems, including severe storms; mesoscale systems; introduction to weather analysis and forecasting systems. Prerequisite: AtS 302.

AtS 392. Weather and Human Interactions.
3 hours spring. 3 ①
Man's adaptation to weather processes and his attempts to modify the weather; meteorological services and their problem-solving approaches to the needs of agriculture, industry, transportation, the military and recreation; weather elements and typical variations according to time of day, season, storm passage, and geographic location.

AtS 401. Research.
AtS 403. Thesis.
AtS 405. Reading and Conference.
AtS 406. Projects.
AtS 407. Seminar.
Terms and hours to be arranged.

AtS 412. Physical Climatology. (G)
3 hours fall. 3 ①
Physical processes leading to climatic types; theories of climatic change; classification of climates. Prerequisite: AtS 302.

AtS 413. Climatology Laboratory. (G)
2 hours winter. 2 ③
Analysis, interpretation, and application of standard and special climatological data. Prerequisite: AtS 412; St 311.

AtS 421. Atmospheric Thermodynamics. (G) 3 hours fall. 3 ①
Equation of state; dry and saturated adiabatic processes; stability, thermodynamic charts. Prerequisite: Mth 113; Ph 213.

AtS 422. Atmospheric Radiative Processes. (G) 3 hours winter. 3 ①
Nature of radiation; solar and terrestrial radiation; satellite measurements of solar and terrestrial radiation. Prerequisite or concurrent: Mth 211; Ph 213.

AtS 424. Geophysical Fluid Mechanics. (G)
3 hours spring. 3 ①
Kinematics, dynamics, and thermodynamics of idealized geophysical systems; inertial flow. Prerequisite or concurrent: Mth 321.

AtS 425. Atmospheric Mechanics. (G)
3 hours fall. 3 ①
Equations of motion for a rotating system; statics and kinematics; vorticity; motion under balanced forces. Prerequisite or concurrent: AtS 424; Mth 322.

AtS 426. Atmospheric Dynamics. (G)
3 hours winter. 3 ①
The Navier-Stokes equations for atmospheric flow; approximate forms; frictional forces. Prerequisite or concurrent: AtS 425; Mth 487.

AtS 433. Weather Analysis Laboratory. (G)
3 hours fall. 3 ②
Weather map plotting and analysis; three-dimensional structure of fronts and atmospheric waves. Prerequisite or concurrent: AtS 303.

AtS 434. Weather Analysis Laboratory. (G)
3 hours winter. 3 ②
Determination of the fields of atmospheric vorticity, divergence, vertical velocity, and advection by graphical and numerical techniques. Prerequisite or concurrent: AtS 433.

AtS 441. Atmospheric Physics. (G)
3 hours spring. 3 ①
Structure and composition of clouds and precipitation; nucleation processes; introduction to weather modification. Prerequisite or concurrent: AtS 421,422.

AtS 451. Introductory Atmospheric Chemistry. (G)
3 hours fall. 2 ① 1 ③
Essential chemical concepts; chemistry of the following elements as related to natural processes: sulfur, nitrogen, carbon both organic and inorganic; photochemistry. Prerequisite: Ch 203 or 206.

AtS 471. Atmospheric Measurements. (G)
2 hours fall. 2 ①
Principles of measurement; methods of measuring surface pressure, temperature, humidity, precipitation, wind, and radiation; upper air measurements. Prerequisite: Mth 113; Ph 213.

AtS 472. Atmospheric Measurements Laboratory. (G)
2 hours winter. 2 ②
Laboratory analysis of the response characteristics of single instruments and of instrument systems. Prerequisite: AtS 471 or F 536.

AtS 482. Micrometeorology. (G)
3 hours winter. 3 ①
Temperature, humidity, and wind and turbulence structure near the ground; topoclimates; soil influences. Prerequisite or concurrent: Ph 201 or 211.

AtS 491. Introduction to Biometeorology. (G)
3 hours spring. 3 ①
Energy budgets near the earth's surface; response of plants, animals, and humans to atmospheric processes. Prerequisite: AtS 482; Bot 201 or GS 103.

AtS 492. Air Pollution Meteorology. (G)
4 hours fall. 4 ①
Aspects of weather and climate significant for air pollution analysis and control; wind variations in time and space; atmospheric stability and inversions; stagnant anticyclones; atmospheric dispersion equations; patterns of urban pollution dispersion; natural cleansing processes; meteorological factors in plant location, design, and operation. Prerequisite: Mth 211; Ph 213.

AtS 501. Research.
AtS 503. Thesis.
AtS 505. Reading and Conference.
AtS 506. Projects.
AtS 507. Seminar.
Terms and hours to be arranged.

AtS 527. Advanced Atmospheric Dynamics.
3 hours spring. 3 ①
Atmospheric wave motions; wave types: gravity, inertia, and Rossby; quasigeostrophic flow; computation of horizontal divergence and vertical velocity. Prerequisite: AtS 425; Mth 425.

AtS 535. Advanced Weather Analysis Laboratory.
3 hours spring. 3 ③
Selected weather situations; use of weather satellite photographs; introduction to numerical weather prediction. Prerequisite: AtS 434.

AtS 536. Numerical Weather Analysis and Prediction.
3 hours winter. 3 ①
Numerical analysis as applied to meteorology; filtering approximations; truncation errors; use of the primitive equations; numerical prediction of the motion and development of major weather systems. Prerequisite: Mth 487; AtS 426. Offered alternate years. Offered 1970-71.

AtS 543,544. Radar Meteorology.
3 hours winter and spring. 3 ①
AtS 543: Principles of microwave electromagnetic propagation in the atmosphere. Corequisite: AtS 441. *AtS 544:* Weather radar analyses to observe precipitation patterns, wind, and flight hazards. Prerequisite: AtS 543. Sequence offered alternate years. Offered 1970-71.

AtS 552. Atmospheric Chemistry.
3 hours winter. 3 ①
Physical chemistry of atmospheric aerosols; drag and radiometric forces; electrical effects; microscopy. Prerequisite: AtS 451.

AtS 553. Atmospheric Chemistry.
3 hours spring. 3 ①
Light scattering by particles: Rayleigh, Mie, and Fraunhofer; Brownian motion; diffusion, coagulation of aerosols. Prerequisite: AtS 552.

AtS 581. Atmospheric Dispersion.
3 hours winter. 3 ①
Dispersion processes; atmospheric turbulence; turbulent diffusion; distribution of windborne material from various sources. Prerequisite: Mth 321; AtS 492.

AtS 583. Advanced Micrometeorology.
3 hours spring. 3 ①
Heat, mass, and momentum transfer in the atmospheric boundary layer; statistical theory of turbulence; convection, forced and free; evaporation and diffusion. Prerequisite: AtS 426, 482. Offered alternate years. Offered 1970-71.

AtS 587. Mesometeorology.
3 hours spring. 3 ①
Mathematical-physical modeling of local wind systems such as lake and sea breezes, slope and valley winds, and convective columns and clouds. Corequisite: AtS 426. Offered alternate years. Offered 1970-71.

BIOCHEMISTRY AND BIOPHYSICS

The Department of Biochemistry and Biophysics offers undergraduate service courses, and graduate courses and programs leading to the M.A., M.S., or Ph.D. degrees in biochemistry or biophysics, or to a minor for an advanced degree in other fields.

Students wishing to pursue graduate study and research should have an undergraduate major in the physical sciences with some knowledge in the biological sciences, or an undergraduate major in the biological sciences with strong supporting courses in the physical sciences.

Upper Division Courses
Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

BB 331,332,333. Introduction to Biophysics.
3 hours each term. 3 ①
An elementary course in biophysics for students who desire a descriptive acquaintance with molecular biophysics. Prerequisite: Ch 203 or 206; Mth 60.

BB 350. Elementary Biochemistry.
4 hours. 4 ①
Service course for students desiring a short introduction to biochemistry. Prerequisite: Ch 227 or equivalent.

BB 401. Research.
Terms and hours to be arranged.

BB 405. Reading and Conference.
Terms and hours to be arranged.

BB 450,451,452. General Biochemistry. (g)
4 hours fall, 3 hours winter and spring. 4 ①, 3 ①, 3 ①
Service courses in biochemistry; physical chemical principles; physical and organic chemistry in biochemistry. Prerequisite: Ch 228 or equivalent.

BB 461,462. General Biophysics. (g)
3 hours each term. 3 ①
Service course in biophysics to provide an elementary knowledge of important biological interactions and processes as investigated by physical methods. Prerequisite: general chemistry; general physics; calculus.

BB 490,491,492. Biochemistry. (G)
3 hours each term. 3 ①
Professional course to meet the requirements of majors in biochemistry. Prerequisite: Ch 336; Ch 425; or Ch 442.

BB 493,494,495. Biochemistry Laboratory. (G)
2 hours each term. 2 ③
Laboratory to accompany BB 450,451,452 or BB 490,491,492.

Graduate Courses
See also courses marked (g) and (G) above.
BB 501. Research
BB 503. Thesis.
BB 505. Reading and Conference.
BB 507. Seminar.
Terms and hours to be arranged.

BB 550,551,552. Selected Topics in Biochemistry.
3 hours each term. 3 ①
Nonsequence courses designed to acquaint student with recent advances in biochemistry. Topics: Proteins, Nucleic Acids every year. Alternate years. Carbohydrates, Lipids, Intermediary Metabolism, Biological Oxidations, Enzymes, and Nutrition. Prerequisite: BB 492 or permission of instructor.

BB 553. Plant Biochemistry.
3 hours spring. 3 ①
Chemical processes and metabolism in plant systems. Prerequisite: BB 492 or consent of instructor.

BB 554. Plant Biochemistry Laboratory.
2 hours spring. 2 ③
A laboratory course to accompany BB 553, to demonstrate the use of biochemical tools for studying plant materials.

BB 561,562,563. Biophysics.
2 hours each term. 2 ①
Quantitative properties of biological systems and biological phenomena using concepts derived from mathematics and physics. Prerequisite: Ch 442.

BB 564. Physical Methods in Biophysics and Biochemistry.
3 hours spring. 3 ①
Important techniques for studying biopolymers and biological systems. Prerequisite: BB 563; Quantum Theory.

BB 565. Selected Topics in Biophysics.
3 hours spring. 3 ①
Nonsequence course designed to acquaint student with recent advances in biophysics. Prerequisite: BB 563.

BB 580T. Biochemistry for Science Teachers.
3 hours summer. 3 ①
Introduction to biochemistry for high school or college teachers. Designed to acquaint teachers with molecular concepts and fundamentals of biochemistry. Prerequisite: Organic chemistry.

GENERAL BIOLOGICAL SCIENCE

Courses with a Bi designator will be accepted for major credit by the departments of botany, entomology, general science, microbiology, and zoology.

Lower Division Courses

Bi 211,212,213. **Biology.**
5 hours each term. 3 ①, 1 ③, 1 ①
211: Cellular structure, organization and function. *212:* Genetics, comparative physiology and developmental biology. *212:* Behavior, population, community and ecosystem dynamics, plant and animal evolution. Prerequisite: Mth 110; corequisite: Ch 226.

Upper Division Courses

Bi 341. **Genetics.**
3 hours fall or spring. 3 ①
The gene as basis of variation and heredity; principles of genetics. Prerequisite: general chemistry and biology, botany, or zoology. ROBERTS, DAWSON.

Bi 342. **Genetics Laboratory.**
2 hours fall or spring. 2 ③
Experiments demonstrating Mendelian principles, crossing-over, mutation, and other attributes of the genetic material. Prerequisite: Bi 341. ROBERTS, DAWSON.

Bi 360. **Cell Physiology.**
3 hours winter. 3 ①
Relationship between structural components and chemical organization of the cell: Bioenergetics, cell morphogenesis, cell permeability, cell replication, cell specialization, and cell senescence. Prerequisite: one year of biological science.

Bi 361. **Cell Physiology Laboratory.**
2 hours spring. 2 ③
The dynamic relationship between the structural components of the cell and its internal physico-chemical organization. Prerequisite: Bi 360.

Bi 370. **General Ecology.**
5 hours fall or spring. 3 ①, 1 ①, 1 ③
The biology of ecosystems: energy, patterns of ecosystems and populations, interspecies interactions, diversity, and development. Prerequisite: one year of biological science.

BOTANY

Courses offered provide a basis for a liberal arts major in botany or comprehensive and advanced training for majors who intend to enter any of the professional fields. Undergraduate majors do not specialize but obtain thorough grounding in fundamental botany that will enable them to work in various specialized areas of botany or plant pathology or in related fields in forestry or agriculture. Students are encouraged to broaden their training by taking a range of courses in related sciences and in the humanities. Qualified students interested in entering professional fields of botany or plant pathology should plan to take additional training beyond the baccalaureate degree since, for most positions, an M.A., M.S., or a Ph.D. degree is a prerequisite.

The undergraduate curriculum is intended to qualify major students for (1) graduate work in various areas of botany or in plant pathology, (2) certain state or federal civil service positions, (3) teaching positions in secondary schools. Graduate programs are designed to qualify students for teaching positions in colleges or universities or for research positions in industry or with units of the Federal Government such as the Agricultural Research Service, the Forest Service, or the Public Health Service.

An extensive or diversified research program offers an opportunity for undergraduate experience in research and for a variety of types of specialized graduate training.

Lower Division Courses

Bot 201,202,203. **General Botany.**
4 hours each term. 2 ① 2 ②; 2 ① 2 ②; 1 ① 1 ② 1 ③
How plants get their food, grow, differentiate, and reproduce. *Bot 201:* seed plants; *Bot 202:* lower plants; *Bot 203;* identification of native plants; use of keys, floral morphology.

Upper Division Courses

Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

Bot 316. **Aquatic Plants.**
4 hours fall. 2 ① 2 ③
Ecology, taxonomy, and economic significance. Prerequisite: Bot 203 or equivalent. MCINTIRE, JOHNSTON.

Bot 320. **Fungus Deterioration of Wood Products.**
3 hours winter. 2 ① 1 ③
Relation of decay in standing timber to decay of wood products; fungus deterioration of logs, lumber, and manufactured products. Prerequisite: Bot 201,202 or Bi 211,212,213. Offered alternate years. Offered 1970-71. ROTH.

Bot 321. **Systematic Botany.**
4 hours spring. 2 ① 2 ③
Vascular plants. Plant classification; collection and identification. Prerequisite: Bot 201,203 or Bi 211,212,213. CHAMBERS.

Bot 330. **Introductory Plant Physiology.**
4 hours winter. 3 ① 1 ③
Fundamental concepts of physiological processes. Service course for students majoring in forestry. Prerequisite: Bot 201,202, or equivalent. ZOBEL.

Bot 331. **Plant Physiology.**
5 hours fall or spring. 3 ① 2 ③
Physiological processes stressing modern concepts and areas of research. Prerequisite: Bot 202 or Bi 213 and Bi 360, or equivalent. MOORE, QUATRANO.

Bot 341. **Plant Ecology.**
4 hours fall or spring. 2 ① 2 ②
Structure, methods of analysis, environmental relations, and dynamics of vegetation. Prerequisite: Bot 203 or Bi 213 and Bi 370, or equivalent. CHILCOTE, ZOBEL.

Bot 371. **Structure of Seed Plants.**
4 hours winter. 2 ① 2 ③
Morphology, anatomy, and reproduction. Prerequisite: Bot 201 or Bi 213. SMITH.

Bot 401. **Research.**
Bot 403. **Thesis.**
Bot 405. **Reading and Conference.**
Terms and hours to be arranged.

Bot 407. **Seminar.**
1 hour each term.

Bot 411,412. **Morphology.** (G)
5 hours fall and winter. 3 ① 2 ②
Fall: algae, fungi, lichens. *Winter:* bryophytes, pteridophytes. Prerequisite: Bot 203 or Bi 213, and three terms of upper division biology. PHINNEY.

Bot 414. **Agrostology.** (G)
4 hours fall. 2 ① 2 ②
Taxonomy of grasses. Identification in vegetative condition and in flower. Prerequisite: Bot 321 or equivalent. CHAMBERS.

Bot 415. **Forest Pathology.**
3 hours winter. 2 ① 1 ④
Disease in relation to forest development, protection, and harvest. Prerequisite: Bot 201, 202. ROTH.

Bot 421,422. **Advanced Systematic Botany.** (G)
3 hours fall and winter. 2 ① 1 ③
Bot 421: variation; ecotypes, introgressive hybridization, genetic isolation. *Bot 422:* speciation; genetic systems, polyploidy, apomixis, structural hybridity. Prerequisite: Bi 341; Bot 321. CHAMBERS.

Bot 423. **Selected Topics in Systematic Botany.** (G)
1, 2, or 3 hours. 1 ①, 2 ①, or 3 ①
Prerequisite: Bot 421 or 422. CHAMBERS.

Bot 425. **Plant Taxonomy.** (g)
3 hours spring. 2 ③
Use of taxonomic keys; floral structure, relationships and diagnostic characteristics of vascular plants. Prerequisite: Bot 203 or equivalent. JOHNSTON.

Bot 431,432. **Advanced Plant Physiology.** (G)
3 hours fall and winter. 3 ①
Bot 431: structure and function within plant cells; biosynthesis and metabolism of essential plant constituents. *Bot 432:* photoreactions of plants. Prerequisite: Bot 331 and organic chemistry. BISHOP.

Bot 433. **Plant Growth and Development.** (G)
3 hours spring. 3 ①
Kinetics and periodicities of growth and developmental processes, cellular differentiation, and morphogenesis; hormones, inhibitors, pigment systems, and synthetic growth-regulating chemicals; senescence; effects of light and temperature. Prerequisite: Bot 330 or 331. MOORE.

Bot 441,442,443. **Advanced Plant Ecology.** (G)
3 hours each term. 2 ① 1 ③
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.

Bot 450. **Plant Pathology.** (g)
5 hours spring. 3 ① 2 ③
Infectious and non-infectious plant diseases, nature of pathogens and pathogenesis, influence of environment, and principles of control. Prerequisite: Bot 202,331. LEACH.

Bot 451. **Plant Disease Diagnosis.** (G)
3 hours summer. 1 ④ 1 ②
Field trips and laboratory on plant disease identification and control. Prerequisite: Bot 450 or equivalent. HORNER.

Bot 452,453. **Advanced Plant Pathology.** (G)
5 hours fall and winter. 3 ① 2 ③
Bot 452: growth and reproduction of pathogens, host-parasite interactions. *Bot 453:* epidemiology and disease control. Prerequisite: Bot 450 or equivalent.

Z 454. **Principles of Symbiosis.** (G)
4 hours winter. 2 ① 2 ②
See ZOOLOGY.

Bot 461. Mycology. (G)
4 hours fall. 2 ① 2 ③
Biology of fungi: the structure, function, and ecology of yeasts, molds, mushrooms, and other fungi. Prerequisite: two terms of upper division biology. DENISON.

Bot 462. Mycology. (G)
5 hours winter. 3 ① 2 ③
Classification of fungi; techniques of collection and preservation; literature of mycological taxonomy. Prerequisite: Bot 461 or equivalent. DENISON.

Bot 463. Selected Topics in Mycology. (G)
1, 2, or 3 hours. 1 ①, 2 ①, or 3 ①
Prerequisite: Bot 461 or 462. DENISON.

Bot 470. Microtechnique. (G)
4 hours winter. 3 ③
Preparation of permanent microscope slides of plant materials. Prerequisite: Bot 201 or Bi 213, 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 371 or Bi 213, and two terms of upper division botany. 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 or Bi 213, and two terms of upper division botany. SMITH.

Bot 473. Plant Tissue Culture. (G)
3 hours fall. 2 ③
Culture methods for plant tissue and single cells. Prerequisite: 9 hours of upper division biology. JONES.

Bot 480. Fungus Genetics. (G)
3 hours fall. 2 ① 1 ②
Genetic mechanisms in microorganisms other than bacteria and viruses. Prerequisite: Bi 341. CAMERON.

Graduate Courses
See also courses marked (*g*) and (*G*) above.

Bot 501. Research.
Bot 503. Thesis.
Bot 505. Reading and Conference.
Terms and hours to be arranged.

Bot 507. Seminar.
1 hour each term.

Bot 511. Fresh-Water Algae.
4 hours spring. 2 ① 2 ③
Taxonomy and ecology. Prerequisite: Bot 411 or Z 451. PHINNEY.

Bot 512. Marine Algae.
4 hours spring. 2 ① 2 ③
Taxonomy and ecology. 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 450 or equivalent. Offered alternate years. Not offered 1970-71. ROTH.

Bot 531,532. Research Methods in Plant Physiology.
2 hours fall and winter. 2 ③
Methodology of current research. Prerequisite or parallel: Bot 431,432. Oriented for plant physiology majors. BISHOP.

Bot 533. Laboratory in Plant Growth and Development. (G)
2 hours spring. 2 ③
Companion course for Bot 433 intended for majors in plant physiology. Assigned and independent investigations of hormones, inhibitors, pigment systems, and environmental factors. Prerequisite or parallel: Bot 433. MOORE.

Bot 534. Mineral Metabolism.
3 hours winter. 2 ① 1 ③
Mineral elements in metabolic processes; ion accumulation in cells. Prerequisite: BB 450. EVANS.

Bot 541. Plant Geography.
3 hours winter. 2 ① 1 ③
Origin, development, and distribution of major units of vegetation, with emphasis on western United States. Prerequisite: Bot 321,341,441. CHILCOTE.

G 543. Palynology.
4 hours spring. 2 ① 2 ③
See GEOLOGY.

Bot 551. Plant Virology.
3 hours fall. 2 ① 1 ③
Nature and properties; symptomology; transmission, inhibitors; purification; electron microscopy; serology; control. Prerequisite: Bot 450; 6 hours of upper division biology. ALLEN.

Bot 552. Bacterial Diseases of Plants.
3 hours winter. 2 ① 1 ③
Symptoms, etiology, and control; causal agents. Prerequisite: Bot 450; Mb 304; 6 hours of upper division biology. Offered alternate years. Not offered 1970-71.

Bot 554. Nematode Diseases of Plants.
4 hours spring. 2 ① 2 ②
Nematology; identification and biology of nematodes; symptoms and control. Prerequisite: Bot 450 or equivalent and 6 hours of upper division biology. JENSEN.

Bot 560. Fungicides.
3 hours winter. 2 ① 1 ③
Chemical control of plant diseases; mode of action. Prerequisite: Bot 450 or equivalent; organic chemistry. Offered alternate years. Offered 1970-71. CORDEN.

Bot 564. Physiology of Fungi.
5 hours spring. 3 ① 2 ③
Fungus growth, reproduction, survival; their raw materials, metabolism, products; chemical and physical agents; variation. Prerequisite: plant physiology or equivalent; organic chemistry. TRIONE.

Bot 566. Physiology of Parasitism.
4 hours winter. 2 ① 2 ③
Recent advances in specific fields in plant diseases. For advanced graduate students. Topics covered include: infection, tissue maceration, toxins, wilting, abnormal plant growth, and plant disease resistance. Prerequisite: Bot 433; BB 451 or equivalent. Offered alternate years. Not offered 1970-71. CORDEN.

Bot 567. Electron Microscopy Laboratory in Botany.
3 hours. 3 ②
Botanical applications of the electron microscope; specimen preparation and photographic techniques. For botany majors only. Prerequisite: Z 566 and approval of the instructor. ALLEN.

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. 3 ① 1 ②
Effects of variations in chromosome structure and number. Prerequisite: Bi 341; Bot 472.

Bot 580. Biological Micrography.
3 hours winter. 1 ① 2 ③
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 or biochemistry. The student is urged to broaden his training by utilizing some of the large number 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 104,105,106. General Chemistry.
5 hours first term, 4 hours second and third terms. 5 ①; 3 ① 1 ③
A nonterminal service course for students who have had no previous training in chemistry and for those whose college aptitude test scores indicate a need for a more elementary introduction to chemistry. This sequence and Ch 107 will allow students to take advanced laboratory courses in chemistry.

Ch 107. General Chemistry Laboratory.
2 hours fall. 2 ③
Laboratory work to complete the instruction given in Ch 104,105,106 and to prepare students for more advanced laboratory training in chemistry. Prerequisite: Ch 106.

[1]Ch 201,202,203. General Chemistry.
3 hours each term. 3 ①; 2 ① 1 ③
Service course covering basic principles of general chemistry. Prerequisite: one year of high school chemistry and acceptable college aptitude scores. This sequence and Ch 207 will allow students to take advanced laboratory courses in chemistry.

Ch 204,205,206. General Chemistry.
5 hours each term. 3 ① 2 ③
Professional course for students majoring in chemistry, pharmacy, and related sciences. Prerequisite: one year of high school chemistry and acceptable college aptitude scores.

Ch 207. General Chemistry Laboratory.
2 hours fall. 2 ③
Laboratory to complete the instruction given in Ch 203 and to prepare students for more advanced laboratory training in chemistry. Prerequisite: Ch 203.

Ch 226,227,228. Organic Chemistry.
3 hours fall and winter, 2 hours spring. 3 ①, 3 ①, 2 ①
Service course covering aliphatic and aromatic chemistry. Prerequisite: Ch 106, 203, or 206.

Ch 229. Organic Chemistry Laboratory.
2 hours spring or fall. 2 ③
A laboratory course taken concurrently with or after Ch 228. Prerequisite: Ch 107 or Ch 207 or 206.

[1]Ch 234. Quantitative Analysis.
4 hours fall, winter, or spring. 2 ① 2 ③
Service course for pharmacy, premedical, and medical technology students covering gravimetric, volumetric, and instrumental analysis. Prerequisite: Ch 206 or corequisite: Ch 107 or Ch 207.

Upper Division Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

[1]Ch 320. Analytical Chemistry.
4 hours fall. 2 ① 2 ③
A professional course for majors in chemistry. Sampling, sample dissolution, separations, and data evaluation. Prerequisite: Ch 206, or corequisite: Ch 207. FREUND.

[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 203, a maximum of 9 term hours is allowed; the terminal course being Ch 206, a maximum of 15 term hours is allowed. Credit cannot be had for both Ch 320 and Ch 234.

Ch 334,335,336. Organic Chemistry.
3 hours each term. 3 ①
Professional course designed to meet the requirement of majors in chemistry and chemical engineering. Prerequisite: Ch 106 or Ch 203 or 206.

Ch 337,338,339. Organic Chemistry Laboratory.
2 hours each term. 2 ③
Laboratory arranged to support the Ch 334, 335,336 sequence and to include elementary organic analysis. Prerequisite: Ch 334 and 107 or 206 or 207.

Ch 340. Elementary Physical Chemistry.
3 hours spring. 3 ①
Aspects having application in engineering, biological sciences, and medicine. Mathematics minimized. Some knowledge of physics required. Prerequisite: Ch 106 or 203 or 206.

Ch 370,371,372. Glass Blowing.
1 hour each term. 2 ②
Manipulation of glass and assembling setups. May be started any term.

Ch 401. Research.
Ch 403. Thesis.
Ch 405. Reading and Conference.
Ch 407. Seminar.
Terms and hours to be arranged.

Ch 411,412,413. Inorganic Chemistry.
(G) 3 hours each term. 3 ①
Structure and bonding of inorganic compounds. Chemistry of non-transition elements from the standpoint of the periodic table and atomic structure. Ligand field theory and descriptive chemistry of transition metal compounds. Prerequisite: three years of college chemistry.

Ch 414. Inorganic Laboratory. (G)
1 hour each term, maximum 3 hours. 1 ③
Laboratory techniques for the synthesis and characterization of inorganic compounds. Corequisite: Ch 411 or 412.

Ch 416. Nuclear Chemistry. (G)
4 hours. 3 ① 1 ③
Radioactive decay, nuclear properties, nuclear structure, alpha, beta, and gamma decay, nuclear reactions, fission, interaction of radiation with matter, chemical techniques, radiation safety and nuclear instrumentation. Prerequisite: college physics.

Ch 418. History of Chemistry. (G)
3 hours. 3 ①
Chemical theories and laws. Prerequisite: three years of chemistry.

Ch 419. Radioactive Tracer Methods.
(G) 4 hours. 2 ① 2 ③
Radiochemistry; radioisotopes; radioactivity; radiotracer methods as research tool in physical and biological science. Prerequisite: two years of college chemistry.

Ch 421,422. Analytical Chemistry. (g)
4 hours winter and spring. 2 ① 2 ③
Professional course for majors in chemistry and chemical engineering. Electrical, optical, and mechanical instruments assembled and applied to quantitative chemical measurements. Prerequisite: Ch 320. FREUND, PIEPMEIER.

Ch 423,424,425. Introduction to Physical Chemistry. (g)
3 hours each term. 3 ①
Service course covering thermodynamics, electrochemistry, kinetics, molecular structure, colligative properties, surface chemistry, macromolecules. Prerequisite: Mth 112 or equivalent; one year of college chemistry; one year of college physics.

Ch 426. Chemical Microscopy. (G)
3 hours spring. 1 ① 2 ③
Theory and use of microscope in microscopic measurements, quantitative analysis of mixtures, identification of organic compounds, optical crystallography, crystallization phenomena, etc. Prerequisite: three years of college chemistry; college physics. WILLIAMS.

Ch 428. Instrumental Analysis. (g)
4 hours fall. 2 ① 2 ③
Service course for the nonspecialist outside the field of chemistry covering a broad spectrum of analytical instrumentation. Prerequisite: senior or graduate standing. WILLIAMS.

Ch 430,431,432. Advanced Organic Laboratory. (G)
3 hours each term. 1 ① 2 ③
Principles and practice in advanced organic laboratory techniques; distillation, crystallization, filtration, chromatography, extractions, spectrographic methods, ion exchange, pressure reactions, and organic synthesis. Third term devoted to advanced organic analysis. Prerequisite: Ch 339,442. CHRISTENSEN, MARVELL.

Ch 434. Organic Preparations. (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 339 or equivalent.

Ch 437,438. Survey of Organic Chemistry. (G)
3 hours each term. 3 ①
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 336 or equivalent.

Ch 440,441,442. Physical Chemistry.
(g) 3 hours each term. 3 ①
Theoretical chemistry, thermodynamics, properties of gases, liquids, and solids; solutions; chemical equilibrium, reaction kinetics, atomic and molecular structure. Prerequisite: Mth 211; Ph 213. HEDBERG.

Ch 443,444,445. Experimental Physical Chemistry. (g)
2 hours each term. 1 ① 1 ③
Elucidation of the principles of physical chemistry by measurements of the properties of chemical systems. Familiarization with experimental techniques used in these measurements. Prerequisite: Ch 320, Ch 442. SHARMA.

Ch 448,449. Colloid and Surface Chemistry. (G)
3 hours each. 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 467. Molecular Spectroscopy. (G)
2 hours. 1 ① 1 ③
Infrared and other types of spectroscopy; identification and analysis of gases, liquids, crystalline and polymeric solids; molecular structure. Prerequisite: Ch 442. DECIUS.

Ch 468. Chemical Kinetics. (G)
3 hours. 3 ①
Reaction rates, experimental methods, elementary processes, complex inorganic reactions, complex organic reactions, catalysis, general theories, and potential energy surfaces. Prerequisite: Ch 442. KRUEGER.

Ch 469. Electrochemistry. (G)
3 hours. 3 ①
Theoretical electrochemistry of solutions. Electrolytic transport, thermodynamics of cells, electrode kinetics. Prerequisite: Ch 442. SCOTT.

Ch 480,481. Survey of Physical Chemistry. (G)
3 hours each. 3 ①
For advanced chemistry students not majoring in physical chemistry. An elementary introduction to modern concepts of molecular structure and the properties of molecules. Prerequisite: Ch 442. FREDERICKS.

Ch 482,483. Thermodynamics. (G)
3 hours each. 3 ①
Chemical principles from standpoint of thermodynamics. Prerequisite: Ch 442. SCOTT, HEDBERG.

Ch 484. Irreversible Thermodynamics.
(G) 3 hours. 3 ①
Application of thermodynamics to physicochemical systems not at equilibrium. Transport of heat and matter. Electrolytic transport in fluids and solids. Chemical reactions. Prerequisite: Ch 483. FREDERICKS.

Graduate Courses
See also courses marked (*g*) and (*G*) above.

Ch 501. Research.
Ch 503. Thesis.
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.

Ch 511,512,513. Selected Topics in Inorganic Chemistry.
3 hours each term. 3 ①
Nonsequence courses designed to acquaint the advanced graduate student with recent advances in fields such as spectroscopy and magnetism, chemistry of coordination compounds, kinetics and mechanisms of inorganic reactions, acid-base theory and reactions in non-aqueous solvents, and chemistry of the less familiar elements. Prerequisite: Ch 413 or passing scores on the graduate inorganic qualifying examination.

Ch 517,518. Advanced Nuclear Chemistry.
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 416, Ch 540. NORRIS.

Ch 519. Experimental Nuclear Chemistry.
3 hours spring. 1 ① 2 ③
Radiation safety, detection and measurement of nuclear radiation, radioactive decay relationships, radiochemical separations, low level techniques, use of tracers in physical chemistry problems, nuclear fission, nuclear reactions, and nuclear spectroscopy. Prerequisite: Ch 528.

Ch 520,521,522. Advanced Analytical Chemistry.
3 hours each term. 3 ①
Physical chemical principles underlying separations and modern methods of analytical chemistry measurements. Prerequisite: Ch 442. FREUND, PIEPMEIER.

Ch 524,525,526. Advanced Instrumental Analysis.
3 hours each term. 1 ① 2 ③
Electrical, optical, and mechanical analytical instruments systems, critical study of principles and performance; special topics in spectrochemical, electrochemical, and gas chromatographic methods of analysis; automatic, continuous, and remote methods of analysis, telemetry, data acquisition and storage. Prerequisite: Ch 442. FREUND.

Ch 527. Advanced Radiotracer Methodology.
3 hours spring. 1 ① 2 ③
Radiotracer experiments, synthesis and degradation of labeled compounds; advanced instruments for radioactivity measurement; tritium as a radiotracer; liquid scintillation mechanism; recent advancement. Prerequisite: three years of college chemistry.

Ch 528. Activation Analysis.
3 hours winter. 2 ① 1 ③
Theory; various methods of activation emphasizing neutron activation, fundamentals of radioactivity detection, instrumental and radiochemical methods; applications to physical, chemical, biological, geochemical fields, etc. Instrumentation and laboratory techniques include use of beta-, gamma-ray detectors, and use of multi-channel analyzers. Prerequisite: Ch 419 or senior standing in chemistry or physics, or graduate standing in biological science or earth science.

Ch 529. Advanced Activation Analysis.
3 hours spring. 1 ① 2 ③
Reaction mechanisms, principles and practices in advanced instrumental and radiochemical activation techniques; advanced instruments for radioactivity measurements; automatic data acquisition, storage, and data reduction by computer. Prerequisite: Ch 518 or 528.

Ch 530,531,532. Advanced Organic Chemistry.
3 hours each term. 3 ①
Principles of stereoisomerism, conformational analysis, and advanced methods of synthesis. Prerequisite: passing grade in graduate qualifying examination.

Ch 536,537,538. Selected Topics in Organic Chemistry.
3 hours each term. 3 ①
Nonsequence courses designed to acquaint student with recent advances in organic chemistry and their application to special fields of study. Topics covered vary from term to term and year to year. (Consult department for specific information regarding a given term.) Topics include: (1) Theoretical Organic Chemistry, (2) Recent Advances in Reaction Mechanisms, (3) Advanced Synthesis, (4) Free Radical Reactions, (5) Organic Sulfur Chemistry. Prerequisite: Ch 532 or its equivalent.

Ch 540,541,542. Advanced Physical Chemistry.
3 hours each term. 3 ①
Atomic and molecular structure; chemical bond; thermodynamic functions. Prerequisite: Ch 442. DECIUS.

Ch 543,544,545. Selected Topics in Physical Chemistry.
2 hours each term. 2 ①
Topics in molecular structure, spectroscopy, crystallography, and physical chemistry of solids. Not all topics covered each year.

Ch 546. Chemical Literature.
1 hour. 1 ①
Use; character of various chemical journals, dictionaries, reference books, and other sources of information.

Ch 547,548,549. Solid State Chemistry.
2 hours each term. 2 ①
Elementary crystallography; free-electron, band, and valence-bond theories; thermodynamics of perfect, imperfect, and impure crystals; equilibria involving lattice defects; dislocations, ionic diffusion and conduction; dependence of physical properties of crystals upon chemical constitution. Prerequisite: Ch 442 or graduate standing in physics or engineering. SCOTT, FREDERICKS.

Ch 563,564,565. Selected Topics in Analytical Chemistry.
2 hours each term. 2 ①
Nonsequence courses designed to acquaint the advanced graduate student with recent advances in Analytical Chemistry. Prerequisite: Ch 522 or Ch 526.

Ch 566,567,568. Selected Topics in Nuclear and Radiation Chemistry.
2 hours each term. 2 ①
Nuclear structure and nuclear models, nuclear reactions and nuclear fission, cosmochemistry, radiation and photochemistry. Prerequisite: Ch 518, 585.

Ch 580. Chemistry of Pesticides.
3 hours. 3 ①
Chemical relationships of insecticides, herbicides, fungicides, and other pesticides to their physical and biological environments; movement of pesticides in the environment; mode-of-action of pesticides; non-toxic and chronic effects of pesticides on biological systems; interactions of pesticides on the environment. Prerequisite: Ch 340; BB 350.

Ch 583. Photochemistry.
2 hours fall. 2 ①
Theoretical and experimental aspects of the chemistry of excited species. Of interest to students of chemical kinetics, and mechanisms of inorganic and organic reactions. Prerequisite: Ch 336, Ch 440.

Ch 584,585. Radiation Chemistry.
2 hours winter and spring. 2 ①
Theoretical and experimental aspects of the chemical changes caused by high-energy radiation. Prerequisite: Ch 336,440.

ENTOMOLOGY

Entomology courses are planned to give the student a broad understanding of the life processes of insects, their role in the ecosystem, and means of population regulation. He will also gain an appreciation of the diversity of insect life and an acquaintance with recognition characters of the main groups. Undergraduates wishing to specialize in entomology should elect the entomology option in the zoology curriculum.

Advanced work is offered in general entomology, economic entomology, forest entomology, insect toxicology, insect physiology, systematic entomology, aquatic entomology, and insect pathology. In addition to the regularly scheduled courses listed on the following pages, advanced seminars and reading and conference courses are offered in specialized subjects to provide further training tailored to the specific needs of the student. Various state and federal entomologists, not formally included on the teaching staff, are available for consultation in specialized areas. Advanced courses equip students specializing in entomology with sufficient fundamental groundwork for effective service in 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 four-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, the aquatic insect laboratory, and the forest insect research laboratory. The entomology museum, containing over 600,000 specimens of insects and mites, is also available for research purposes. Research or teaching assistantships open to qualified graduate students provide valuable work experience.

Upper Division Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may he taken for graduate credit.

Ent 311. **Applied Entomology.**
3 hours fall. 2 ① 1 ②
Recognition, hiology, and management of injurious and beneficial insects; insects and human welfare. DICKASON.

Ent 314. **General Entomology.**
4 hours winter and spring. 2 ① 2 ②
Study of insects with emphasis on biology, ecology, classification, morphology, physiology, and control. LATTIN.

Ent 401. **Research.**
Terms and hours to be arranged.
Work on approved prohlems carried on in lihrary, lahoratory, or field.

Ent 403. **Thesis.**
Ent 405. **Reading and Conference.**
Ent 407. **Seminar.**
Terms and hours to be arranged.

Ent 416. **Anatomy and Physiology of Insects.** (G)
4 hours winter. 2 ① 2 ②
Structure and function of the appendages and principal organ systems; nerve transmission, locomotion, digestion, excretion, respiration, and reproduction. Prerequisite: Ent 311 or 314. BROOKES.

Ent 423. **Forest Entomology.** (G)
3 hours fall. 2 ① 1 ③
Bark beetles, sawflies, Lepidoptera, and Homoptera injurious to forest trees. Prerequisite: one year of forestry or Ent 314. NAGEL.

Ent 425. **Forest Insect Dynamics.** (G)
3 hours winter. 2 ① 1 ③
Population dynamics; host susceptibilty and resistance; host selection. Prerequisite: Ent 423 or equivalent. RUDINSKY.

Ent 433. **Aquatic Entomology.** (G)
4 hours spring. 2 ① 2 ②
Biology, ecology, collection and identification of aquatic insects. Prerequisite: upper division standing. ANDERSON.

Ent 441. **Economic Entomology.** (G)
3 hours fall. 3 ①
Pesticides: their chemistry, formulation, environmental and legal aspects, and toxicology. Prerequisite: organic chemistry. TERRIERE.

Ent 442. **Economic Entomology.** (G)
3 hours winter. 2 ① 1 ②
The chemical, cultural, and biological control of insect pests of crops. Prerequisite: Ent 311 or 314. DICKASON.

Ent 443. **Economic Entomology.** (G)
3 hours spring. 3 ①
Control of arthropod pests of man, his animals, goods, and structures. Prerequisite: Ent 311 or Ent 314. GOULDING.

Ent 450. **Systematics and Adaptations of Insects.** (G)
4 hours fall. 2 ① 2 ②
Evolution of the insects and near relatives; emphasis on critical points of biological, ecological, and morphological divergence. Prerequisite: Ent 314. LATTIN.

Ent 452, 453. **Systematic Entomology.** (G)
4 hours winter and spring. 2 ① 2 ②
Taxonomy, nomenclature, literature, phylogeny, and distribution of insects. Prerequisite: Ent 311 or Ent 314,450. OMAN.

Z 454. **Principles of Symbiosis.** (G)
4 hours spring. 2 ① 2 ②
See ZOOLOGY.

Ent 461. **General Acarology.** (G)
4 hours spring. 2 ① 2 ②
Taxonomy of mites and ticks; collection and preservation. Consent of instructor required. Prerequisite: Ent 314. Offered alternate years. Not offered 1970-71. KRANTZ.

Ent 475. **Comparative Animal Behavior.** (G)
3 hours winter. 3 ①
Concepts of behavior; sensory receptors, internal mechanisms, governing responses; learning and hahituation; social organization and communication. Prerequisite: one year of biological science. STEPHEN.

Ent 485. **Insect Ecology and Biological Control.** (G)
5 hours winter. 3 ① 2 ②
Influence of environment on insect development and distrihution. Characteristics of insect populations. Relation of insect enemies to insect populations. Case-history examples of population regulation studies. Prerequisite: Ent 314; Bi 370. NAGEL, ANDERSON.

Graduate Courses

See also courses marked (*g*) and (*G*) above.

Ent 501. **Research.**
Ent 503. **Thesis.**
Ent 505. **Reading and Conference.**
Ent 507. **Seminar.**
Terms and hours to be arranged.

Ent 515. **Methods of Insect Population Analysis.**
3 hours winter. 1 ① 2 ③
Applied biometry, sampling techniques, life table and component analyses. Prerequisite: Bi 370; St 451,452. Offered alternate years. Not offered 1970-71. NAGEL.

Ent 516,517,518. **Selected Topics in Entomology.** 3 hours each term.
Topics: (1) Economic entomology; (2) Forest entomology; (3) Insect toxicology; (4) Insect physiology; (5) Systematic entomology; (6) Aquatic entomology; (7) Medical and veterinary entomology; (8) Biological control.

Ent 525. **Insect Transmission of Plant Viruses.**
3 hours fall. 2 ① 1 ③
Plant virus transmission hy arthropods applied to field and laboratory. Prerequisite: Ent 452; Bot 551. Offered alternate years. Not offered 1970-71. SWENSON.

Ent 554. **Immature Insects.**
3 hours fall. 3 ②
Collection, preservation, and identification; taxonomy and morphology. Prerequisite: Ent 453,481. Offered alternate years. Not offered 1970-71. RITCHER.

Ent 572. **Developmental Physiology of Insects.** 4 hours spring. 2 ① 2 ②
Growth and development, nutrition, metabolism; endocrine system and metamorphosis. Prerequisite: Ent 416. 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. Not offered 1970-71. 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 1970-71. STEPHEN.

GENERAL SCIENCE

The Department of General Science offers curricula which allow considerable flexibility in the development of strong undergraduate preparation and some graduate programs each of which emphasizes the interdisciplinary approach to knowledge. Although the curricula in general science are not intended to prepare students for graduate majors in those science departments which offer complete undergraduate programs, special options are available which prepare a student for graduate work in certain areas of biology and in departments which lack undergraduate majors, such as oceanography and statistics. Some of the students in the preprofessional programs of medicine and dentistry may also major in general science. Other curricula in general science are specially designed for students interested in fields that involve two or more of the traditional physical and biological sciences, i.e., radiation biology, radiological physics, biophysics, paleobiology. Both undergraduate and graduate programs are also offered in general science for those who are preparing for science teaching at either the high school or college level.

Lower Division Courses

[1]GS 101,102,103. **General Biology.**
4 hours each term. 3 ① 1 ②
Biological principles applied to both plants and animals.

[1]GS 104,105,106. **Physical Science.**
4 hours each term. 3 ① 1 ②
Physics, chemistry, astronomy, and geology; the scientific method. For majors in fields other than the physical sciences.

GS 111,112,113H. **Honors Colloquia.**
1 hour each term.
Reading and discussion groups organized on a modified tutorial basis. Reserved for students in the University Honors Program.

[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 the latter toward graduation except with the approval of the dean of the School of Science. A similar limitation exists for GS 104,105,106.

GS 214,215,216H. **Honors Colloquia.**
1 hour each term.
Reading and discussion groups organized on a modified tutorial basis. Reserved for students in the University Honors Program.

Upper Division Courses

Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

GS 311,312. **The Social and Historical Context of Science.**
3 hours winter and spring. 3 ①
A sociological history of science from 1600 to the present. The development of science in relation to other social institutions and the intellectual context of that development. Prerequisite: one year of college science.

GS 331. **Bioecology.**
3 hours spring. 2 ① 1 ③
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.

GS 332. **Biogeography.**
3 hours winter. 3 ①
Plant and animal distribution; faunas and floras; biogeographic areas. Prerequisite: one year of biological science.

GS 371,372,373. **Modern Concepts in Physical Science.**
3 hours each term. 3 ①
A synthesis of modern ideas concerning man's physical environment. Prerequisite: two years of approved physical science.

GS 401. **Research.**
GS 403. **Thesis.**
GS 405. **Reading and Conference.**
GS 407. **Seminar.**
Terms and hours to be arranged.

GS 411. **Science in Antiquity.** (G)
3 hours fall. 3 ①
History of science in ancient times. Developments in scientific thought in astronomy, physics, biology from ancient civilizations to Roman times. Prerequisite: 27 hours of science including one year of upper division science.

GS 412. **The Scientific Revolution.** (G)
3 hours winter. 3 ①
Sixteenth, seventeenth, eighteenth century science. Rise of experimental science, and origin of modern science. Prerequisite: 27 hours of science including one year of upper division science.

GS 413. **Nineteenth-Century Scientific Thought.** (G) 3 hours spring. 3 ①
Dominant physical and biological thought in the nineteenth century. Prerequisite: 27 hours of science including one year upper division.

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: 27 hours of science including one year of upper division science

GS 441. **Marine Radioecology.** (G)
3 hours winter. 3 ①
Artificial radionuclides in the marine environment, their measurement, identification; their uptake and transference through marine food chains. Prerequisite: GS 451.

GS 450. **Biology and Radiation.** (g)
2 hours fall. 2 ①
Biological phenomena directly associated with the major divisions of the electro-magnetic radiation spectrum and responses derived from radiation interactions with living matter. Prerequisite: one year of biological science; one year of either physics or chemistry. Not for majors in radiation biology.

GS 451. **Introductory Radiation Biophysics.** (G) 4 hours fall. 3 ① 1 ③
Physics of radiation for biologists. Prerequisite: one year of general physics; one year of biology; calculus.

GS 461. **Machine Sources of X-Rays.**
(G) 3 hours fall. 2 ① 1 ③
X-ray machines and systems used in medical, industrial, and research applications. Prerequisite: one year each of college physics and college mathematics.

GS 462. **X-Ray Measurements.** (G)
3 hours winter. 2 ① 1 ③
Instrumentation and procedures used in measurement of X-rays from medical, industrial, and research machines and systems. Prerequisite: GS 461.

GS 463. **X-Ray Applications.** (G)
3 hours spring. 2 ① 1 ③
Use of X-rays in medicine, industry, and research. Prerequisite: GS 462.

Graduate Courses

See also courses marked (g) and (G) above.

GS 501. **Research.**
GS 503. **Thesis.**
GS 505. **Reading and Conference.**
GS 507. **Seminar.**
Terms and hours to be arranged.

GS 521,522,523. **Topics in the History of Science.**
3 hours each term. 3 ①
Advanced treatment of nineteenth-century physical thought, nineteenth-century biological thought, the Newtonian revolution, etc. Topics determined by demand; not all topics given any one year. Prerequisite: GS 423 or 411, 412, and 413.

GS 542. **Cellular Radiation Biology.**
2 hours winter. 2 ①
Biochemical and physical properties of cells as they are influenced by interaction with ionizing radiation. Discussion of alteration of macromolecular systems, genetic material, permeability of cell membranes, and cellular replication processes. Prerequisite: GS 451; or modern physics; background needed in genetics and physiology.

GS 543. **Vertebrate Radiation Biology.**
2 hours winter. 2 ①
Etiology of radiation pathogenesis, morphological and physiological aspects of radiation injury in vertebrates. Emphasis on induction of alterations in immune, bloodforming, gastrointestinal, and metabolic systems. Prerequisite: GS 542.

GS 544. **Cellular Radiation Biology Laboratory.**
2 hours winter. 2 ③
Experimental problems demonstrating principles underlying cellular radiation biology phenomena. To be taken concurrently with GS 542. Prerequisite: GS 451.

GS 545. **Vertebrate Radiation Biology Laboratory.**
2 hours spring. 2 ③
Experimental problems demonstrating principles underlying vertebrate radiation biology phenomena. To be taken concurrently with GS 543. Prerequisite: GS 542,544.

GS 551,552,553. **Selected Topics in Radiation Biology.**
3 hours each term. 3 ①
Advanced theoretical discussion in the special fields of radiation genetics, physiology, immunology, photobiology, etc. Topics, determined by demand and staff available. Prerequisite: GS 543.

GS 560. **Radiation Dosimetry.**
3 hours winter. 3 ①
Radiation detection, interaction of radiation with matter and energy absorption processes. Prerequisite: GS 561.

GS 561. **Radiological Physics.**
3 hours spring. 2 ① 1 ③
Physical principles underlying the concept of radiation dosimetry. Laboratory designed to develop proficiency in calibration and operation of radiation sources and measuring devices used in radiobiological and biophysical research. Prerequisite: GS 462; GS 451; two years of college physics; one year of college mathematics.

GS 562. **Techniques in Radiation Surveys.**
4 hours. 2 ① 2 ③
Techniques of radiation survey, including hazard analysis. Actual surveys of facilities using radiation sources.

GEOGRAPHY

The Department of Geography, a joint department of the Schools of Science and Humanities and Social Sciences, offers an undergraduate major, graduate majors in physical and resource geography, and technical supporting courses. The major curriculum prepares students for employment in positions in such fields as land and environmental evaluation and classification, area and industrial resource analysis, planning, a variety of government services, and teaching; it also prepares students for graduate work in geography.

The undergraduate major is designed to provide background in related sciences, the spatial distributions and spatial relations of physical systems and subsystems of the earth, world resources as the bases of man's activities, the geographic point of view, research techniques and methods, problem analysis, and reporting. At the graduate level, emphasis is placed upon systems analysis, problem formulation, and research methodology utilizing the United States as the frame of reference. Advanced students may develop concentrations in systematic physical geography, general physical geography, systematic resource geography, or physical and resource geography of selected areas.

Oregon State University offers outstanding supporting facilities for the study of geography. As one of the nation's land-grant universities, the campus provides course work in a wide range of basic sciences, applied sciences, and technologies. Additional support is provided in business fields, and in social science aspects offered through the School of Humanities and Social Sciences. The OSU library has an outstanding collection of scientific, technical, and resource literature, as well as an excellent map collection. The immediate environs of Corvallis provide variety for field study.

Lower Division Courses

Ggs 227. **Introduction to Physical Geography.**
5 hours. 4 ① 1 ②
An integrated study of the major subsystems of the natural environment, their nature, expression, and spatial distribution.

Ggs 261. **Maps and Map Interpretation.**
3 hours. 2 ① 1 ②
Evolution of maps and mapping; map projections, types, uses, sources; graph and diagram types and uses; case and handling.

Upper Division Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

Ggs 327,328,329. **Physical Geography.**
4 hours each term. 3 ① 1 ②
Systematic analysis of the characteristics, classifications, distributions, and spatial relations of the earth's physical-biotic subsystems. *327:* regional landforms; *328:* climates of the world; *329:* vegetation. Prerequisite: Ggs 227.

Ggs 360. **Cartography.**
4 hours. 1 ① 3 ②
Researching, compiling, designing, and drafting maps, charts, and diagrams. Prerequisite: Mth 60; Ggs 261.

Ggs 361. **Techniques of Field Research.**
5 hours spring. 1 ② 2 ③
Recording, classifying, and analyzing field gathered data.

Ggs 401. **Research.**
Ggs 403. **Thesis.**
Ggs 405. **Reading and Conference.**
Ggs 407. **Seminar.**
Terms and hours to be arranged.

Ggs 411. **Conservation.**
3 hours spring. 3 ①
Examination and appraisal; resources development; policies of public agencies and private enterprise. Prerequisite: upper division standing.

Ggs 413. **Geographic Photointerpretation.** (G) 3 hours. 1 ① 2 ②
Identification, analysis, and interpretation of landscape elements from aerial photographs; use in geographic analysis and planning. Prerequisite: 18 hours of geography including 1 year of physical geography.

Ggs 421. **Biotic Resource Geography.**
(g) 3 hours. 3 ①
Geographic approach to the realities, prospects, and problems of world resources of forests and fisheries. Prerequisite: Ggs 329. JENSEN.

Ggs 422. **Agricultural Geography.** (g)
3 hours. 3 ①
Concepts and methods of agricultural geography; analysis of major world systems. Prerequisite: Ggs 329. HIGHSMITH.

Ggs 423. **Minerals Geography.** (g)
3 hours. 3 ①
Principals and problems of world mineral distributions, production, and interactions. Prerequisite: Ggs 329. MARESH.

Ggs 424. **Water Resource Geography.**
(g) 3 hours. 3 ①
Geographic analysis of the spatial relations among bio-physical factors, human factors, and water resource developments. Comparison of water use systems in developed and developing countries and in planned and unplanned economics. The spatial consequences of various water uses. Prerequisite: Ggs 329. MUCKLESTON.

Ggs 461. **Map Design.** (G)
4 hours 2 ① 2 ②
The theory of map design; quantification of map symbols; representation of complex data; problems of reproduction. Prerequisite: 5 hours of cartography; Mth 113; and 18 hours of upper division geography or equivalent.

Graduate Courses

See also courses marked (*G*) above

Ggs 501. **Research.**
Ggs 503. **Thesis.**
Ggs 505. **Reading and Conference.**
Ggs 507. **Seminar.**
Terms and hours to be arranged.

Ggs 511. **Conservation in the United States.**
3 hours fall. 3 ①
Principles and needs. Prerequisite: graduate standing.

Ggs 513. **Mexico.**
3 hours. 3 ①
Resource geography of Mexico. JENSEN.

Ggs 515. **The Science of Geography.**
3 hours. 1 ③
Geography as a modern discipline and fundamental research science; conceptual structure, traditions, and trends. Prerequisite: graduate standing and 18 hours of upper division geography. JENSEN.

Ggs 520. **Geography of Outdoor Recreation Resources.**
3 hours. 3 ①
The determinants of recreation environments; recreation resources development; agencies and organizations concerned. Two weekend field problems. Prerequisite: Ggs 329. HEINTZELMAN.

Ggs 521. **Biotic Resource Geography of the United States.**
3 hours. 3 ①
Geographic analysis of forest and fishery resources with emphasis on research problems and frontiers. Prerequisite: Ggs 421. JENSEN.

Ggs 522. **Agricultural Geography of the United States.**
3 hours. 3 ①
Applications of principles and methods of ecological-resource geography to study of U.S. Agriculture; disaggregate analysis of variables; aggregate analysis of spatial systems; research problems. Prerequisite: Ggs 422. HIGHSMITH.

Ggs 523. **Mineral Geography of the United States.**
3 hours. 3 ①
Geographic analysis of mineral resources, industries, and commodities; institutional processes and external relationships in mineral development. Prerequisite: Ggs 423. MARESH.

Ggs 524. **Water Resources Geography of the United States.**
3 hours. 3 ①
Geographic analysis of water resources and water developments; institutional processes; multiple, conflicting, and complimentary uses; reesarch problems. Prerequisite: Ggs 424. MUCKLESTON.

Ggs 529. **Topics in Resource Geography.** 3 hours. 2 ① 1 ②
Fundamental problems with stress upon methods of analysis. Topics vary; number may be repeated with consent of major professor. Prerequisite: Ggs 561,562 and appropriate topical background.

Ggs 531. **Climatology.**
3 hours. 2 ① 1 ②
Climatology in geography; data sources; hierarchies of climatic subsystems; employment in typology with special reference to North America. Prerequisite: Ggs 328. RUDD.

Ggs 532. **Landforms Geography.**
3 hours. 2 ① 1 ②
Contemporary trends; the growth of landforms geography, modern research and theories, sources of data, and analytical methods. Includes one-day field trips. Prerequisite: Ggs 327. BARD.

Ggs 533. **Ecological Biogeography.**
3 hours. 2 ① 1 ②
The ecosystem as an analytical and unifying concept in biogeography; classification and analysis of natural communities in biogeography. Prerequisite: Ggs 329. FRENKEL.

Ggs 534. **Climatic Classification and Expression.**
3 hours. 3 ①
Development of climatic classifications, problems of representative expression, man-oriented systems, applications of principles. Prerequisite: Ggs 524. RUDD.

Ggs 539. **Topics in Physical Geography.** 3 hours. 2 ① 1 ②
Fundamental problems with stress upon methods of analysis. Topics vary; number may be repeated with consent of major professor. Prerequisite: Ggs 561,562, and appropriate topical background.

Ggs 561. **Quantitative Research Techniques.**
3 hours. 1 ① 2 ②
Quantitative applications in Geography, with emphasis on analysis of variance, regression, correlation, and spatial simulation. Prerequisite: St 451,452 or St 456,457.

Ggs 562. **Field Research Techniques.**
3 hours. 1 ① 2 ②
Sampling, questionnaire development, and data gathering, with emphasis on quantitative analysis of collected information. Prerequisite: Ggs 561.

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. Summer field camp in geology is required for the B.S. degree in geology. Equivalent experience may be substituted. In cases of financial hardship, the student should consult with his adviser. A field course of at least nine 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] Credit may not be obtained for both G 200, G 201, and G 221.

[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. Field trips required.

G 221. **Basic Geology.**
3 hours. 2 ① 1 ③
Physical geology including laboratory study of minerals, rocks, and topographic maps.

Upper Division Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

G 312,313,314. **Mineralogy and Rock Study.**
4 hours each term. 2 ① 2 ②
Crystal forms, physical and chemical properties; economic and rock-forming minerals and common rocks. Prerequisite: one year of chemistry.

G 321. **Structural Geology.**
4 hours. 3 ① 1 ③
Origin, interpretation, and mapping of joints, faults, cleavage, plutons, and folds. Prerequisite: G 202,204,205.

G 322. **Geomorphology.**
4 hours. 3 ① 1 ③
Surface features of the earth developed by erosion, deposition, earth movements, and volcanism. Prerequisite: general geology.

G 323. **Photogeology.**
4 hours. 2 ① 2 ③
Topographic maps, areal geologic maps, air photographs. Prerequisite: G 321,322.

G 330,331,332. **Life of the Past.**
3 hours each term. 3 ①
Fall: fossil collecting and classification; history of 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 352. **Geology of Oregon.**
3 hours. 3 ①
Origin and history of landscape features; for students without prior geologic background. Field trips required. Prerequisite: G 200.

G 380. **Field Methods.**
3 hours. 1 ① 1 ⑥
Geologic mapping and surveying; pace-and-compass traverses, plane table plotting. Prerequisite: G 321.

G 401. **Research.**
G 403. **Thesis.**
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
Microscope used in identification of minerals and in rock classification. Prerequisite: G 312, 313,314.

G 415,416,417. **X-ray Mineralogy.** (G)
3 hours each term. 2 ① 1 ③
Methods and theory of x-ray diffraction and spectroscopy in identification, structure, and composition of minerals. Prerequisite: G 314; Ch 203.

[1]Credit may not be obtained for both G 200, G 201, and G 221.

G 420. **Geophysical Exploration.** (g)
3 hours. 3 ①
Physical methods used in mining and oil prospecting. Prerequisite: Ph 203; G 321,323.

G 421,422. **Economic Geology.**
3 hours each. 2 ① 1 ②
Origin, occurrence, exploration, mining, technology, and uses of metals, nonmetallic minerals, and other geologic resources. Prerequisite: G 312,313,314. Some field trips required.

G 423. **Oil Geology.**
3 hours. 3 ①
Origin, occurrence, exploration, and technology of gas and oil. Prerequisite: G 201,202, 203. Some field trips required.

G 424. **Biostratigraphy.** (G)
4 hours. 2 ① 2 ③
Use of fossils in chronology and correlations; paleo-ecology; stratigraphic succession of invertebrates; collection, preparation, and identification of megafossils. Field trips required. Prerequisite: G 445.

G 430. **Principles of Stratigraphy.** (G)
4 hours fall. 3 ① 1 ③
Stratigraphic column; environmental, biologic, tectonic factors; correlation; field, laboratory procedures. Field trips required. Prerequisite: two years of geology including G 323.

G 431. **Stratigraphy of North America.** (G) 4 hours. 3 ① 1 ③
The geologic development of the North American continent. Prerequisite: G 323,430.

G 432. **Geologic History of the Pacific Coast.** (G)
4 hours. 3 ① 1 ③
Field trips required. Prerequisite: G 431.

G 443,444,445. **Invertebrate Paleontology.** (g)
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: two years of general geology or two years of biological science.

OC 461. **Geological Oceanography.**
4 hours.
See OCEANOGRAPHY.

G 480. **Field Geology.**
12 hours.
Small area studied intensively in eight-week summer camp. Prerequisite: G 380.

Graduate Courses

See also courses marked (*g*) and (*G*) above.

G 501. **Research.**
G 503. **Thesis.**
G 505. **Reading and Conference.**
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.

G 520,521,522. **Economic Geology.**
3 hours each term. 2 ① 1 ③
Origin and occurrence of metallic and nonmetallic ore deposit including fossil fuels. Field trips required. Prerequisite: G 312,313, 314,414.

G 523,524,525. **Sedimentary Petrology.**
4 hours each term. 2 ① 2 ③
Laboratory analysis of sedimentary rocks. Prerequisite: G 323,414.

G 526,527,528. **Sedimentation.**
3 hours each term. 3 ①
Interdependence between tectonism and sedimentation, depositional environment and composition, textures and structures of geosynclinal and nongeosynclinal sediments. Prerequisite: G 525.

G 540,541. **Micropaleontology.**
4 hours each. 2 ① 2 ③
Collecting, preparation, classification, and identification of microfossils; biostratigraphy and ecologic evaluation of fossil foraminiferal assemblages. Prerequisite: three years of geology or zoology; G 443.

G 543,544,545. **Palynology.**
4 hours each term. 2 ① 2 ③
Principles, morphology of pollen and spores, field and lab techniques, interpretation of pollen diagrams, paleoecology, paleoclimate, geochronology.

G 554. **Volcanology.**
4 hours spring. 3 ① 1 ②
Volcanic activity, form and structure of volcanoes, petrogenesis of volcanic rocks. Prerequisite: G 414.

G 560,561,562. **Fundamental Problems.**
3 hours each term. 3 ①
Interior of the earth; basin deposition and case histories; igneous and metamorphic processes in continental evolution.

G 571,572,573. **Tectonics.**
3 hours each term. 3 ①
Theoretical structural geology; geotectonics and regional structure of selected areas. Prerequisite: G 321.

G 580. **Graduate Field Geology.**
Terms and hours to be arranged.
Advanced field problems assigned to meet the requirements of the graduate student.

G 581,582,583. **Geochemistry.**
3 hours each term. 3 ①
Study of the distribution and partitioning of the chemical elements in igneous, sedimentary, and metamorphic rocks in the earth's crust. Prerequisite: G 414.

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. Flexibility is allowed for first-term shifting of level, up or down, and the half-credit subfreshman remedial courses (Mth 50,51,60) are taught from workbooks which enable each student to proceed at his own speed. Those who are studying the calculus in high school should investigate the Advanced Placement Program, under which college credit may be given.

Undergraduate majors. Informal options include: pure, applied, or actuarial mathematics; secondary teaching; computer science. Suggested course programs for these options, details about honors programs, and other information are included in a special departmental publication, obtainable on request.

Senior sequence. The 27 required hours of upper division mathematics must include an approved 3-term sequence at the fourth-year level. Any regularly listed sequence in the range 411-479 may be submitted. Specially recommended as basic are Mth 411,412,413; Mth 414,415, 416; Mth 431,432,433; Mth 441,442,443.

A grade-point average of 2.00 is required in the senior sequence as well as overall in upper division mathematics courses.

Concurrent degrees (for general regulations, see under DEGREES AND CERTIFICATES). On petition, the biological science requirement may be reduced to 5 hours for students taking baccalaureate degrees in both mathematics and engineering, *provided* a year of biology was taken in high school.

Languages. Anyone who contemplates graduate work in mathematics should learn to read at least two of the languages French, German, Italian, and Russian. This should be done early—by the junior year if possible.

Graduate Study

Master's and doctor's degrees may be earned in any of the broad categories of algebra, geometry, analysis, and applied mathematics (including computer science).

Problems Seminar. Prospective degree candidates should register in the Problems Seminar during the first year of graduate work. This seminar takes the place of a departmental qualifying examination. One term is required in any program for a higher degree.

Master's Degree options. The M.A. and the M.S. in mathematics may be earned in any of the following options: (a) pure and applied mathematical research, supplying a foundation for Ph.D. work; (b) industrial mathematics; or (c) mathematics for secondary school teachers. In options (a) and (b) a thesis is required. In option (c) a three-credit Master's report is required.

The doctoral program is designed to train teachers and independent research workers for universities, government laboratories, and industry. The Ph.D. is a research degree. Special emphasis is placed on (1) analysis and its many ramifications, including the differential and integral equations of mathematical physics, numerical methods and abstract functional analysis; (2) automaton theory, including the languages, logic, and design of computer systems; (3) probability theory and its applications (in cooperation with the Department of Statistics); (4) the complementary basic fields of geometry (including topology) and algebra (including number theory and logic).

Special joint programs have been established: Computer Science (see under COMPUTER SCIENCE); Applied Mathematics: Geophysics Option (with the Department of Oceanography).

Staff and Facilities. The faculty includes outstanding research workers and teachers in both pure and applied mathematics. There is an exceptionally good library. The University's computing center is equipped with computers and laboratories which facilitate research and instruction in many directions.

Lower Division Courses

Mth 10. Elementary Algebra.
No credit. 4 ①
Review of beginning high school algebra. Offered only in summer term.

Mth 50,51. Intermediate Algebra.
2 hours each. 4 ①
Brief review of elementary algebra; simultaneous linear equations, ratio and proportion, quadratics, exponents. Complex numbers, functions and variables, logarithms, progressions, binomial theorem, simultaneous quadratics. Prerequisite: appropriate placement score.

Mth 60. Trigonometry.
2 hours. 4 ①
Trigonometric functions for general angles, solution of triangles, addition formulas, trigonometric equations, graphs. Prerequisite: placement or Mth 51.

Mth 107,108. Finite Mathematics.
4 hours each. 4 ①
Symbolic logic, sets, and Venn diagrams; probability; vectors and matrices; linear inequalities and programing; game theory. Prerequisite: Mth 111 placement or Mth 51.

Mth 110. Analytic Geometry.
4 hours. 4 ①
Coordinate systems, linear transformations, loci in two- and three-dimensional spaces. Prerequisite: Placement or Mth 60.

Mth 111,112,113. Calculus.
4 hours each term. 4 ①
Differentiation and integration of functions of one variable, maxima and minima, applications to physics and other sciences, infinite series, improper integrals. Prerequisite to or corequisite with Mth 111: Mth 110.

Mth 151. Programing Digital Computers. 4 hours. 3 ① 1 ①
Algorithms; the stored program computer; machine language programing; symbolic languages: ALGOL. Console operation. Prerequisite: Mth 50 or Mth 51 placement.

Mth 161,162,163. Mathematics for the Biological, Management, and Social Sciences.
4 hours each term. 3 ① 1 ①
Topics from symbolic logic, probability, algebra, analytic geometry, and elementary calculus; applications in business, biology, and the social sciences. Prerequisite: Mth 51 placement or Mth 50.

Mth 190. Freshman Honors.
1 hour each term, 3 terms. 1 ①
Consent of instructor required.

Mth 191,192,193. Mathematics for Elementary Teachers.
3 hours each term. 3 ①
Arithmetic as a logical structure. *Mth 193:* the new programs.

Mth 211. Calculus of Several Variables.
4 hours. 4 ①
Linear algebra, partial differentiation, multiple integration. Prerequisite: Mth 113.

Mth 241. Linear Equations.
4 hours. 4 ①
Systems of linear equations, Matrix algebras, quadratic forms, linear spaces, and Euclidean spaces. Prerequisite: Mth 111.

Mth 242. Polynomial Equations.
4 hours. 4 ①
Determination of zeros of polynomials over the real and complex fields: factorization; polynomial equations in several unknowns. Prerequisite: Mth 241.

Mth 251. Computer Organization.
4 hours. 3 ① 1 ①
Logical organization of computers; limitations of procedure-oriented languages; usefulness of hardware functional units in producing efficient programs. Prerequisite: Mth 151.

Mth 290. Sophomore Honors.
1 hour each term, 3 terms. 1 ①
Consent of instructor required.

Upper Division Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

Mth 311,312. Advanced Calculus.
4 hours each. 4 ①
Uniform convergence, uniform continuity, interchange of limits. Line and surface integrals, Green's identities, differentiable manifolds, functions of vectors. Prerequisite: Mth 211.

Mth 321,322. Applied Differential Equations.
4 hours each term. 4 ①
Linear systems of ordinary differential equations, numerical methods, vectors, boundary value problems for partial differential equations. Applications to physical and engineering science. Prerequisite: Mth 211.

Mth 331. Coordinate Geometry.
3 hours. 3 ①
A careful second look at Cartesian geometry of two and three dimensions. Prerequisite: Mth 111 or Mth 241.

Mth 332. Projective Geometry.
3 hours. 3 ①
Properties which are invariant under the group of projections. Analytic and synthetic methods. Prerequisite: Mth 113 or Mth 241.

Mth 333. Topology.
3 hours. 3 ①
Combinatorial and point set topology. Discussions of traversing networks and coloring maps followed by more rigorous general developments. Prerequisite: Mth 113 or Mth 241.

Mth 343. Theory of Numbers.
3 hours. 3 ①
Integers, Euclid's algorithm, diophantine equations, prime numbers, congruences, residues of powers, law of quadratic reciprocity. Prerequisite: Mth 113 or Mth 241.

Mth 347,348. Algebraic Structure.
3 hours each. 3 ①
Topics in groups, rings, fields. Prerequisite: Mth 113 or Mth 241.

Mth 351. **Symbolic Language Programing.**
4 hours. 3 ① 1 ①
More advanced work with ALGOL, introductions to other languages. Prerequisite: Mth 151.

Mth 352. **Machine Language Programing.**
4 hours. 3 ① 1 ①
Machine-language programing for a typical computer. Prerequisite: Mth 251.

Mth 353. **Information Structures.**
4 hours. 3 ① 1 ①
Data bases: their structure, processing, and transformation. Special attention to lists and trees. Prerequisite: Mth 251.

Mth 355. **Automata.**
3 hours. 3 ①
The Turing machine, strings, Church's hypothesis, some unsolvability problems. Prerequisite: Mth 251 or Mth 351 or Mth 352.

Mth 358,359. **Introduction to Numerical Calculus.**
3 hours each. 3 ①
Solutions of equations in one unknown, curve fitting, interpolation, numerical differentiation and integration, list sorting, table look-up. Prerequisite: Mth 113 and either Mth 351 or Mth 352.

Mth 361. **Probability.**
3 hours. 3 ①
Combinatorial problems, continuous distributions, expectation, laws of large numbers. Prerequisite: Mth 111 or Mth 108.

Mth 362. **Finite Differences.**
3 hours. 3 ①
Difference techniques used in finite integration and series summation, solution of difference equations. Prerequisite: Mth 111.

Mth 363. **Linear Programing and Games.**
3 hours. 3 ①
Optimization subject to linear constraints, zero-sum two-person games, industrial and economic problems. Prerequisite or parallel: Mth 241.

Mth 371,372. **Principles and Axioms of Mechanics.**
3 hours each. 3 ①
A mathematically rigorous description of several axiomatic approaches to analytical mechanics. Prerequisite: Mth 313.

Mth 373. **Introduction to Applied Mathematics.**
3 hours. 3 ①
Mathematical models as axiom systems: axiom systems for the physical and life sciences. Vector spaces and groups: their applications in finite mathematics, chemistry, and physics. Vector fields, dynamical systems, and transformation groups in the physical and life sciences. Role of probability and statistics. Prerequisite: Mth 241,322.

Mth 390. **Junior Honors.**
1 hour each term, 3 terms. 1 ①
Enrollment in School of Science Honors Program or consent of instructor required.

Mth 401. **Research.**
Mth 403. **Thesis.**
Mth 405. **Reading and Conference.**
Mth 407. **Seminar.**
Terms and hours to be arranged.

Mth 411,412,413. **Real Analysis.** (G)
3 hours each term. 3 ①
Logically rigorous examination of the calculus. Prerequisite: Mth 312.

Mth 414. **Vector Analysis.** (G)
3 hours. 3 ①
Calculus of functions of two or more variables. Prerequisite: Mth 322.

Mth 415. **Orthogonal Series.** (G)
3 hours. 3 ①
Fourier series and their convergence; expansions in terms of other orthogonal functions. Prerequisite: Mth 312.

Mth 416. **Complex Functions.** (G)
3 hours. 3 ①
Analytic functions of a complex variable. Prerequisite: Mth 312.

Mth 421,422,423. **Theoretical Differential Equations.** (G)
3 hours each term. 3 ①
Ordinary differential equations including existence theorems, systems, and nonlinear oscillation theory. Prerequisite: Mth 312 and Mth 321.

Mth 424,425,426. **Partial Differential Equations of Physics.** (G)
3 hours each term. 3 ①
Second order partial differential equations governing various physical phenomena; orthogonal expansions, Green's functions. Prerequisite: Mth 312 and Mth 321.

Mth 427. **Calculus of Variations.** (G)
3 hours. 3 ①
Minimization of integrals involving functions of one or more variables. Prerequisite: Mth 312 and Mth 321.

Mth 428,429. **Linear Integral Equations.** (G)
3 hours each. 3 ①
Conversion of differential problems into linear integral equations of Volterra and Fredholm types, solutions by iteration and other methods, existence theories, eigenvalue problems and the Hilbert-Schmidt theory of symmetric kernels. Prerequisite: Mth 312, Mth 321 and Mth 341.

Mth 431,432,433. **Principles of Geometry.** (G)
3 hours each term. 3 ①
Hilbert's axioms. Coordinate systems and linear transformations: the affine and projective groups and geometries. Moebius transformations: the elliptic, parabolic and hyperbolic groups and geometries. Prerequisite: 6 hours from Mth 331-348.

Mth 434,435,436. **Differential Geometry.** (G)
3 hours each term. 3 ①
Surfaces in Euclidean space, fundamental forms, equations of structure, curvature; global theory. Prerequisite: Mth 241,312.

Mth 440. **Selected Topics in Number Theory.** (G)
3 hours each term. 3 ①
May be repeated for credit. Consent of instructor required.

Mth 441,442. **Linear Algebra.** (G)
3 hours each. 3 ①
Matrix algebra, norms, quadratic forms, canonical reductions. Prerequisite: Mth 341.

Mth 443. **Multilinear Algebra.** (G)
3 hours. 3 ①
Multilinear forms and transformations, algebra of tensors. Prerequisite: Mth 442.

Mth 444. **Logic and Boolean Algebra.** (G) 3 hours. 3 ①
Sentences, quantifiers, truth functions; the sentential calculus, Boolean algebra, lattices. Prerequisite: Any 6 hours from Mth 312, Mth 333-348, Phl 461.

Mth 447,448. **Abstract Algebra.** (G)
3 hours each term. 3 ①
Groups; rings and ideals; polynomials and unique factorization rings; modules and vector spaces; fields. Prerequisite: Mth 241; 3 hours from Mth 242,347,441,444.

Mth 451,452,453. **Numerical Calculus.** (G) 3 hours fall, winter, spring. 3 ①
Mth 451: Matrix problems; theory and programing of numerical techniques. *Mth 452:* Ordinary differential equations: theory and programing of numerical techniques. *Mth 453:* Partial differential equations: theory and programing of numerical techniques. Prerequisite: Mth 341 and Mth 359.

Mth 454. **Computer Logic.** (G)
3 hours. 3 ①
Algebra of n Boolean variables as applied to switching circuits; the minimization problem and the theory of prime implicants, Boolean matrices. Prerequisite: Mth 444.

Mth 456. **Selected Topics in Design of Information Systems.** (G)
3 hours each term. 3 ①
May be repeated for credit. Prerequisite: Consent of instructor.

Mth 457,458. **Systems Programing.** (G)
3 hours each. 3 ①
Theory and construction of monitors, interpreters, simulators, assemblers, and compilers. Prerequisite: Mth 351,352,353.

Mth 461,462,463. **Mathematical Methods in Statistics.** (G)
3 hours each term. 3 ①
Sampling distributions, estimation and tests of hypotheses. Prerequisite: Mth 312 and Mth 341. (Equivalent to St 481,482,483.)

Mth 464,465,466. **Theory of Probability.** (G) 3 hours each term. 3 ①
Random variables, central limit theorem; distributions of standard statistics; Markov chains, continuous and discontinuous stochastic processes. Prerequisite: Mth 312 and Mth 341.

Mth 467. **Finite Markov Chains.** (G)
3 hours. 3 ①
Classifications of states; transition matrix and fundamental matrices; limiting behavior and passage times; random walks, applications. Prerequisite: Mth 241.

Mth 468,469. **Mathematical Programing.** (G)
3 hours. 3 ①
General concepts and algorithms of linear programing and distribution. Integer, quadratic, and dynamic programing. Kuhn-Tucker conditions. Prerequisite: Mth 363 or equivalent, Mth 211.

Mth 472,473. **Mechanics of Continua.** (G) 3 hours each. 3 ①
Elements of tensor theory with applications to study of continuous matter: fluids, plastics, elastic solids. Prerequisite: Mth 312, or Mth 322 and consent of instructor.

Mth 481,482,483. **Mathematical Methods for Engineers and Physicists.** (g)
3 hours each term. 3 ①
Vibrating systems, boundary value problems in electricity and elasticity, operational calculus, numerical methods and techniques of operations research. Prerequisite: Mth 322.

Mth 487,488,489. **Numerical Methods for Scientists.** (g)
3 hours each term. 3 ①
Finite differences; interpolation, numerical integration, linear systems, polynomials, differential equations. Primarily for advanced students in physical or engineering science. Prerequisite: Mth 321 or 6 hours of upper division mathematics.

Mth 491,492,493. **Mathematics for Secondary Teachers.** (g)
3 hours each term. 3 ①
Mth 491: arithmetic. *Mth 492:* algebra. *Mth 493:* geometry. Study in depth of the new curricula, especially those being developed by the School Mathematics Study Group. Prerequisite: 3 hours of upper division mathematics.

Mth 494. **Foundations of Elementary Mathematics.** (g)
3 hours. 3 ①
Logical development of selected portions of arithmetic, algebra, and geometry. Prerequisite: 3 hours of upper division mathematics.

Mth 495. **History of Elementary Mathematics.** (g)
3 hours. 3 ①
Arithmetic, algebra, and geometry from ancient times into the modern era. Prerequisite: 3 hours of upper division mathematics.

Mth 496. **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.

Graduate Courses
See also courses marked (g) and (G) above.

Mth 501. **Research.**
Mth 503. **Thesis.**
Mth 505. **Reading and Conference.**
Mth 507. **Seminar.**
Terms and hours to be arranged.

Mth 510. **Foundations of Analysis.**
3 hours. 3 ①
Axiomatic development of the real number system. Prerequisite: Mth 411.

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 414,415,416.

Mth 514,515,516. **Measure and Integration.**
3 hours each term. 3 ①
Mth 514: one-dimensional Lebesgue measure and integral, convergence in mean. *Mth 515, 516:* functions of two or more real variables, other generalizations and applications. Prerequisite: Mth 413; or Mth 415,416, 510.

Mth 521. **Sequential Hilbert Space.**
3 hours. 3 ①
Denumerably infinite dimensional spaces with quadratic norms; linear functionals and operators, bounds; strong and weak convergence; complete continuity, solution of infinite linear systems. Prerequisite: Mth 441.

Mth 522,523. **Abstract Hilbert Space.**
3 hours each. 3 ①
Inner product spaces, both separable and nonseparable. Linear operators, spectral problems. Prerequisite: Mth 514 and Mth 521.

Mth 527,528,529. **Partial Differential Equations.**
3 hours each term. 3 ①
Advanced theory, including existence proofs. Prerequisite: Mth 426 and Mth 513.

Mth 531,532. **Topology.**
3 hours each. 3 ①
Point sets, metrisation, compactness, continua, mappings. Prerequisite: Mth 413.

Mth 533. **Simplicial Homology.**
3 hours. 3 ①
Simplicial complexes, chain complexes, and homology; Brouwer and Lefshitz fixed-point theorems. Prerequisite: Mth 413.

Mth 534,535,536. **Algebraic Topology.**
3 hours each term. 3 ①
Simplicial and singular homology, products, and cohomology; applications to fixed-point and separation theorems. Topics selected from homotopy, manifold and obstruction theory. Prerequisite: Mth 533.

Mth 537,538,539. **Differential Geometry of Manifolds.**
3 hours each term. 3 ①
Differentiable manifolds, connections in linear bundles, Riemannian manifolds and submanifolds. Selected topics, such as variational theory of geodesics, harmonic forms, and characteristic classes. Prerequisite: Mth 413, 442 or equivalent.

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 442 and Mth 447.

Mth 551,552. **Algorithmic Theory and Applications.**
3 hours each term. 3 ①
Markov's normal algorithm, Turing machines, Post's Tag systems. Problems of encoding, the fixed word-length stored program computer, list processors. Unsolvability. Prerequisite: Mth 454.

Mth 554. **Formal Languages.**
3 hours. 3 ①
Characteristics of a good computer input language; ALGOL and its extensions. Languages for symbol manipulation. Prerequisite: Mth 551.

Mth 561,562,563. **Applications of Stochastic Processes.**
3 hours each term. 3 ①
Various types of random processes occurring in the physical and biological sciences, engineering and management. Prerequisite: Mth 466; or Mth 413 and Mth 463. (Equivalent to St 561,562,563.)

Mth 564,565,566. **Topics in Probability Theory.**
3 hours each term. 3 ①
A theoretical course, based on measure theory. Prerequisite: Mth 519.

Mth 581,582,583. **Functional Analysis.**
3 hours each term. 3 ①
Linear transformations on Banach and other topological spaces; nonlinear problems, multilinear operators, Frechet differentials. Applications to differential and integral equations and selected topics in analysis. Prerequisite: Any 12 hours from Mth 441-443, 510-536.

Mth 587,588,589. **Banach Algebras.**
3 hours each term. 3 ①
Function algebras, spectrum, structure space of a commutative Banach algebra; further properties of commutative Banach algebras; commutative harmonic analysis; self-adjoint Banach algebras; dual algebras; C^*-algebras, and operator algebras in Hilbert spaces. Prerequisite: Mth 448,582.

Mth 596. **Selected Topics in Geometry.**
3 hours. 3 ①
May be repeated for credit. Consent of instructor required.

Mth 597. **Selected Topics in Classical Analysis.**
3 hours. 3 ①
May be repeated for credit. Consent of instructor required.

Mth 598. **Selected Topics in Numerical Analysis.**
3 hours. 3 ①
May be repeated for credit. Consent of instructor required.

Mth 599. **Selected Topics in Functional Analysis.**
3 hours. 3 ①
May be repeated for credit. Consent of instructor required.

MICROBIOLOGY

Microbiology deals with the forms and activities of bacteria, yeasts, molds, and viruses. Undergraduate students may elect a major in this field, either for a liberal arts degree or as preparation for professional service in microbiology and allied fields. The first two years of the microbiology curriculum include a thorough background in chemistry, biology, and liberal arts. During the third and fourth years students may specialize in some area of microbiology.

Many specialized fields of microbiology are available to the student and research worker. These include fundamental aspects such as the physiology, structure, or genetics of microorganisms, the applications of microbiology concerned with soil fertility, marine environments, food and dairy production and processing, industrial fermentation and biotransformation processes, sanitation, immunology, and human, animal, and plant diseases. Undergraduate studies in these areas will prepare students for admission to graduate programs in microbiology.

Undergraduate majors who plan to pursue a graduate program should elect the Microbiology curriculum. Undergraduate majors planning to terminate this training with the bachelor's degree may elect the Environmental Microbiology curriculum.

GENERAL MICROBIOLOGY

Lower Division Course

Mb 130. **Introductory Microbiology.**
3 hours any term. 2 ① 1 ②
Microbiology applied to everyday living. Relationships of microorganisms to sanitation, foods, water, soil, industry, and medicine. Science elective for students in agriculture, home economics, engineering, humanities and social science.

Upper Division Courses
Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

Mb 304. **General Microbiology.**
5 hours fall and spring. 3 ① 2 ②
The study of microbes as biological entities, with primary emphasis on growth, cytology, physiology, genetics, energetics and classification. Prerequisite: one year of chemistry.

Mb 305. **General Microbiology.**
4 hours winter. 2 ① 2 ②
Techniques and application of microbiology to foods, water, soil, industry, and medicine. Prerequisite: Mb 304.

Mb 306. Advanced General Microbiology.
5 hours spring. 3 ① 2 ③
The physiological and genetic properties of microorganisms: microbial structure and function, metabolism, biosynthesis and regulation mechanisms, genetic properties, and bacterial viruses. Prerequisite: Mb 304; Ch 228,229 or equivalent.

Mb 321. Sanitation.
See DIVISION OF PHYSICAL EDUCATION.

Mb 322. Communicable and Noncommunicable Diseases.
See DIVISION OF PHYSICAL EDUCATION.

Mb 401. Research.
Mb 403. Thesis.
Mb 405. Reading and Conference.
Terms and hours to be arranged.

Mb 407. Seminar.
1 hour each term. Staff.

Mb 420. Systematic Microbiology. (G)
5 hours winter. 3 ① 2 ②
Nomenclature and classification, methods in taxonomy; biology and taxonomy of groups of bacteria. Prerequisite: Mb 304.

Mb 424,425,426. Community Health Problems. (g)
See DIVISION OF PHYSICAL EDUCATION.

MEDICAL MICROBIOLOGY

Mb 430. Pathogenic Microbiology. (G)
3 hours fall. 3 ①
Bacteria pathogenic for man, emphasizing morphological, physiological, and disease-producing properties; methods of isolation and identification. Prerequisite: Mb 304; two years of chemistry.

Mb 431. Pathogenic Microbiology Laboratory. (G)
2 hours fall. 2 ③
Laboratory studies to accompany Mb 430.

Mb 432. Immunology and Serology. (G)
3 hours winter. 3 ①
Theory and applications of immunity in infectious diseases and of serological reactions in diagnosis of disease and in medicolegal problems. Prerequisite: Mb 430.

Mb 433. Immunology and Serology Laboratory. (G)
2 hours winter. 2 ③
Laboratory exercises to accompany Mb 432. Prerequisite: Mb 431.

Mb 434. Virology. (G)
3 hours spring. 3 ①
Properties of viruses, serological reactions, cultivation. Emphasis on animal viruses, including the major groups and their relation to disease. Prerequisite: Mb 430,432; BB 451.

Mb 435. Virology Laboratory. (G)
2 hours spring. 2 ③
Laboratory experiments to accompany Mb 434.

INDUSTRIAL AND ENVIRONMENTAL MICROBIOLOGY

Mb 440. Microbial Contamination Control. (G)
4 hours fall. 2 ① 2 ②
Basic principles in contamination and germicidal treatment; emphasis on microbiological problems and techniques associated with food, air, and water. Prerequisite: Mb 304.

Mb 442. Dairy Microbiology. (G)
4 hours winter. 2 ① 2 ②
Advanced techniques important to dairy and food microbiologists; control of microorganisms in production and handling; emphasis on bacteria, yeasts, molds, and bacteriophages in cultured milks and cheeses; metabolism and genetics of lactic acid bacteria. Prerequisite: Mb 304.

Mb 444. Food Microbiology. (G)
4 hours spring. 2 ① 2 ②
Continuation of Mb 442. Role of microorganisms in food spoilage, preservation, food infection, and intoxication; methods of examining food. Prerequisite: Mb 304.

Mb 446. Biotransformation Processes. (G)
3 hours spring. 3 ①
Microbial culture techniques for production of cells, enzymes, and metabolites; related biotransformation and co-oxidation processes. For advanced students in microbiology, chemistry, pharmacy, and chemical engineering. Prerequisite: Mb 306 or equivalent; two years of chemistry, including organic.

Mb 447. Biotransformation Processes Laboratory. (G)
2 hours spring. 2 ②
Laboratory studies to accompany Mb 446.

Mb 450. Marine and Freshwater Microbiology. (G)
4 hours spring. 3 ① 1 ②
Ecology, function, and importance of microorganisms in marine and freshwater environments; microbiology of sedimentary processes, low temperature, hydrostatic pressure, and salinity effects on marine microorganisms, microorganisms in freshwater; water quality control. Prerequisite: Mb 304.

Mb 452. Soil Microbiology. (G)
5 hours fall. 3 ① 2 ③
Soil as a microbial ecological system, including relationships to nutrient cycles and effects of microbial activities on plant and animal life. Prerequisite: Mb 304 or equivalent.

Mb 453. Epidemiology. (G)
See DIVISION OF PHYSICAL EDUCATION.

Graduate Courses

See also courses marked (*g*) and (*G*) above.

Mb 501. Research.
Mb 503. Thesis.
Mb 505. Reading and Conference.
Mb 507. Seminar.
Terms and hours to be arranged.

Mb 550. Microbial Physiology.
3 hours winter. 3 ①
Regulation of cell metabolism; coding, structures, and function. Prerequisite: BB 452 or equivalent; Mb 306 or equivalent.

Mb 552. Microbial Physiology.
3 hours spring. 3 ①
Control and mechanism of macromolecular synthesis in microorganisms. Prerequisite: Mb 550.

Mb 554. Microbial Genetics.
4 hours winter. 2 ① 2 ③
Genetic principles as applied to microorganisms; available techniques and experimental procedures. Prerequisite: Mb 306; BB 452; Bi 341 or equivalent.

Mb 560. Selected Topics in Microbiology.
3 hours fall. 3 ①
Nonsequence course designed to acquaint the student with recent advances. Topics vary and may include radiation microbiology, aerobic and anaerobic sporeformers, photosynthetic and autotrophic bacteria, relation of structure to function in bacteria, microbial nutrition. Prerequisite: Mb 306 or equivalent.

Mb 562. Selected Topics in Microbiology.
3 hours summer. 3 ①
Nonsequence course designed to acquaint the student with recent advances. Topics vary and may include radiation microbiology, aerobic and anaerobic sporeformers, photosynthetic and autotrophic bacteria, relation of structure to function in bacteria, microbial nutrition. Prerequisite: Mb 306 or equivalent.

Mb 590T. Principles and Applications of Microbiology.
4 hours spring. 3 ① 1 ③
Bacteria, molds, yeasts, and viruses; microbiology in agriculture, industry, medicine, and sanitation. Prerequisite: two years of biological science.

NURSING

Nur 111. Backgrounds for Nursing.
3 hours. 3 ①
Modern social and health movements; relation to evolution of nursing as a profession; present aims and problems in nursing at home and abroad. OLSON.

OCEANOGRAPHY

Oceanography is a composite subject that requires the use of mathematics and the basic sciences to study the processes taking place in the oceans and adjacent waters. Oceanographers are usually specialists in one of the sciences but are required to have some training in others.

The Department of Oceanography at Oregon State University prepares students for (1) research and teaching positions with colleges and universities, (2) Civil Service positions with federal or state governments, (3) research and technical positions at oceanographic laboratories, (4) research and instrument development with industry, and (5) applied research related to other areas of study, such as fisheries, geology, meteorology, or engineering.

The department offers work leading to the Ph.D., M.A., and M.S. degrees in Oceanography. Students may specialize in the fields of physical oceanography; biological oceanography; geological oceanography; chemical oceanography; marine, terrestrial, or theoretical geophysics; or marine radioecology. Minors for both the Ph.D. and M.S. degrees are offered to students majoring in other fields.

The prerequisites for graduate work leading to the M.S. degree in oceanography are: (1) a bachelor's degree in one of the following: a physical or biological science, mathematics, or engineering; (2) mathematics through calculus; (3) general chemistry; and (4) general physics. Students are expected to take part in field work and research projects carried out by the department.

Geophysics Options

At Oregon State, course work in geophysics, the application of physics to problems involving the earth and other planets, is offered by the Oceanography Department. Subject matter includes both

marine and terrestrial aspects of the science. The four options preparing students to enter careers in different branches of geophysics lead to M.S. or Ph.D. degrees. All four require course work and a thesis in geophysics, but each has slightly different emphasis.

OCEANOGRAPHY WITH GEOPHYSICS OPTION: Emphasizes marine and terrestrial geophysics for students preparing for careers in general geophysics. Courses in oceanography are required.

APPLIED PHYSICS WITH GEOPHYSICS OPTION: Emphasizes theoretical and laboratory work. Courses required in physics and geology.

GEOLOGY WITH GEOPHYSICS OPTION: Emphasizes use of geophysical methods to solve geological problems. Courses required in geology.

APPLIED MATHEMATICS WITH GEOPHYSICS OPTION: Emphasizes use of applied mathematical methods in theoretical geophysical problems. Courses in mathematics, physics, and geology are required.

Lower Division Course

Oc 133. Elements of Oceanography.
3 hours any term. 3 ①
Development of principles of oceanography by pioneers in the field; their backgrounds and contributions; ships and equipment used from Polynesian times to present. For freshmen and sophomores only. Not offered 1970-71.

Upper Division Courses

Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

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 441. Marine Radioecology. (G)
3 hours winter. 3 ①
See GENERAL SCIENCE.

Oc 441. Biological Oceanography. (G)
4 hours fall. 3 ① 1 ③
Physical, chemical, and biological factors characterizing marine environment; factors controlling plant and animal populations; methods of sampling, identification, and analysis. Prerequisite: 18 hours of upper division science.

Oc 442. Marine Zooplankton. (G)
5 hours winter. 3 ① 2 ③
Floating animal life in the sea; population and production; regional distribution; sampling; identification, nuisance forms. Prerequisite: two years of biology or Oc 441.

Mb 450. Marine and Freshwater Microbiology. (G)
4 hours spring. 3 ① 1 ②
See MICROBIOLOGY.

Oc 451. Chemical Oceanography. (G)
4 hours winter. 3 ① 1 ③
Chemical composition of sea water; standard chemical methods for oceanographers; salinity, pH, dissolved gases, nutrients, carbonate cycle, geochemistry, and extraction. Prerequisite: Ch 203 or 205; consent of instructor.

Oc 461. Geological Oceanography (G)
4 hours spring. 3 ① 1 ②
Sedimentation, bottom topography, erosion, shorelines, and physics; sampling and analysis of marine sediments.

Oc 471. Physical Limnology. (g)
3 hours winter. 3 ①
Geological and physical processes in lakes, rivers, and reservoirs; procedures for field studies in physical limnology. Prerequisite: Mth 51; 18 hours of science.

Oc 480. Marine Geophysics. (G)
3 hours fall. 3 ①
For students with limited experience in geophysics. Prerequisite: one year each of geology, physics, and calculus.

Graduate Courses

See also courses marked (g) and (G) above.

Oc 501. Research.
Oc 503. Thesis.
Oc 505. Reading and Conference.
Oc 507. Seminar.
Terms and hours to be arranged.

Oc 521. Marine Radioecology.
3 hours. 3 ①
Artificial radionuclides in the marine environment, their measurement, identification; their uptake and transference through marine food chains. Prerequisite: Ch 419.

Oc 529. Special Topics in Marine Radioecology.
1, 2, or 3 hours any term.
1 ①, 2 ①, or 3 ①

Oc 531. Descriptive Physical Oceanography I.
4 hours fall. 3 ① 1 ②
Descriptive and statistical information on the following physical processes observed in the oceans; air-sea interaction; heat, water, and salt budget; variations in density; waves; tides; estuaries. Prerequisite: one year of college physics; differential and integral calculus.

Oc 532. Descriptive Physical Oceanography II.
4 hours winter. 3 ① 1 ②
Descriptive and statistical information on the following physical processes observed in the oceans: surface currents, water masses, mixing, deep circulation, regional physical oceanography, upwelling and observations in Oregon coastal waters. Prerequisite: Oc 531; one year of college physics, differential and integral calculus.

Oc 542. Marine Nekton.
3 hours spring. 3 ①
Squid, fishes, and marine mammals; vertical and horizontal distribution; migrations; physical, chemical, and biological factors affecting distribution and abundance; foodchain relationships; special problems of deep-sea life; methods of sampling. Prerequisite: Oc 441 or equivalent.

Oc 543. Marine Nekton Laboratory.
1 hour spring. 1 ③
Oc 542 to be taken concurrently.

Oc 544. Marine Phytoplankton Ecology.
3 hours fall. 3 ①
Floating plant life in the sea and estuaries; systematics and distribution; physiology; population dynamics; environmental factors; artificial cultivation; effect upon environment and position in food webs. Prerequisite: Oc 331 or Oc 441 or two years of biology.

Oc 545. Marine Phytoplankton Physiology.
3 hours winter. 3 ①
Life processes of plankton algae: energy-capturing processes, mineral nutrition, flotation mechanisms, cell division. Evaluation of experimental procedures; problems of existence in the open ocean; artificial production of maximum yields. Prerequisite: Oc 544.

Oc 546. Marine Primary Production.
5 hours spring. 3 ① 2 ③
Experimental procedures for measuring primary biological production. Evaluation of experimental results and their interpretation. Consent of instructor required. Prerequisite: Oc 545.

Oc 547. Marine Phytoplankton Systematics.
3 hours winter. 1 ① 1 ⑥
Classification, identification, and geographic distribution of marine phytoplankton; biometry and problems of speciation; techniques of sampling, preparation of specimens for examination and identification, use of literature. Prerequisite: Oc 441 or Oc 544. Offered alternate years. Offered 1970-71.

Oc 548. Marine Benthic Ecology.
4 hours fall. 3 ① 1 ③
Ecology of the marine bottom environment; marine and estuarine bottom communities; effects of the environment on distribution and abundance of fauna; adaptations to the environment; population dynamics. Prerequisite: Z 451,452.

Oc 549. Special Topics in Biological Oceanography.
1, 2, or 3 hours any term.
1 ①, 2 ①, or 3 ①

Oc 552. Chemical Oceanography.
4 hours winter. 3 ① 1 ③
Chemical composition and properties of sea water; standard chemical methods of determining salinity, pH, dissolved gases, nutrients; carbon dioxide and nutrient cycles; chemical equilibria in sea water; organic matter; biogeochemistry. Prerequisite: undergraduate degree in chemistry.

Oc 553. Descriptive Chemical Oceanography.
4 hours fall. 4 ①
Reasons for observed distributions and cycles of chemical species in seawater. Applications of these distributions to the study of water masses, exchange with the atmosphere, biological production, and sedimentation. Prerequisite: Oc 451 or Oc 552.

Oc 554. Theoretical Chemical Oceanography.
4 hours fall. 4 ①
Thermodynamics of chemical reactions in seawater at atmospheric and at high pressures, illustrated mainly by the carbon dioxide-carbonate system. Physico-chemical properties of seawater. Prerequisite: one year of physical chemistry.

Oc 559. Special Topics in Chemical Oceanography.
1, 2, or 3 hours any term.
1 ①, 2 ①, or 3 ①

Oc 561. Geology of Ocean Basins.
3 hours fall. 3 ①
Comparison of oceanic and continental blocks; morphology, geophysical nature and structure of ocean basins. Development of the earth's crust; world-wide geotectonic concepts and the origin of ocean basins and continents. Required for geological oceanography majors.

Oc 562. Marine Geology of the Continental Margin.
3 hours winter. 3 ①
Sediments and sedimentation processes of the coastal plain, nearshore zone, continental shelf and continental slope. Facies of continental shelf sediments; structure, history, and genesis of the continental margins. Recent marine sediments as a key to the interpretation of ancient sedimentary deposits.

Oc 563. Deep-Sea Sediments.
3 hours spring. 3 ①
Nature and distribution of deep-sea deposits; factors controlling the distribution of terrigenous, volcanic, biogenic and authigenic components; diagenesis and redistribution at the ocean floor; ancient deep-sea sediments.

Oc 564. **Mineralogy of Marine Sediments.**
3 hours fall. 2 ① 1 ③
Identification and quantitative determination of fine-grained minerals in marine, especially deep-sea, sediments; structural characteristics and genesis of important mineral groups; application of laboratory techniques, particularly X-ray diffraction, to specialized research problems.

Oc 565. **Stratigraphy of Marine Sediments.**
3 hours winter. 3 ①
History of ocean basins as revealed by sedimentary deposits; interpretation of paleontological, geological, and geophysical data and uses of these data in stratigraphic correlations. Prerequisite: Oc 561,563. Offered alternate years.

Oc 566. **Ecology of Foraminifera.**
3 hours winter. 3 ①
Morphology and physiology; physical, chemical, and biological controls on the distribution and abundance of benthic and planktonic foraminifera; gross population trends; seasonal variations in faunas; applications to other fields. Prerequisite: Oc 441 or G 540 or two years of biology. Offered alternate years.

Oc 567. **Marine Micropaleontology I: Foraminifera.**
4 hours fall. 2 ① 2 ③
Systematics and taxonomy; laboratory identification and classification; field and laboratory techniques, use of literature; numerical analysis of faunas; familiarization with bathymetric and zoogeographic index species of benthic and planktonic foraminifera; specialized research problems.

Oc 568. **Marine Micropaleontology II: Radiolaria and Calcareous Nannoplankton.**
4 hours spring. 2 ① 2 ③
Stratigraphic distribution; systematics and taxonomy of Radiolaria and calcareous nannoplankton; distribution and abundance of faunas; laboratory identification and classification.

Oc 569. **Special Topics in Geological Oceanography.**
1, 2, or 3 hours any term.
1 ①, 2 ①, or 3 ①

Oc 571. **Theoretical Physical Oceanography I.**
4 hours fall. 3 ①, 1 ②
Physics of fluids, basic properties of sea water and sea ice. Introduction to fluid dynamics, with emphasis on derivation of the equations of motion from first principles. Prerequisite: two years of college physics; mathematics through vector calculus.

Oc 572. **Theoretical Physical Oceanography II.**
4 hours winter. 3 ① 1 ②
Theoretical treatment of surface gravity and capillary waves, internal waves, and wave spectra. Theory of wave forecasting. Development of the equations of motion for rotating coordinate systems, and consideration of possible solutions. Prerequisite: Oc 571.

Oc 573. **Theoretical Physical Oceanography III.**
4 hours spring. 3 ① 1 ②
Basic theories of tides; heat transfer across the sea-air interface; thermohaline circulation; and theoretical discussion of the behavior of light and sound in the sea. Prerequisite: Oc 572.

Oc 574. **Wave Dynamics.**
4 hours spring. 3 ① 1 ②
Linear and non-linear surface capillary and gravity waves; theories of wind wave generation, interaction, and decay. Linear and nonlinear wave statistics. Prerequisite: Oc 573.

Oc 575. **Marine Hydrodynamics.**
4 hours fall. 4 ①
Dimensional analysis; major theories and analyses of motion in oceans; dynamic computation; special problems in Pacific Ocean circulation. Term paper required. Prerequisite: Oc 573.

Oc 579. **Special Topics in Physical Oceanography.**
1, 2, or 3 hours any term.
1 ①, 2 ①, or 3 ①
Consent of instructor required.

Oc 580. **Theoretical Geophysics: Sound Transmission.**
2 hours winter. 2 ①
Fundamental relations of acoustic wave transmission in the sea; shallow water and deep water transmission, reflectivity, attenuation. Prerequisite: Oc 582.

Oc 581. **Theoretical Geophysics: Earth Gravity.**
3 hours fall. 3 ①
Gravity field and gravity potential, earth ellipsoid; gravity measurements (sea, land, and space), reduction of gravity measurements; gravity anomalies, isostasy, deviations from isostatic equilibrium; internal constitution of the earth. Prerequisite: differential equations; two years of physics; one year of geology; Oc 480 or equivalent.

Oc 582. **Theoretical Seismology.**
3 hours fall. 3 ①
Wave propagation in one-dimensional structures; stress and strain in liquids and solids; propagation of waves in linearly elastic solids; basic solutions, body waves, surface waves, and propagation of elastic energy; theory of guided waves and waves in layered media. Fundamental oscillation modes of the earth. Prerequisite: differential equations; complex functions.

Oc 583. **Earthquake Seismology.**
3 hours spring. 3 ①
Description of earthquakes; types of earthquakes; seismograph theory; seismic ray paths; velocity determinations; shallow and deep earthquakes; magnitude and energies of earthquakes; locating earthquakes; microseisms; seismicity. Prerequisite: Oc 582.

Oc 584. **Physics of the Earth.**
3 hours winter. 3 ①
Effects of confining pressure, temperature, time, and solutions on properties of rocks; earth and moon in solar system; source materials and their reliabilities for determining nature and composition of the earth; composition of core, crust, and mantle; processes within the earth with special reference to their effect on earthquakes, isostasy, crustal structure, island arcs. Prerequisite: differential equations; two years of physics; one year of geology.

Oc 586. **Theoretical Geophysics: Magnetics.**
3 hours winter. 3 ①
Geomagnetic field and magnetic potential; general morphology, secular change, magnetic storms; magnetic measurements, reduction of magnetic measurements; magnetic anomalies, application to structure and composition of crust, mantle, and core of earth. Prerequisite: differential equations; two years of physics; one year of geology; Oc 480 or equivalent.

Oc 589. **Special Topics in Geophysics.**
1, 2, or 3 hours any term.
1 ①, 2 ①, or 3 ①
Permission of instructor required. STAFF.

Oc 590T. **Biological Oceanography for Teachers.**
3 hours summer. 3 ①
See ACADEMIC YEAR INSTITUTE, page 80.

Oc 591T. **Physical Oceanography for Teachers.**
3 hours summer. 3 ①
See ACADEMIC YEAR INSTITUTE, page 80.

Oc 592T. **Geological Oceanography for Teachers.**
3 hours summer. 3 ①
See ACADEMIC YEAR INSTITUTE, page 80.

Oc 593T. **Chemical Oceanography for Teachers.**
3 hours summer. 3 ①
See ACADEMIC YEAR INSTITUTE, page 80.

PHYSICS

Physics is the study of the fundamental structure of matter and the interactions of its constituents. Physicists are concerned with the continuing development of concepts needed for a precise description of nature and with experiments to test such concepts.

For students of the arts and letters, the study of physics provides an introduction to modern ideas about the most fundamental and elemental aspects of nature. For students in all scientific and technical fields, physics is a basic and indispensable tool. Students majoring in physics may prepare for careers in teaching, research, industry, or government.

The department offers two different approaches to the study of physics at the undergraduate level: one stressing more detailed and advanced preparation for graduate study in experimental and theoretical physics, and the other providing the fundamental ideas of physics as a science for students planning to do graduate work in one of the allied fields (biophysics, geophysics, atmospheric physics, chemical physics, physical oceanography) or to go into high school physics teaching or science administration. The program is flexible, so that the student may follow either plan, or a combination of the two, in accordance with his interest or aptitude.

Recommended preparation for undergraduate physics majors includes one year of biology, chemistry, and physics; four years of mathematics through analytic geometry; and two to three years of a foreign language, preferably French or German. Students who enter without this preparation may be delayed in their progress toward graduation.

Lower Division Courses

Ph 111,112,113. **Abridged General Physics.**
3 hours each term. 1 ① 2 ②
Mechanics, heat, sound, light, electricity, magnetism, and modern physics.

Ph 201,202,203. **General Physics.**
4 hours each term. 3 ① 1 ① 1 ②
Mechanics, sound, heat, light, electricity, magnetism, and modern physics. Prerequisite: Mth 51, 60 or equivalent.

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. Prerequisite: Ph 113 or 203.

Ph 211,212,213. **General Physics I.**
4 hours each term. 2 ② 1 ③
Mechanics, oscillations, sound, electricity, and magnetism. Prerequisite: one year of high school physics or acceptable college aptitude scores. Corequisite: three terms from Mth 110, 111,112,113.

Ph 221,222,223. **Physics I.**
5 hours each term. 3 ① 1 ① 1 ③
Concepts and elementary techniques of physics. Part of a 6-term sequence covering the major area of physics, classical and modern. Emphasis in the present course will be principally, but not exclusively, classical. Prerequisite: one year of high school physics or acceptable college aptitude scores. Corequisite: three terms from Mth 110,111,112,113.

Upper Division Courses

Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

Ph 311,312,313. **General Physics II.**
3 hours each term. 2 ① 1 ① 1 ②
Second part of a six-term sequence: kinetic theory, the electron, radioactivity, photoelectricity, thermionic emission, x-rays, electronic devices, gaseous conduction, cosmic rays, atomic physics, solid state, and nuclear physics. Prerequisite: Ph 213 or 223; Mth 113, 211 previously or parallel.

Ph 321,322,323. **Physics II.**
4 hours each term. 3 ① 1 ②
Second part of a six-term physics sequence: waves and oscillations, quantum physics, thermal physics, introductory atomic, nuclear, and particle physics. Prerequisite: Ph 223 or 213.

Ph 401. **Research.**
Ph 403. **Thesis.**
Ph 405. **Reading and Conference.**
Ph 407. **Seminar.**
Terms and hours to be arranged.

Ph 424,425,426. **Mechanics.** (g)
3 hours each term. 3 ①
Kinematics, dynamics of particles and rigid bodies; generalized coordinates. Prerequisite: Ph 213,223; Mth 322.

Ph 430. **Electronics.**
3 hours. 2 ① 1 ③
Thermionic and solid state electronic devices and circuits. Prerequisite: Ph 203 or 213,223.

Ph 431,432,433. **Electromagnetism and Optics.** (g)
4 hours each term. 3 ① 1 ②
Electromagnetic theory; electrical and magnetic measurements; principles and applications of geometrical and physical optics. Prerequisite: Ph 323 or 313; Mth 322.

Ph 437,438,439. **Electronics.**
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 GE 203.

Ph 451,452. **Thermal Physics.** (g)
3 hours each. 3 ①
Fundamental concepts and laws of thermodynamics; entropy and other characteristic functions; kinetic theory of gases; classical and quantum statistical mechanics. Prerequisite: Ph 424.

Ph 471,472,473. **Selected Topics in Classical Physics.** (g)
4 hours each term. 4 ①
Mathematical treatment of classical theories; Lagrangian and Hamiltonian mechanics, Maxwell's equations, electromagnetic theory and physical optics; kinetic theory and statistical thermal physics. Prerequisite: Ph 213 or 223; Mth 322.

Ph 474,475,476. **Selected Topics in Modern Physics.** (g)
3 hours each term. 3 ①
Atomic structure and atomic processes; introduction to quantum mechanics; properties of atomic nuclei; subatomic particles and their behavior. Prerequisite: Ph 313 or Ph 323 or graduate standing in chemistry or engineering and approval of instructor.

Ph 481,482,483. **Quantum Physics.** (g)
3 hours each term. 3 ①
Quantum mechanics, radiation and radiative transitions, atomic spectroscopy, molecular binding and molecular spectra, X-rays, nuclear structures, nuclear forces, nuclear models, particle scattering, particle physics. Prerequisite: Ph 426,433.

Graduate Courses

Graduate courses are given only when warranted by demand. The dates are given when courses are offered alernate years.

Ph 501. **Research.**
Ph 503. **Thesis.**
Ph 505. **Reading and Conference.**
Ph 507. **Seminar.**
Terms and hours to be arranged.

Ph 515. **Relativity.**
3 hours. 3 ①
Application of Lorentz transformation theory to mechanics and electrodynamics; general relativity. Prerequisite: Ph 522.

Ph 517,518,519. **Quantum Mechanics.**
3 hours each term. 3 ①
Transformation theory; quantum mechanical equations of motion and their solutions; transition probabilities; illustrative applications. Prerequisite: Ph 426,476; or equivalent.

Ph 521,522. **Dynamics.**
3 hours each. 3 ①
Lagrangian and Hamiltonian mechanics; canonical transformations; Hamilton-Jacobi theory; continua. Prerequisite: Ph 426.

Ph 531,532. **Electromagnetic Theory.**
4 hours each. 4 ①
Mathematical treatment of classical theories of electricity, magnetism, and radiation. Prerequisite: graduate standing in physics or consent of instructor.

Ph 546,547,548. **Introductory Solid State.**
3 hours each term. 3 ①
Mechanical and thermal properties of crystals; magnetic and dielectric behavior; band theory; theory of metals and semiconductors; superconductivity. Prerequisite: Ph 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 476 or graduate standing in chemistry, mathematics, or engineering.

Ph 551,552,553. **Quantum Physics of Solids.**
3 hours each term. 3 ①
Band theory and methods; Fermi gas; theory of metals; particle interactions, quasi particles; optical and transport properties of metals and semiconductors; theory of magnetism and super conductivity. Corequisite: Ph 574.

Ph 557,558,559. **Statistical Thermophysics.**
3 hours each term. 3 ①
Statistical mechanics; kinetic theory; thermodynamics. Prerequisite: Ph 521 previously or parallel.

Ph 563. **Physical Optics.**
4 hours. 4 ①
Prerequisite: Ph 532.

Ph 567,568,569. **Quantum Field Theory.**
3 hours each term. 3 ①
Quantization of scalar and vector fields. Applications to the physics of solid state, electrodynamics, and elementary particles. Prerequisite: Ph 519.

Ph 571,572,573. **Nuclear Physics.**
3 hours each term. 3 ①
Prerequisite: Ph 519.

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.

Ph 575,576,577. **Experimental Nuclear Physics.**
3 hours each term. 2 ③
Radiation detectors and detecting systems; characteristics and operation of accelerators and reactors; various experiments in nuclear phyiscs using radioactive materials and the OSU machines. Prerequisite: Ph 571,572,573 previously or parallel.

Ph 584,585,586. **Atomic Interactions.**
3 hours each term. 3 ①
Elastic and inelastic scattering; structure of atoms, molecules, and ions; spectra; transition probabilities. Prerequisite: Ph 519.

Ph 587,588,589. **Plasmas in Gases and Solids.**
3 hours each term. 3 ①
Electrical, mechanical, and thermal properties of gases and solids; plasma theories and experiments. Prerequisite: Ph 519.

SCIENCE EDUCATION

Graduate Courses for Secondary School Science Teachers

ACADEMIC YEAR INSTITUTE

The following courses are designed for experienced high school science and mathematics teachers as a part of the Academic Year Institute program sponsored by the National Science Foundation. They also may be taken by other experienced high school teachers working toward the Master of Science degree, but may not be used for a departmental major.

Bot 590,591T. **Fundamentals of Plant Science.**
4 hours winter and spring. 3 ① 1 ③
Growth, reproduction, and distribution of plants; recent advances and new techniques of investigation, integration of information, and application to teaching and research problems in botany. Prerequisite: two years of biological science. DEEP, JONES.

Ch 590,591T. **Fundamental Principles of Chemistry.**
4 hours winter and spring. 3 ① 1 ③
Application in fields of inorganic, organic, analytical, and physical chemistry; recent advances in chemistry. Prerequisite: one year each of chemistry, physics, and mathematics. CALDWELL, YOKE.

G 590T. Principles of Geology.
4 hours fall. 3 ① 1 ③
Rock-forming minerals; common igneous, sedimentary, and metamorphic rocks; gradational processes, diastrophism, and vulcanism. Lectures, field trips, and laboratory. Prerequisite: two years of physical science. WILKINSON.

GE 590T. Engineering Fundamentals.
4 hours fall. 3 ① 1 ③
Basic principles of physical science; material and energy balances, dimensional analysis, stoichiometric calculations, graphical analysis and representation, mass and energy transport, properties of materials. Prerequisite: one year each of college-level physics, chemistry, and mathematics. GLEESON.

Ggs 590T. American Resources and their Conservation.
4 hours winter. 4 ①
America's resource base. Inventory-presented development, climate and topography, soils, water, forest, range, wildlife, minerals, fisheries, and recreation. Special attention to teaching aids, materials, and sources. Prerequisite: two years of biological science. HIGHSMITH.

Mth 590T. Selected Topics for Science Teachers.
4 hours. 4 ①
May be repeated once for credit. Structure of the number system; algebra, analysis, and geometry with stress on mathematical processes. Prerequisite: two years of mathematics.

Mb 590T. Principles and Applications of Microbiology.
4 hours spring. 3 ① 1 ③
Bacteria, molds, yeasts, and viruses; microbiology in agriculture, industry, medicine, and sanitation. Prerequisite: two years of biological science.

Oc 590T. Biological Oceanography for Teachers.
3 hours summer. 3 ①
Factors in the marine environment—physical, chemical, and biological; influences controlling the nekton and plankton populations; food chain relationships; regional distribution and other special problems of sea life; methods of sampling and techniques used in studying marine life. Some field work.

Oc 591T. Physical Oceanography for Teachers.
3 hours summer. 3 ①
Physical processes in ocean and estuary; factors controlling the origin of water masses and currents; waves, tides, and tidal currents. Some field work.

Oc 592T. Geological Oceanography for Teachers.
3 hours summer. 3 ①
Geologic processes in basins, continental margins, shorelines, deltas, and estuaries. Prerequisite: 12 hours of science.

Oc 593T. Chemical Oceanography for Teachers.
3 hours summer. 3 ①
The chemistry of the sea; its chemical composition, methods of analysis, the chemical reactions which occur in the sea and between the sea and the atmosphere, the sediments and living organisms; the origin of sea water; selected topics of interest to teachers. Prerequisite: one year of college chemistry.

Ph 590,591T. Recent Advances in Modern Physics.
4 hours winter and spring. 3 ① 1 ③
Particle and wave phenomena; fundamental physical constants; solid state physics; nuclear physics. Prerequisite: one year each of chemistry, physics, and mathematics. BRADY.

Z 590T. Perspectives in Modern Zoology.
4 hours fall. 3 ① 1 ③
Biological effects of radiation; the gene; cell division; embryonic development; mechanism of nervous transmission; parasite life cycles and host specificity; animal populations; animal homing and migratory movements. Prerequisite: two years of biological science. DORNFELD, staff.

Summer Courses for Secondary School Science Teachers

The courses below 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 Term Catalog.

BB 580T. Biochemistry for Science Teachers.
3 hours summer. 3 ①
Introduction to biochemistry for high school or college teachers. Designed to acquaint teachers with molecular concepts and fundamentals of biochemistry. Prerequisite: organic chemistry.

Bot 521T. Taxonomy and Field Botany.
3 hours summer.

Bot 522T. Preparation of Botanical Materials.
3 hours summer.

Bot 530T. Plant Physiology.
3 hours summer.

Bot 540T. Plant Ecology.
3 hours summer.

Bot 571T. Morphology of Lower Plants.
3 hours summer.

Bot 572T. Morphology and Anatomy of Seed Plants.
3 hours summer.

Ch 560T. Physical Chemistry for Science Teachers.
6 hours summer.
Physical chemical principles applied in engineering and the biological sciences. Use of mathematics minimized, but some knowledge of physics expected.

Ch 561T. Advanced Inorganic Chemistry. 6 hours summer.

Ch 562T. Organic Chemistry.
6 hours summer.

Ch 592T. Inorganic Chemistry for College Teachers.
3 hours summer. 3 ① 1 ③
Valence bond and crystal field theories of the coordinate bond; stereo-chemistry, addition, substitution, isomerization, and oxidation-reduction reactions of coordinate compounds.

Ch 593T. Analytical Chemistry for College Teachers.
3 hours summer. 3 ① 1 ③
Theory, practical application, and use in laboratory of a variety of instruments.

Ch 594T. Organic Chemistry for College Teachers.
3 hours summer. 3 ① 1 ③
Review of some basic concepts leading to a discussion of modern theoretical concepts. Influence of shapes of molecules and intramolecular transmission of electron effects upon reaction mechanisms and reaction rates.

Ch 595T. Physical Chemistry for College Teachers.
3 hours summer. 3 ① 1 ③
Salient points of physical chemistry, combined with computation periods for the solution of typical problems.

Ch 596T. Modern Inorganic Concepts in General Chemistry.
3 hours summer. 3 ① 1 ③
Acid-base theory, ligand field theory, structure and bonding, energy relationships, kinetics and other topics in the college introductory course.

Ch 597T. Radioisotope Chemistry for College Teachers.
3 hours summer. 3 ① 1 ③
Elementary radiochemistry; basic principles of radiotracer methodology; use of radioisotope methods to illustrate principles and phenomena in general, analytical, physical, organic, and biochemistry.

Ent 555T. Natural History of Insects.
3 hours summer.
Phylogeny, biology, anatomy, parasitism, distribution, social behavior; collection, preservation and rearing methods. Prerequisite: one year of biological science.

GS 511T. History of Biological Science.
3 hours summer.

GS 541T. Bioecology.
3 hours summer.

G 517T. Geology for Teachers.
3 hours summer.

G 530T. Historical Geology.
3 hours summer.

G 550T. Rocks and Minerals.
3 hours summer.

G 552T. Geology of Northwest.
3 hours summer.

Mth 591,592T. Selected Modern Topics for Mathematics Teachers.
3 hours each. 3 ①
Introduction to some of the mathematics disciplines which underlie the newer curricula (set theory, Boolean algebra, probability, real numbers theory, etc.). Prerequisite: one year experience teaching high school mathematics.

Ph 520T. Astronomy.
3 hours summer.

Ph 581T. Modern Physics.
3 hours summer.

Ph 582T. Modern Physics.
3 hours summer.

Ph 583T. Modern Physics.
3 hours summer.
Nuclear reactions; molecular and solid state physics. Prerequisite: Ph 582.

Ph 592T. Meteorology.
3 hours summer.

Z 541T. Heredity.
3 hours summer.

Z 554T. Invertebrate Zoology.
3 hours summer.

Z 556T. Collection and Preparation of Zoological Materials.
3 hours summer.

Z 560T. Cells and Tissues.
3 hours summer.

Z 577T. Ornithology.
3 hours summer.

Z 578T. Field Natural History.
3 hours summer.

STATISTICS

The Department of Statistics offers undergraduate service courses, and graduate courses and programs leading to the M.A., M.S., and Ph.D. degrees in statistics and operations research, or to a minor for an advanced degree in other fields. Specialization is available in theory of statistics, operations research, biometry, or applied statistics. Students planning to major in statistics at the graduate level should have a minimum of mathematics through calculus and upper division work in statistics.

Upper Division Courses
Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

St 311,312. Introduction to Statistics.
3 hours each. 3 ①
Descriptive statistics, fundamentals of probability and frequency distributions, sampling distributions, estimation and hypothesis testing, confidence limits, linear regression and correlation, nonparametric methods, analysis of variance. Prerequisite: for *311:* sophomore standing. for *312:* St 311.

St 331. FORTRAN Programming.
3 hours. 3 ①
Computer applications and the use of the FORTRAN language. Prerequisite: previous programming instruction.

St 371,372,373. Basic Statistics and Operations Research.
3 hours each term. 3 ①
Introduction to statistics, programming, linear programming, queue theory, stochastic models. Prerequisite: Mth 211.

St 401. Research.
St 405. Reading and Conference.
St 406. Projects.
St 407. Seminar.
Terms and hours to be arranged.

St 414,415. Data Systems Analysis. (G)
3 hours each. 3 ①
Role of systems analysis; data systems development and design; equipment selection and application; data system implementation. Prerequisite: St 331, Mth 351, or BA 431.

St 417. Computer Simulation. (G)
3 hours. 3 ①
Probability and statistics; direct simulation; generation of pseudo-random numbers; general structure of Monte Carlo simulators. Prerequisite: Computer Programming; Mth 361.

St 426. Regression Analysis. (G)
3 hours. 3 ①
Multiple linear regression; polynomial models; transformations; harmonic analysis; multiple covariates; nonlinear methods. Prerequisite: St 452 or 457.

St 431. Design of Experiments. (G)
3 hours. 3 ①
Principles used; methods of analysis; comparison of designs; interpretation of results. Prerequisite: St 452 or 457.

St 432. Design of Industrial Experiments. (G)
3 hours. 3 ①
Experimental design and analysis of variance; statistical quality control and sampling inspection, reliability, and life testing models. Prerequisite: St 452 or 457.

St 435. Quantitative Ecology. (G)
3 hours. 3 ①
Statistical and mathematical models in ecological theory and application; quantitative theories of communities and populations; theory and practice of sampling and analyzing ecological data; parameter estimation. Prerequisite: St 452.

St 441. Sampling Methods. (G)
3 hours. 3 ①
Simple and stratified random sampling; systematic sampling; cluster sampling; double sampling; area sampling; analytical surveys; estimation of sample size. Prerequisite: St 451 or 456.

St 442. Sampling Theory. (G)
3 hours. 3 ①
The basic sampling model for equal probability selection; basic sampling methods; generalization of the basic model; common applications of the general theory; analytic surveys. Prerequisite: St 441 or St 481.

St 451. Statistical Inference for Biological and Social Sciences. (G)
4 hours. 3 ① 1 ②
Population and sample; notation; descriptive statistics; probability; discrete distributions; continuous distributions; estimation; hypothesis testing. Prerequisite: Mth 50.

St 452. Linear Estimation for Biological and Social Sciences. (G)
4 hours. 3 ① 1 ②
Basic assumptions; method of least squares in general; the one parameter model; two parameter model; elementary matrix concepts; computing methods. Prerequisite: St 451.

St 456. Statistical Inference for Physical and Engineering Sciences. (G)
4 hours. 3 ① 1 ②
Scientific method and applied statistics; frequency distributions; theoretical distributions; probability; sampling and sampling distributions. Prerequisite: Mth 113.

St 457. Linear Estimation for Physical and Engineering Sciences. (G)
4 hours. 3 ① 1 ②
Regression and related topics; analysis of variance; introduction to factorials. Prerequisite: St 456.

St 461. Stochastic Processes in Biology. (G) 3 hours winter. 3 ①
Generating functions, Markov chains, epidemic processes, birth and death processes, competition and predation. Prerequisite: St 481.

Mth 464,465,466. Theory of Probability. (G)
3 hours. 3 ①
See MATHEMATICS for course description.

St 474. Inventory Analysis. (G)
3 hours. 3 ①
Mathematical models for deterministic and stochastic inventory systems. Prerequisite: Mth 464.

St 475. Queues. (G)
3 hours. 3 ①
Theory of stochastic service systems including single and many server queues, queues in series, and simulation methods. Prerequisite: Mth 464.

St 476. Reliability Models. (G)
3 hours. 3 ①
Stochastic models for the failure of complex systems; statistical evaluation of reliability; optimum maintenance policies. Prerequisite: Mth 464.

St 481,482,483. Theory of Statistics. (G)
3 hours each term. 3 ①
Sampling distributions, estimation, and tests of hypotheses. Prerequisite: Mth 211.

Graduate Courses
See also courses marked (*g*) and (*G*) above.

St 501. Research.
St 503. Thesis.
St 505. Reading and Conference.
St 506. Projects.
St 507. Seminar.
Terms and hours to be arranged.

St 521. Time Series Analysis.
3 hours. 3 ①
Principles of analysis of serially correlated data series in both time and frequency domains. Includes filtering, smoothing, Wiener prediction, spectral and cross-spectral analysis, and frequency response studies. Prerequisite: St 483.

St 531. Advanced Experimental Design.
3 hours. 3 ①
Foundations of experimental inference; factorial experiments; incomplete blocks; designs for regression analysis; sequential designs. Prerequisite: St 431.

St 534. Statistical Concepts in Genetics.
3 hours. 3 ①
Genetic probability, quantitative inheritance, designs for estimating genetic parameters, multiple trait selection. Prerequisite: St 452; one graduate course in genetics.

St 550. Distribution Theory.
3 hours. 3 ①
Random variables; characteristic functions; some properties of certain distributions; limit theorems; random sampling; order statistics. Prerequisite: Mth 312,441; St 483.

St 551,552. General Linear Hypothesis.
3 hours each. 3 ①
Multivariate normal and related distributions; moments and characteristic functions; estimation and distribution of estimators; principle of least squares; confidence regions and test of hypothesis; regression models; general weighted least squares. Prerequisite: St 550.

St 553. Multivariate Analysis.
3 hours. 3 ①
The generalized T^2 statistic; the Wishart distribution; the k-sample problem; discriminant functions; principal components; canonical correlation. Prerequisite: St 552.

St 561,562,563. Applications of Stochastic Processes.
3 hours each term. 3 ①
Various types of random processes occurring in the physical and biological sciences, engineering, and management. Prerequisite: Mth 413; St 483 or Mth 465. (Equivalent to Mth 561,562,563.)

St 571,572,573. Operations Research.
3 hours each term. 3 ①
Statistical methods, queueing theory, linear programming, game theory. Prerequisite: Mth 211; 6 hours of upper division matrix algebra and/or probability.

St 574,575. **Advanced Topics in Mathematical Programming.**
3 hours each. 3 ①
Theory of linear programming; nonlinear programming, dynamic programming. Prerequisite: Mth 413,441; St 573.

St 576. **Integer Programming.**
3 hours spring. 3 ①
Theoretical and applied integer programming. Prerequisite: St 572.

St 581,582,583. **Mathematical Statistics.**
3 hours each term. 3 ①
Structure of probability spaces; decision theoretic approach to estimation and hypothesis testing including admissibility, completeness, Bayes and minimax procedures, sufficiency, unbiasedness, invariance, uniformly most powerful tests; individual study in literature of statistics expected. Prerequisite: St 483; Mth 413; St 550 or Mth 466.

St 591,592,593. **Special Topics.**
3 hours each term. 3 ①
Topics of special and current interest not covered in other courses.

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.

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. Ellis.

Z 117,118,119. **Human Biology Laboratory.** 1 hour each term. 1 ②
Laboratory work to accompany Z 114,115, 116. Ellis.

[1]Z 201,202,203. **General Zoology.**
3 hours each term. 2 ① 1 ③
Introduction to animal biology. For students other than majors in biological sciences. Hisaw, Conte, Morris.

[1] Credit is granted for only one of the following combinations: Z 114,115,116; or Z 201,202, 203; or Bi 211,212,213.

Bi 211,212,213. **Biology.**
5 hours each term. 3 ① 1 ③ 1 ①
See Biology.

Z 311. **Zoological Literature.**
1 hour fall. 1 ①
Use of journals, reference works, bibliographic sources in zoological research. Graded on S-U basis only. Owczarzak.

Upper Division Courses

Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

Ent 314. **General Entomology.**
4 hours winter and spring. 2 ① 2 ②
See Entomology.

Z 321,322. **Elementary Human Anatomy.**
3 hours fall and winter. 2 ① 1 ②
For physical education students. Prerequisite: Z 114,115,116, or equivalent. Johnson.

Z 324. **Comparative Vertebrate Embryology.**
4 hours fall. 2 ① 2 ③
Comparative study of the early development of vertebrates, with a descriptive, experimental, and evolutionary approach. Prerequisite: Bi 213 or Z 203. Hillemann.

Z 325,326. **Comparative Vertebrate Anatomy.**
4 hours winter and spring. 2 ① 2 ③
Comparative study of the development and anatomy of all organ systems of vertebrates, with a descriptive, experimental, and evolutionary approach. Prerequisite: Z 324. Hillemann.

Z 331,332. **Physiology.**
3 hours fall and winter. 2 ① 1 ②
For students in home economics, humanities and social sciences, and physical education; not for zoology majors. Pritchard.

Bi 341. **Genetics.**
3 hours fall or spring. 3 ①
See Biology.

Bi 342. **Genetics Laboratory.**
2 hours fall or spring. 2 ③
See Biology.

Z 345. **Evolution.**
3 hours winter. 3 ①
Patterns and mechanisms, including elementary population genetics, selection, and speciation. Origin and history of life.

Z 351. **Invertebrate Biology.**
5 hours spring. 3 ① 2 ②
Structure and function in invertebrate animals with reference to phylogenetic relationships and evolutionary adaptations to different environments. Prerequisite: one year of biology. Morris.

Bi 360. **Cell Physiology.**
3 hours winter. 3 ①
See Biology.

Bi 361. **Cell Physiology Laboratory.**
2 hours spring. 2 ③
See Biology.

Bi 370. **General Ecology.**
5 hours fall or spring. 3 ① 1 ① 1 ③
See Biology.

Z 371. **Vertebrate Biology.**
5 hours winter. 3 ① 2 ②
Structure, classification, evolution, distribution, and behavior of vertebrates. Prerequisite: one year of biology. Storm, Wiens.

Z 401. **Research.**

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

Ent 416. **Anatomy and Physiology of Insects.** (G)
4 hours winter. 2 ① 2 ②
See Entomology.

Z 425. **Developmental Biology.** (G)
3 hours winter. 3 ①
Fertilization, cleavage, morphogenetic movements; induction and tissue differentiation; regeneration. Prerequisite: Bi 341,360. Harris, Morris, Owczarzak.

Z 426. **Developmental Biology Laboratory.** (G)
2 hours winter. 2 ②
Laboratory work to supplement Z 425. Prerequisite: Bi 341, 360. Harris, Morris, Owczarzak.

Z 431,432. **Physiology.** (g)
4 hours winter and spring. 3 ① 1 ③
Two-term sequence for students in pharmacy, medical technology, zoology, and related areas, and for graduate minors. Prerequisite: Bi 213 or Z 203. Alvarado.

Ent 433. **Aquatic Entomology.** (G)
4 hours spring. 2 ① 2 ②
See Entomology.

Z 434. **General Physiology.** (G)
5 hours fall. 3 ① 2 ③
Physiological processes primarily at the cellular level: cell chemistry and colloidal properties, metabolism, permeability and active transport, muscle contraction, conduction. Prerequisite: Organic chemistry and two years of zoology. Alvarado.

Z 435. **Comparative Physiology.** (G)
5 hours spring. 3 ① 2 ③
Comparative analysis of regulation in physiological systems; respiration, circulation, excretion, osmotic and ionic regulation, nervous systems and coordination. Prerequisite: Z 434 or Z 432. Pritchard.

Z 437. **Biochemical Adaptations.** (G)
3 hours spring. 3 ①
The molecular and metabolic aspects of adaptation in animals. Prerequisite: BB 450, 451, 452. Brookes, Conte.

Ent 450. **Systematics and Adaptations of Insects.** (G)
4 hours fall. 2 ① 2 ②
See Entomology.

Ent 452,453. **Systematic Entomology.** (G)
4 hours winter and spring. 2 ① 2 ②
See Entomology.

Z 451,452. **Invertebrate Zoology.** (G)
5 hours winter and spring. 3 ① 2 ③
Structure, classification, distribution, and life histories of the invertebrates. Prerequisite: two years of zoology. Morris, Pratt.

Z 454. **Principles of Symbiosis.** (G)
4 hours spring. 2 ① 2 ②
Compares basic principles of inter-organismic relationships: animal-animal, animal-plant, plant-plant, plant-animal. Prerequisite: general chemistry; 2 years of biology. Knapp.

Z 456. Parasitology. (G)
4 hours fall. 2 ① 2 ③
Morphology, life cycles, physiological adaptations, evolution, and distribution of parasitic animals. Prerequisite: two years of biology. PRATT.

Ent 461. General Acarology. (G)
4 hours spring. 2 ① 2 ②
See ENTOMOLOGY.

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: two years of zoology. OWCZARZAK.

Z 462. Microtechnique. (G)
4 hours spring. 1 ① 3 ③
Preparation of histological, embryological, and cytological specimens for microscopic study. Prerequisite: two years of biology. OWCZARZAK.

Z 471. Ornithology. (G)
3 hours spring. 2 ① 1 ③
World families and distribution of birds; population biology; life histories; current literature. Prerequisite: Z 371. WIENS.

Z 472. Mammalogy. (G)
3 hours fall. 2 ① 1 ③
World families and distribution of mammals; population biology; life histories; current literature. Prerequisite: Z 371. STORM.

Z 473. Herpetology. (G)
3 hours spring. 2 ① 1 ③
World families and distribution of amphibians and reptiles; population biology; life histories; current literature. Prerequisite: Z 371. STORM.

Ent 475. Comparative Animal Behavior. (G)
3 hours winter. 3 ①
See ENTOMOLOGY.

Ent 485. Insect Ecology and Biological Control. (G)
5 hours winter. 3 ① 2 ②
See ENTOMOLOGY.

Graduate Courses
See also courses marked (*g*) and (*G*) above.

Z 501. Research.
Z 503. Thesis.
Z 505. Reading and Conference.
Z 507. Seminar.
Terms and hours to be arranged.

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.

Ent 515. Methods of Insect Population Analysis.
3 hours winter. 1 ① 2 ③
See ENTOMOLOGY.

Z 521. Organogeny and Fetal Physiology. 4 hours fall. 2 ① 2 ③
Embryonic and fetal physiology; laboratory work on the later stages of morphogenesis (organogeny); student projects in developmental anatomy and physiology. Prerequisite: physiology and Z 324. HILLEMANN.

Ent 554. Immature Insects.
3 hours fall. 3 ②
See ENTOMOLOGY.

Ent 572. Developmental Physiology of Insects.
4 hours spring. 2 ① 2 ②
See ENTOMOLOGY.

Ent 582. Principles of Systematics.
3 hours winter. 3 ①
See ENTOMOLOGY.

Ent 583. Speciation and Distribution.
3 hours winter. 3 ①
See ENTOMOLOGY.

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: Z 326, 461 and organic chemistry. KRUEGER.

Z 534,535,536. Mammalian Physiology Laboratory.
2 hours each term. 2 ③
Laboratory work accompanying Z 531,532, 533. KRUEGER.

Z 537. Endocrinology.
3 hours winter. 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 spring. 3 ③
Laboratory work to supplement Z 537. Prerequisite: Z 537. HISAW.

Z 539. Selected Topics in Physiology.
3 hours. 2 ① 1 ③
Topics vary. May be repeated for credit. Prerequisite: Z 435 or equivalent. ALVARADO, HISAW, KRUEGER, PRITCHARD, CONTE.

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: Bi 341 or equivalent. ROBERTS.

Z 551. Protozoology.
4 hours fall. 2 ① 2 ③
Morphology, physiology, and ecology of freshwater, marine, terrestrial, and parasitic protozoa. Prerequisite: Z 451,452. PRATT.

Z 553. Invertebrate Embryology.
4 hours spring. 3 ① 1 ③
Cleavage, organogeny, and larval development of marine and freshwater invertebrates. Prerequisite: Z 451,452. MORRIS.

Z 554. Selected Topics in Invertebrate Zoology.
3 hours any term. 2 ① 1 ③
Topics vary. May be repeated for credit. Prerequisite: Z 452. MORRIS, GONOR, PRATT.

Z 558. Selected Topics in Parasitology.
3 hours any term. 2 ① 1 ③
Advanced laboratory training in parasitological methods and discussion of current problems. Prerequisite: Z 454 or 456. PRATT.

Z 561,562,563. Biology of the Cell.
3 hours each term. 2 ① 1 ③
Structure and physico-chemical properties of cellular components; cellular replication and differentiation; chromosomal organization and evolution. Prerequisite: Z 461,462, and organic chemistry. 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 histochemistry, tissue culture, etc. Prerequisite: Z 461, 462,561,562,563, and biochemistry. DORNFELD, OWCZARZAK, HARRIS.

Z 566. Electron Microscopy.
3 hours winter. 3 ①
Biological applications of the electron microscope, including discussion of basic principles of electron optics and standard preparation techniques. Prerequisite: elementary physics, biochemistry, graduate standing in biological science. HARRIS.

Z 567. Electron Microscopy Laboratory.
3 hours spring. 3 ②
Prerequisite: Z 566 previously or parallel and approval of instructor. Knowledge of photographic techniques desirable. HARRIS.

Z 571,572,573. Ichthyology.
3 hours each term. 2 ① 1 ③
Orders and families of fishes; morphology, distribution, and ecology of selected groups and species. Prerequisite: Fsh 274,275,276, or equivalent. BOND.

Z 581. Zoogeography.
3 hours winter. 2 ① 1 ②
Distribution of animals: general principles; faunal areas of world and of North America. Prerequisite: Bi 370. STORM.

Z 584. Behavioral Ecology.
4 hours winter. 3 ① 1 ③
The impact of the behavior of organisms and populations upon their ecology, with relevance to ecological and evolutionary theory. Prerequisite: Bi 370. WIENS.

Z 585. Selected Topics in Vertebrate Ecology.
3 hours spring. 1 ① 2 ③
Advanced training in field and laboratory methods and discussion of current problems. Consent of instructor required. STORM, WIENS.

The Professional Schools

THOSE COURSES OF STUDY THAT PREPARE STUDENTS TO ENTER DIRECTLY into a specific professional or occupational field are grouped at Oregon State University into seven professional schools and one division. In addition to these are the three separate departments of the Reserve Officers Training Corps: Aerospace Studies, Military Science, and Naval Science.

The professional areas at Oregon State University described on the following pages are:

The School of Agriculture

The School of Business and Technology

The School of Education

The School of Engineering

The School of Forestry

The School of Home Economics

The School of Pharmacy

The Division of Physical Education

For further information about any of these fields, inquiries should be directed to the dean of the school or head of the division concerned.

THE SCHOOL OF AGRICULTURE IS DEDICATED TO THE PHILOSOPHY OF promoting the development of each student to the extent of his capacity. The faculty of the school tries, through the many courses offered and through extracurricular activities, to help each student discover and develop social, aesthetic, and ethical values as well as professional ability.

School of Agriculture

FACULTY

As of January 1970

WILBUR TARLTON COONEY, M.S., Dean of Agriculture.

ELMER CLARK STEVENSON, Ph.D., Director of Resident Instruction and Associate Dean of Agriculture.

WILLIAM MARTIN LANGAN, B.S., Head Adviser.

Dean Emeritus FREDERICK EARL PRICE.

Emeritus Professors BOUQUET, M. CONKLIN, DIMICK, HAAG, HILL, HOLLANDS, L. JENSEN, LITWILLER, MCKENZIE, MILLER, MUMFORD, NELSON, OLIVER, POTTER, POWERS, RICHARDSON, RODGERS, SCHALLIG, SHAW, STEPHENSON, WILSTER, WIEGAND.

Agricultural Economics: Professors CASTLE (department head), BECKER, BLANCH, BROWN, EDWARDS, GAROIAN, HALTER, MUMFORD, SITTON.
Associate Professors BLENSLY, LANGMO, SMITH, STOEVENER.
Assistant Professors F. CONKLIN, JOHNSTON, NELSON, REEDER, RETTIG, SEEVERS, STEVENS, YOUDE, YOUMANS.

Agricultural Education: Professor DAVIS (department head).
Assistant Professor SHIRLEY.

Agricultural Engineering: Professors KIRK (acting department head), CROPSEY, LONG, LUNDE, RODGERS, SINNARD, WOLFE.
Associate Professors BOOSTER, BROOKS, CHRISTENSEN, PAGE.
Assistant Professor BACKUS.
Instructor REID.

Animal Science: Professors OLDFIELD (department head), BOGART, ENGLAND, POULTON, RALSTON.
Associate Professors CHURCH, KENNICK, STOUT, WOLBERG, WU.
Assistant Professors BEDELL, CHEEKE, STORMSHAK.
Instructors ADAIR, MEYERS, RUTLAND.

Extension Methods: Professor NIBLER.
Associate Professor KLEIN.

Farm Crops: Professors COWAN (department head), FOOTE, FURTICK, GATES, GRABE, HEDRICK, JENSEN, MCGUIRE, POULTON.
Associate Professors APPLEBY, CALHOUN, CHILCOTE, CHING, FRAKES, KRONSTAD, HARDIN.
Assistant Professors BEDELL, FENDALL.
Instructor DANIELSON.

Fisheries and Wildlife: Professors SCOTT (department head), BOND, DOUDOROFF, HORTON, KUHN, LONG, MILLEMANN, WARREN, WIGHT.
Associate Professors HALL, MCNEIL, VOHS.
Assistant Professors DONALDSON, VERTS.
Instructor JUNTUNEN.

Food Science and Technology: Professors SCHULTZ (department head), CAIN, MORGAN, SAMUELS, SINNHUBER.
Associate Professors ANGLEMIER, BILLS, CRAWFORD, HARVEY, KRUMPERMAN, LAW, J. LEE, LIBBEY, MONTGOMERY, MCGILL, WALES, YANG.
Assistant Professors BABBITT, BEAVERS, BODYFELT, D. LEE, NIXON, PAWLOWSKI, SCANLAN, VARSEVELD, WROLSTAD, WYATT, YU.
Instructor SODERQUIST.

Horticulture: Professors APPLE (department head), FRAZIER, HANSEN, MACK, ROBERTS, WESTWOOD.
Associate Professors BAGGETT, CRABTREE, GARREN, WADSWORTH.
Assistant Professors CHAPLIN, FUCHIGAMI, SMITH, THOMPSON.

Poultry Science: Professors ARSCOTT (acting department head), BERNIER, HARPER, PARKER.
Assistant Professor DORMINEY.

Range Management: Professors COWAN and OLDFIELD (co-administrators), POULTON (program director), GATES.
Assistant Professors BEDELL, RITTENHOUSE.

Soils: Professors CHENEY (department head), DAWSON, HARWARD, JACKSON, KNOX, YOUNGBERG.
Associate Professors BOERSMA, MOORE, SIMONSON.
Assistant Professors ROBERTS, VOLK.

Veterinary Medicine: Professors DICKINSON (department head), BONE, KNAPP, PETERSON.
Associate Professor HARR.
Assistant Professor STEVENS.

High School Preparation

The remarkable advances in technology and science in agriculture make the study of physical, biological, and social sciences and communications a vital necessity. Therefore, the following preparation in high school is strongly recommended for students in agriculture: English, 4 units; mathematics, 3 units; physics, chemistry, and biology, 1 unit each; and social studies, 3 units.

Individual Counseling

Every student is considered an important individual; his or her study program is developed in personal consultation with a faculty adviser. This person is selected from faculty members serving the department in which the student has expressed a major interest. As early as informed judgment will permit, students select a subject area and become associated with instructors and other students of similar interests. Initial or early counseling is based upon the student's high school record and all placement test scores. When preparation is found to be inadequate, the student is 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 terms to complete a prescribed four-year curriculum.

University Honors Program

The Honors Program in this School is coordinated with the programs in other Schools and administered by the Director of the University Honors Program (see page 28). Information concerning eligibility and application forms may be obtained from the Director.

Tropical Agriculture Studies

The tropical Agriculture Studies program, conducted by Oregon State University in a reciprocal agreement with the College of Tropical Agriculture, University of Hawaii, provides a full academic year of undergraduate study in agricultural subjects dealing with tropical environment at the University of Hawaii. Students participating in this program will plan their study with their departmental adviser, using courses offered at the campus of the University of Hawaii.

The Tropical Agriculture Studies program provides the student an opportunity to gain knowledge and experience in methods of agricultural production and utilization of food and fiber in the tropical regions of the world.

Registration, tuition, and fees will be handled at the University of Hawaii campus. Students will be responsible for providing their own transportation between Honolulu and Corvallis and living expenses while attending the University of Hawaii.

Additional information may be obtained from the School of Agriculture or the office of the Director of International Education.

Job Opportunities

There is a wide diversity of professional and occupational areas in agriculture. These include production, processing, and marketing of food and fiber; outdoor recreation, and efficient utilization of human and natural resources. Opportunities in agriculture have expanded in variety, interest, and challenge. These opportunities exist in research, extension, teaching, communication, production, sales, and services. Curriculum options allow specialization in business, technical, or scientific aspects in preparation for these areas.

Graduation Requirements

A student, to be eligible for a bachelor of science (B.S.) degree, must meet the following:

1. The general and institutional requirements listed under *Degrees and Certificates*, page 13.
2. The School of Agriculture requirements:
   a. Satisfactory completion of one of the three curriculum options listed on the following pages.
   b. A passing grade in a comprehensive examination in English.
3. The curricular requirements in the department in which the student is majoring.

Work performance and personal conduct on the part of the student within his or her selected area of concentration are carefully evaluated by the faculty. Students are expected to maintain ethical, professional, and academic standards. Failure to maintain such standards as adjudged by the faculty will be grounds for terminating the student's enrollment in the department or school.

B.S., B.Agr., M.Agr., M.S., Ph.D. degrees

The Bachelor of Science (B.S.) or Bachelor of Agriculture (B.Agr.) degree is offered in the options listed below. Through the Graduate School the advanced degrees of Master of Agriculture (M.Agr.), Master of Science (M.S.), and Doctor of Philosophy (Ph.D.) are also offered.

Minimum Requirements

	Agricultural Science	Agricultural Business	Agricultural Technology
	(Hours)	*(Hours)*	*(Hours)*
Agriculture			
Departmental and subject area requirements	38	45	45
Communications	18	18	18
English composition	(9)	(9)	(9)
Oral communications	(3)	(3)	(3)
Electives	(6)	(6)	(6)
Humanities and Social Science			
Majors in ag economics	36	24	18
Other than ag econ majors	18	24	18
Economics	(3–15)	(9)	(3)
Electives	(15–21)	(15)	(15)
Business	....	32	....
Accounting	....	(8)	....
Production	....	(4)	....
Finance	....	(4)	....
Marketing (business administration or agricultural economics)	....	(4–5)	....
Business law	....	(4)	....
Management (BA 301,302 or AEc 312,313)	....	(6)	....
Human Relations (BA 361)	....	4	....
Biological and Physical Science			
Majors in ag econ	54	38	35
Students other than ag econ majors	72	38	35
* Botany, * Zoology, * Biology	12	12	12
Chemistry			
Majors in ag econ, ag ed, ag engr	(9–13)	(9–13)	(9–13)
Students other than ag econ majors			
Through Ch 203 or 106	....	(9–13)	....
Through Ch 226	(12–16)	....	(12-16)
Physics, Ph 111 or 112 (not required for majors in agricultural education)	(6)	(3)	(3)
Mathematics			
Through Mth 51 and 60	....	(4)	(4)
Through Mth 111 or 163	(4–12)	(4–12)	....
Statistics			
Majors in ag econ	(9)	(6–9)	....
Other than ag econ majors	....	(6–9)	....
‡ Electives			
Majors in agricultural economics	(0–10)	....	(0–3)
Students other than ag econ majors	(18–30)	....	....
Physical education	6	6	6
‡Electives	42	29	72
TOTAL TERM HOURS (minimum)	192	192	192

* The 12 hours may be selected from the following courses: Bot 201, 202,203; Z 201,202,203; Z 341 or upper division Botany and Zoology; GS 101,102,103.

‡ All electives are under the advisement of the departmental faculty except for 9 hours in the junior year and 9 hours in the senior year which are to be unrestricted.

Curriculum Options

Area of specialization	Agricultural Science	Agricultural Business	Agricultural Technology
Agricultural economics	x	x	x
Agricultural education			x
Agricultural Engineering Technology		x	x
Animal science	x	x	x
Farm crops	x	x	x
Fisheries	x		
Food science and technology	x		
General agriculture with minor in journalism		x	x
Horticulture			
Nursery management	x	x	x
Floriculture	x	x	x
Vegetable crops	x	x	x
Pomology	x	x	x
Landscape construction and maintenance	*	*	*
Poultry science	x	x	x
Range management	x	x	
Soils	x	x	x
Wildlife management	x		x

* See special curricula under HORTICULTURE.

Agricultural Science is designed to provide an excellent, minimum education in sciences basic to agriculture and at the same time allow some latitude for specialization in a departmental subject area. It should be elected by students who intend to pursue specialized and professional careers in research, teaching, and other phases of agriculture requiring a good background in the physical and biological sciences.

Agricultural Business meets the needs of students interested in marketing, finance, management, and other business aspects of agriculture. Students completing this option may expect to find employment in industries serving agriculture such as chemical and feed and seed companies, credit agencies, farm supply and equipment companies, and firms processing and marketing agricultural products.

Agricultural Technology is designed primarily for students who wish to obtain a broad education in agriculture. Students interested in farming, teaching agriculture, extension, soil conservation, and certain positions with food processing companies, chemical, feed, and seed companies may find this option best fitted to their needs.

Sample Freshman Year

Common to all Curriculum Options

	Term			Total Hours
	Fall	*Winter*	*Spring*	
English Composition (Wr 121)	3	..	..	3
[1]General Chemistry (Ch 201,202,203)	3	3	3	9
[2]General Botany (Bot 201,202)	4	4	..	8
[2]General Zoology (Z 201,202,203)	3	3	3	9
[3]Mathematics	4	..	..	4
Concepts of Agriculture (Ag 100)	2	..	..	2
Physical education	1	1	1	3
[4]Electives	(3)	9	7	16
	20	20	14	54

[1] Students not qualified to enroll in Ch 201 will be expected to complete 12 hours of general chemistry in the Ch 104 series.

[2] General Biology (GS 101,102,103) may be substituted for Bot 201, 202, and Z 201,202,203 in certain programs of study.

[3] A minimum of Mth 51 and 60 are required of all students electing the agricultural technology and agricultural business options. Mth 111 or 163 is required as a minimum in the agricultural science option.

[4] Basic requirements of one of the three options are to be met and should be considered when selecting elective courses.

AGRICULTURE (GENERAL)

Ag 100. A Concept of Agriculture.
2 hours fall. 2 ①
A perspective of agriculture in society and an understanding of educational and training opportunities.

Ag 407. Seminar. (g)
Terms and hours to be arranged.

AGRICULTURAL ECONOMICS

The curriculum in agricultural economics is designed to accomplish two objectives: (1) to enable students to become educated men and women, and (2) to enhance the productivity of departmental graduates. In order to accomplish these objectives, the curriculum has broad requirements for course work in both the sciences and the humanities, as well as in other subject matter which the faculty of the department feels will contribute to the potential productivity of its students.

A primary advantage of this curriculum is that it permits flexibility by providing for a large number of elective courses. With the help of his faculty adviser, the student can select from a broad range of electives. Thus, while his program may emphasize agricultural economics, his curriculum permits considerable work in interesting related fields.

A well-developed student advising program is essential to the success of such a curriculum. The Department of Agricultural Economics has a highly trained faculty, most of whose members participate in the advising of students. This allows each student more personal attention. The student selects courses in close consultation with his faculty adviser, taking into account previous background, student interest, needs, capabilities, and career aspirations.

Basic Curriculum Requirements in Agricultural Economics:

	Hours
Agriculture	
Agricultural Business Management	5
Agricultural Marketing	5
Agricultural Economics Analysis	9
Electives in Agriculture	26
Communications	
English Composition	9
Oral Communications	3
Electives in Communications	6
Humanities and Social Sciences	
Principles of Economics	9
Macroeconomic Theory	9
Electives in Humanities and Social Sciences	15
Business	
Accounting	3
Biological and Physical Sciences	
Biology	12
Chemistry	9
Physics	3
Mathematics	8
Statistics	6
General and Electives	
Physical Education	6
Other Electives	49
TOTAL HOURS	192

In addition to the basic curriculum requirements, the Department of Agricultural Economics offers several other courses. Research and Reading and Conference courses provide opportunity for independent study in a particular area. Work is also offered leading to the M.S. and Ph.D. degrees. Detailed information on degree programs and course offerings is available upon request.

Lower Division Courses

AEc 111. Agricultural Economics.
3 hours fall, winter, or spring. 3 ①
An introduction to farm management, marketing, agricultural business, finance, and land economics; farm policies and programs. Prerequisite: freshman or sophomore standing. CONKLIN, YOUMANS, REEDER.

AEc 211. Agricultural Business Management.
5 hours spring 5 ①
Farming as a business; the decision-making process; tools of decision-making; acquiring, organizing, and managing land, labor, and capital resources; reasons for success and failure. Prerequisite: sophomore standing in agriculture. BECKER.

AEc 231. Agriculture and the National Economy.
3 hours. 2 ① 1 ②
Role of agriculture in economic development; Historical perspective; urban migration and rural community; rural poverty and its causes; national programs and the agricultural sector, including monetary and fiscal policies; comparison of U.S. with other nations.

Upper Division 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 311. Agricultural Marketing.
5 hours fall or winter. 5 ①
Marketing functions; marketing firms and their services; price determining forces; marketing problems; cooperatives. Prerequisite: Ec 202.

AEc 312,313,314. Agricultural Economics Analysis.
3 hours each term. 3 ①
First term: Agricultural business profits as affected by product mix, input combinations, and level of output. *Second term:* Consumer behavior; markets and prices for agricultural commodities and factors. *Third term:* Quantitative analysis applied to agricultural business problems. Prerequisite: Ec 203; Mth 111 or 163; St 311,312 previously or parallel. SMITH, STEVENS, RETTIG.

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.

AEc 408. Workshop. (g)
Terms and hours to be arranged.
Workshops may be offered on a variety of subjects including income tax management, taxation, and other subjects traditionally falling within the field of agricultural economics.

AEc 411. Public Policy in Agriculture.
(g) 4 hours. 4 ①
Economic principles applied to agricultural adjustment; agricultural price and income policies established by State and Federal agencies. Prerequisite: AEc 314. YOUDE.

AEc 412. Agribusiness Management.
3 hours. 2 ① 1 ②
Management problems of farm and non-farm firms; application of economic principles and quantitative techniques to aid decision-making; use of computer to provide management information. Prerequisite: AEc 211 or equivalent.

AEc 414. Farm Management. (G)
4 hours fall. 2 ① 1 ③
Management principles and techniques for choosing and combining farm enterprises; farm plans with input factors nonrestrictive and restrictive; visits to observe farm organizational features. Prerequisite: AEc 312. CONKLIN.

AEc 418. Federal Programs and the Farmer. (g)
3 hours winter 1 ① 1 ②
Federal and State programs (ASC, SCS, FHA, BLM, FCES, FCIC, State agencies) as they affect the operation of Oregon farms and ranches. Prerequisite: senior standing. MUMFORD.

AEc 421. Plant Efficiency Analysis.
(g) 3 hours winter. 1 ① 1 ②
Designing effective use of labor, materials, equipment, and fixed facility inputs for the production, processing, handling, and marketing of agricultural products. Techniques to assist management in selecting alternative systems. Prerequisite: AEc 311 or 314.

AEc 425. Property Appraisal. (g)
3 hours spring. 2 ① 1 ③
Theory and techniques; commercial and Federal appraisal methods; field work in appraisal of farms of different types. Prerequisite: senior standing. BLANCH.

AEc 431. Agricultural Finance. (G)
3 hours spring. 3 ①
Finance requirements, principles, and problems; credit role, arrangements, and costs; credit sources; risk; intergeneration transfer of estates. Prerequisite: Ec 203. BLANCH.

AEc 440. Livestock Economics. (g)
3 hours fall. 3 ①
Economic and financial phases; cost-price relationships; market structure; problems and prospects in Pacific Northwest. Prerequisite: senior standing. BLANCH.

AEc 461. Land and Water Economics.
(g) 3 hours winter. 3 ①
Economic principles and institutions; benefits and costs of development and conservation; allocation among uses and users. Prerequisite: Ec 203. STOEVENER.

AEc 462. **International Agricultural Development.** (G)
3 hours winter. 3 ①
Supply and demand for agricultural resources and products; population pressure on land; economic principles governing value and use of resources; institutional factors. Prerequisite: Ec 203. YOUMANS.

AEc 471. **Managerial Economics.**
(G) 3 hours spring. 3 ①
Business policies in agricultural supply and marketing firms. Prerequisite: AEc 314. REEDER.

AEc 481. **Natural Resources Policy.** (G)
3 hours. 3 ①
Public decision-making in natural resource use and development; analysis of public investments and social control over resource use.

Graduate Courses
See also courses marked (*g*) and (*G*) above.

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.**
Terms and hours to be arranged.

AEc 508. **Workshop.**
Terms and hours to be arranged.
Application of agricultural economics to a specific locality in Oregon in areas of agricultural marketing, policy, finance, and farm management.

AEc 510. **Advanced Farm Management.**
9 hours summer (6 weeks). 5 ④ 1 ④
Economic principles, concepts, and procedures basic to management competence; farm record analysis, farm organization; developing material for teaching and counseling farmers. BECKER.

Ec 512,513. **Economic History and Development.** 3 hours each term. 3 ①
Europe and United States (alternate years) with emphasis on major trends in agriculture, manufacturing, trade, transportation, money, banking, and finance.

Ec 514,515,516. **Contemporary Economic Thought.**
3 hours each term. 3 ①
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.

AEc 517,518. **Product and Factor Markets.**
3 hours fall and winter. 3 ①
The market, household, and firm under perfect and imperfect competition; economic problems of production, distribution, and resource allocation in agriculture. Prerequisite: AEc 313 or equivalent. EDWARDS, RETTIG.

AEc 519. **Efficiency and Welfare.**
3 hours spring. 3 ①
Economic welfare pertaining to the firm, industry, and society; application to analysis of public policies for natural resources and agriculture. Prerequisite: AEc 518. STOEVENER.

AEc 520. **Research Methodology.**
3 hours fall. 3 ①
Logic, theory, and statistics in economic research. CASTLE.

AEc 521,522. **Advanced Production and Consumption Economics.**
3 hours fall and spring. 3 ①
Output determination, consumption, price formation, and income distribution under competitive and imperfectly competitive conditions; problems of agriculture and natural resource development. Prerequisite: AEc 518; Mth 112. JOHNSTON.

AEc 523. **Analysis of Agricultural Policies.** 3 hours spring. 3 ①
Public policy; value conflicts; goals; development of policy; economic and political objectives; current and proposed agricultural policies. Prerequisite: AEc 519. SEEVERS.

AEc 524,525. **Decision-Making Theory and Application.**
3 hours winter and spring. 3 ①
AEc 524: Theoretical production, cost, and revenue relationships with application to the firm under conditions of certainty. *AEc 525:* Application to the firm under conditions of risk and uncertainty. Prerequisite: Mth 211. HALTER.

Ec 527,528. **History of Economic Thought.** 3 hours each term. 3 ①
Contribution of greatest economic thinkers with particular attention to schools of thought.

AEc 544,545. **Aggregate Economic Analysis.**
3 hours winter and spring. 3 ①
Interrelationships between agricultural, nonagricultural, and public sectors; effects of monetary, fiscal, and resource supply policies on income and employment in the agricultural sector; effects of changes in the agricultural sector on aggregate economic activity. Prerequisite: AEc 518; Ec 476. SEEVERS, EDWARDS, RETTIG.

AEc 561. **Economics of Natural Resource Development.**
3 hours fall. 3 ①
Welfare economics and benefit-cost analysis. Allocation of natural resources over time and among uses. Optimum and multiple use concepts. Prerequisite: AEc 519 or equivalent. STEVENS.

AEc 567,568. **Econometrics.**
3 hours fall and winter. 3 ①
Application of mathematics and statistics to problems in specification, estimation, and verification of economic relationships. Prerequisite: St 426, 481. Offered alternate years. Offered 1969-70. BROWN.

AEc 572. **Agricultural Marketing.**
3 hours winter. 3 ①
Objectives; costs and organization; margins, transportation, advertising, and cooperative theory; problems, research, and progress. Prerequisite: AEc 518. YOUDE.

AEc 573. **Agricultural Price Analysis.**
3 hours spring. 3 ①
Supply and demand theory; statistical procedures. Prerequisite: AEc 517; St 452 or 457. EDWARDS.

AEc 585,586. **Mathematical Economics.** 4 hours winter and spring. 4 ①
Application of mathematics to economics. Prerequisite: Mth 211. HALTER.

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 TECHNOLOGY

The curriculum in Agricultural Engineering Technology (AET) is one of three types of instruction offered by the Department of Agricultural Engineering: (1) a curriculum leading to the Bachelor of Science and Master of Agriculture degrees, or a graduate minor, in Agricultural Engineering Technology, (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 Agricultural Engineering Department is jointly administered by the Schools of Agriculture and Engineering.

The AET curriculum 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 course of study qualifies him for work of an applied nature in many phases of industry, public and self-employment.

Students enrolled under Agricultural Engineering Technology may elect one of two options: *Agricultural business* or *agricultural technology*. In addition to the minimum basic school requirements for these two options, all AET students must satisfy the following departmental requirements:

	Hours
Mechanical Problems in Agriculture (AET 101,102)	4
Mathematics (Mth 111 or 163)	4
Agricultural Mechanics (AET 221)	3
Abridged General Physics (Ph 112)	3
Engineering Drawing (GE 115)	3
Plane Surveying (CE 226)	3
Motor Vehicles (AET 312)	3
Motor Vehicles (AET 313)	3
Land Drainage (AET 319)	3
Pumps and Irrigation (AET 321)	3
Farm Electricity (AET 331)	3
Farm Buildings (AET 361)	3
Agricultural Processing (AET 371)	3
Farm Implements (AET 391)	3
Seminar (AE 407)	2
Statics and Strength of Materials (AET 421)	3
Dynamics of Solids and Fluids (AET 422)	3
Heat Energy Processes (AET 423)	3

The increasing importance of modern agricultural machinery in reducing production costs and improving rural living conditions necessitates more complete and effective use 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 of building material. Models of farm water systems and centrifugal and turbine pumps for sprinkler irrigation systems are available for study.

Lower Division Courses

AET 101,102. **Mechanical Problems in Agriculture.**
2 hours fall, winter. 1 ① 1 ②
Lectures and elementary problems. LONG.

AET 211. **Agricultural Engineering Survey.**
3 hours any term. 1 ① 2 ②
Mechanics, hydraulics, soil conservation, and electricity applied to farm problems. Prerequisite: Mth 50 or equivalent. LONG.

AET 221. **Agricultural Mechanics.**
3 hours any term. 1 ① 2 ③
Hand and power tools for wood and metal working, roof framing, arc and acetylene welding; construction of wood and metal farm appliances; concrete work. CHRISTENSEN.

AET 222. **Agricultural Mechanics.**
3 hours spring. 1 ① 2 ③
Repair of agriculture implements; selection and maintenance of electrical equipment; construction of equipment, buildings, and conveniences. Prerequisite: AET 221. CHRISTENSEN.

Upper Division Courses

Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

AET 312. **Motor Vehicles.**
3 hours any term. 2 ① 1 ③
Otto and Diesel cycle engine principles, construction, accessories; lubrication and fuels. Automobile, truck, and tractor power transmission systems, traction elements, steering, brakes, and chassis components. Cannot be taken for credit if credit has previously been earned in AE 311. Prerequisite: Ch 203; Ph 111.

AET 317. **Power Mechanics.**
3 hours fall. 2 ① 1 ③
Internal combustion engine cycles, principles, and accessories; adjustments, overhaul procedures, and trouble shooting related to small engines; hydraulic and air-powered equipment. LUNDE.

AET 319. **Land Drainage.**
3 hours spring. 2 ① 1 ③
Surface and subsurface drainage systems; ponds and earth dams; erosion control. Prerequisite: Sls 210. BROOKS.

AET 321. **Pumps and Irrigation.**
3 hours fall. 2 ① 1 ③
Sprinkler and gravity irrigation systems; irrigation pumps; wells. Sls 311 recommended. WOLFE.

AET 331. **Farm Electricity.**
3 hours winter. 2 ① 1 ③
Fundamentals, electrical codes, electrical motors, and use of electricity in agriculture. Prerequisite: AE 211 or equivalent. CROPSEY.

AET 341. **Use of Explosives.**
2 hours winter. 1 ① 1 ③
Removing stumps, constructing drainage ditches, and rock blasting; 30 hours of Saturday field work arranged. Prerequisite: junior standing in schools of Agriculture, Engineering, and Forestry.

AET 361. **Farm Buildings.**
3 hours spring. 1 ① 2 ②
Building services, economical utilization, materials and types of construction, and creative farmstead planning.

AET 371. **Agricultural Processing.**
3 hours fall. 2 ① 1 ③
Processing and handling agricultural materials. Prerequisite: Ph 111. BOOSTER.

AET 381,382,383. **Farm Skills.**
1 hour each term. 1 ②
Arc and gas welding techniques; application for high school farm mechanics instruction in repair and construction of farm machinery and equipment. CHRISTENSEN.

AET 391. **Farm Implements.**
3 hours fall or spring. 2 ① 1 ③
Power farming implements; operation, maintenance, adjustments, calibration and use. Prerequisite: Mth 50 or equivalent. RODGERS.

AET 401. **Research.**
Terms and hours to be arranged.

AET 405. **Reading and Conference.**
Terms and hours to be arranged.

AET 406. **Projects.**
Terms and hours to be arranged.

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

AET 408. **Workshop.**
Terms and hours to be arranged.

AET 421. **Statics and Strength of Materials.**
3 hours fall. 2 ① 1 ②
Statics and strength of materials and their applications in agricultural technology. Prerequisite: Ph 111. LONG.

AET 422. **Dynamics of Solids and Fluids.**
3 hours winter. 2 ① 1 ②
Dynamics of solids and fluids and their applications in agricultural technology. Prerequisite: AE 421. BROOKS.

AET 423. **Heat Energy Processes.**
3 hours spring. 2 ① 1 ②
Fundamentals of heat energy process and their applications in agricultural technology. Prerequisite: Ph 111.

AET 441. **Food Engineering.**
3 hours fall. 3 ①
Engineering graphics and mechanics of solids and fluids fundamental to food plant operations. Prerequisite: Mth 111; Ph 112; FST 223. KIRK.

AET 442. **Food Engineering.**
3 hours winter. 2 ① 1 ②
Electricity and thermodynamics applied to problems in food plant management. Prerequisite: AE 441. KIRK.

AET 443. **Food Engineering.** (G)
4 hours spring. 3 ① 1 ②
Thermodynamics and heat transfer applied to the processing of food. Prerequisite: AE 442. KIRK.

AET 451. **Environmental Housing.** (g)
3 hours winter. 1 ① 2 ②
Structural materials, design, and methods of construction; typical dwellings using planning and building standards developed by Agricultural Experiment Station and other research. Prerequisite: AA 178 and senior standing. SINNARD.

AET 481. **Agricultural Waste Disposal.**
(g) 3 hours spring. 3 ①
Agricultural wastes and their effects upon municipal and rural sanitation. Outline of the problem and present methods of control. Prerequisite: senior standing. CROPSEY.

Graduate Courses

See also courses marked (g) and (G) above.

AET 501. **Research.**
Terms and hours to be arranged.

AET 503. **Thesis.**
Terms and hours to be arranged.

AET 505. **Reading and Conference.**
Terms and hours to be arranged.

AET 506. **Projects.**
Terms and hours to be arranged.

AET 507. **Seminar.**
Terms and hours to be arranged.

AET 508. **Workshop.**
Terms and hours to be arranged.

ANIMAL SCIENCE

The field of animal science relates to the production of livestock and livestock products including beef and dairy cattle, swine, sheep, horses, and mink. Essential to this science is knowledge in the areas of animal breeding, genetics, reproductive physiology, nutrition, livestock management, meats, and judging. These areas are included as fundamentals in a diverse curriculum which enables the student from rural or urban background to select an option which will emphasize either livestock science, business, or technology. Animal Science faculty members will assist students in selecting a particular option and in developing a program of study. The increasing demand for meat and other livestock products by a geometrically expanding human population insures job opportunities for well-trained individuals from the field. Students who graduate with a good grade-point average encounter many opportunities for employment. Recent graduates from this department have been employed in such areas as:

- Agricultural appraisers for banking firms and real estate companies.
- Salesmen for commercial feed, seed, and chemical companies and also for veterinary products.
- Managers of milk and meat processing plants.
- Representatives for railroads and agricultural commodity groups.
- Agricultural extension agents.
- Peace Corps and various other federal agencies.
- U.S.D.A., farm, ranch, and feed lot operators.

Today many young women are graduating from this department. They are encouraged to choose their elective courses in the School of Business, the School of Humanities and Social Sciences, or in the School of Science.

Graduate students in Animal Science have the opportunity to pursue research projects through the Agricultural Experiment Station as part of their programs for the M.S. or Ph.D. degrees. Graduate programs may be organized in: animal genetics, animal nutrition, animal physiology, or range management. Range management is supported by both the Animal Science and Farm Crops departments. Strong minor programs for those majoring in some phase of animal science are encouraged in other departments of the schools of Agriculture, Science, or Forestry.

Science Option

This option is designed for students intending to prepare for professional careers in animal science teaching and/or research. A broadened opportunity is provided for training in the biological and physical sciences necessary for understanding the basic mechanisms involved in animal functions. Within this option, one of three areas may be emphasized: nutrition, genetics, or physiology. Foundation courses and a major portion of the elective courses are taken in the School of Science; skill in application of fundamental scientific principles is developed through advanced courses in the Department of Animal Science. During the senior year, students selecting this option may engage in scientific investigations under the direction of animal science faculty members.

Business Option

Because agriculture is a venture in which good business management holds the key to success, this curriculum is directed along business lines. The option will permit a student to take a core of courses amounting to 30-35 credit hours in the area of business including courses relating to economics, accounting, finance, marketing, statistics, business and real estate law, investments, salesmanship, and human relations in business. Also, a minimum of three courses in the Department of Agricultural Economics will be required. Courses within the Department of Animal Science will be recommended depending upon the student's previous experience and interest.

Technology Option

This option stresses the basic principles of animal breeding, feeding, management, and marketing of farm animals and their products. General and specialized training is available according to the student's needs and desires. Well-equipped laboratories and small animal facilities supplement extensive purebred herds and flocks of dairy and beef cattle, sheep, swine, and mink used to demonstrate the principles of livestock production.

Lower Division Courses

AnS 121. Animal Science.
3 hours any term. 3 ①
WOLBERG.

AnS 122. Animal Science Laboratory.
2 hours fall or spring. 2 ②
Prerequisite: AnS 121 prerequisite or parallel.

AnS 221. Horse Husbandry.
3 hours fall or spring. 2 ① 1 ②
Feeding, care, and management of light horses. OLIVER.

AnS 231. Selection of Farm Animals.
2 hours winter. 2 ③
RALSTON, KLIEWER.

Upper Division Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

AnS 311. Animal Nutrition.
3 hours fall and winter. 3 ①
Digestion and metabolism; nutritional deficiencies. Prerequisite: Ch 103. OLDFIELD.

AnS 313. Ration Formulation and Feed Processing.
3 hours spring. 3 ①
Nutritional implications of feed processing and storage; formulating rations for specific animal requirements including application of computer techniques. Prerequisite: AnS 311. RALSTON.

AnS 316. Reproduction in Domestic Animals.
3 hours. 3 ①
Male and female reproductive systems; fertility complex and factors affecting it. Prerequisite: Z 202 or GS 103. WU.

AnS 317. Reproduction in Domestic Animals Laboratory.
1 hour. 1 ③
To accompany AnS 316.

AnS 320. Evaluation of Dairy Cattle.
4 hours spring. 1 ① 3 ②
The phenotypic and genotypic evaluation of dairy cattle including judging, classification, and performance records.

AnS 321. Evaluation of Livestock.
4 hours spring. 2 ① 2 ③
Phenotypic characteristics in live animals related to their carcass merit and production efficiency. Prerequisite: AnS 231 or equivalent. RALSTON, KENNICK.

AnS 327. Artificial Insemination.
3 hours spring. 1 ① 2 ②
Consent of instructor required. Prerequisite: AnS 316. WOLBERG.

AnS 351. Meats.
3 hours fall or spring. 1 ① 2 ②
Slaughtering, cutting, sanitation and inspection, packing house, retail markets. Prerequisite: junior standing. KENNICK.

AnS 352. Wholesale and Retail Meat.
3 hours winter. 2 ① 1 ②
Identification, selection, and utilization. Prerequisite: junior standing. KENNICK.

AnS 401. Research.
Terms and hours to be arranged.

AnS 405. Reading and Conference.
Terms and hours to be arranged.

AnS 407. Seminar.
1 hour fall, winter, or spring. 1 ②

AnS 411. Ruminant Nutrition. (G)
3 hours fall. 3 ①
Nutritional principles as applied to ruminants. Prerequisite: AnS 311; Ch 227. CHURCH.

AnS 413. Comparative Nutrition. (G)
3 hours winter. 3 ①
Comparative nutrient requirements of domestic animals and factors modifying these requirements with emphasis upon similarities and differences among the various species. Prerequisite: AnS 311; Ch 227; Physiology. CHEEKE.

AnS 421. Dairy Production. (g)
3 hours winter. 2 ① 1 ②
Production and management factors which will result in efficient production of milk. Prerequisite: AnS 311; Z 341 or GS 103. KLIEWER.

AnS 422. Sheep Production. (g)
3 hours winter. 2 ① 1 ②
Prerequisite: AnS 311 or 411; GS 103 or Z 341. FOX.

AnS 423. Swine Production. (g)
3 hours fall. 2 ① 1 ②
Prerequisite: AnS 311 or 411; GS 103 or Z 341. ENGLAND.

AnS 424. Beef Cattle Production. (g)
3 hours spring. 2 ① 1 ②
Prerequisite: AnS 311 or 411; GS 103 or Z 341. RALSTON.

AnS 426. Livestock Judging.
2 hours fall. 2 ②
Swine, sheep, horses, beef, and dairy cattle. Prerequisite: AnS 231,321 or 320. RALSTON, KLIEWER.

AnS 432. Physiology of Lactation. (G)
3 hours spring. 2 ① 1 ②
Physiological factors concerned with mammary gland development and functional activity. Prerequisite: VM 321 or Ch 227. Offered alternate years. Not offered 1970-71. STORMSHAK.

AnS 476. Reproduction Problems. (G)
3 hours winter. 1 ① 2 ②
Problems in reproduction and progress made in solving them. Prerequisite: AnS 316. STORMSHAK, WU, WOLBERG.

AnS 478. Animal Improvement. (G)
5 hours fall. 5 ①
Genetics, breeding systems, and selection principles. Prerequisite: Z 341. BOGART, ENGLAND, KLIEWER.

AnS 481. Wool Production. (g)
3 hours fall. 2 ① 1 ②
Preparation, sorting, grading, scouring, and manufacturing. Offered alternate years. Offered 1970-71.

AnS 483. Wool Technology. (G)
2 hours spring. 1 ① 1 ③
Techniques in evaluating physical properties. Prerequisite: AnS 481. Offered alternate years. Offered 1970-71.

Graduate Courses

See also courses marked (*g*) and (*G*) above.

AnS 501. Research.
Terms and hours to be arranged.

AnS 503. Thesis.
Terms and hours to be arranged.

AnS 505. Reading and Conference.
Terms and hours to be arranged.

AnS 507. Seminar.
Terms and hours to be arranged.

AnS 550,551,552. **Topics in Animal Nutrition.**
3 hours each term. 3 ①
Recent advances. Different topic each term. Prerequisite: AnS 411 or AnS 413. CHURCH, RALSTON, STOUT.

AnS 570,571,572. **Topics in Animal Breeding.**
3 hours each term. 3 ①
Nonsequence courses designed to acquaint student with recent advances in animal breeding. Different topic each quarter. Prerequisite: AnS 478 or equivalent. BOGART, ENGLAND, KLIEWER.

AnS 573. **Physiology of Reproduction in Domestic Animals.**
3 hours spring. 3 ①
Gonads, germ cells, and fertilization; inheritance, environment, hormones, nutrition, and management in reproduction. Prerequisite: AnS 476. Offered alternate years. Offered 1969-70. BOGART, STORMSHAK, WU.

AnS 574. **Growth in Domestic Animals.**
3 hours fall. 3 ①
Endocrines and growth; bioenergetics and differentiation; genetic, bacterial, and nutritional aspects. Prerequisite: Ch 452; Z 533; AnS 411, 578. Offered alternate years. Offered 1969-70. BOGART, OLDFIELD, STORMSHAK.

AnS 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.

EXTENSION METHODS

Extension Methods courses will be valuable for anyone who plans to teach adults—particularly those who do off-campus, informal teaching of the type carried on by Cooperative Extension workers. Training in Extension Methods can also be useful for those entering other professions relating to agriculture, home economics, and community service which call for skills in teaching and consulting with adults and young people.

An Extension worker must be adept at communicating with others as well as having subject matter competence. He must know the sources of new scientific knowledge and how to work with people; also how to develop and conduct programs that apply new knowledge for improved living, citizenship, and community development. Majors in agriculture and home economics interested in Extension as a career are encouraged to choose electives in humanities and social sciences, as well as the courses in Extension Methods.

Upper Division Courses
Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

EM 405. **Reading and Conference.**
Terms and hours to be arranged.
KLEIN.

EM 411. **Extension Methods.** (G)
3 hours winter or spring. 3 ①
Organization, scope, and responsibilities of Cooperative Extension Service; adult learning; diffusion and communication processes; overview of Extension Methods in agriculture and home economics. KLEIN.

EM 412. **Extension Methods.** (G)
3 hours winter or spring. 3 ①
Further explorations into Extension Methods in agriculture and home economics, program planning and development of skills in selecting and using methods. KLEIN.

EM 453. **Field Work in Extension.**
(g) Terms and hours to be arranged.
Field practice in county extension work in agriculture and home economics under supervision of professor of Extension Methods and county extension agents. Prerequisite: EM 411,412. KLEIN.

Graduate Courses
See also courses marked (*g*) and (*G*) above.

EM 505. **Reading and Conference.**
Terms and hours to be arranged.
KLEIN.

EM 508. **Workshop.**
Terms and hours to be arranged.
To provide special job-related training for Extension workers and others with comparable background. Individual offerings will depend largely on interests and needs of Extension Staff, i.e., Program Planning, Resource Development, Educational Methods in Extension, Rural Social Problems. Taught by Resident and Extension staff.

FARM CROPS

Farm Crops offers opportunity for study in specialized, scientific areas of agriculture. These courses lead to an understanding of principles and processes involved in growing, protecting, developing, and improving plants which supply our population's food, livestock feed, seed, industrial raw materials, soil and watershed protection, lawns, turf, and wildlife crops. The courses integrate the scientific principles of soils, physics, chemistry, botany, and genetics as the student deals with the theories and practices of crop production, management, and improvement.

Undergraduate Curricula offered in the Department of Farm Crops include three options: agricultural science, agricultural business, and agricultural technology. Each curriculum is flexible enough to provide for the student's individual professional needs and interests and also allows for the selection of electives in humanities and social sciences. A farm crops graduate is qualified to engage in business, industry, farming, research, communications, conservation, and education. Positions are available in organizations such as agricultural experiment stations, agricultural extension services, state departments of agriculture, food processing companies, insurance agencies, and commercial concerns dealing in the manufacture, processing, or sale of farm products, chemicals, and seed.

Counselors within the Department of Farm Crops provide experienced curriculum guidance, aid in professional extracurricular activities, and assist in career decisions and job placement for farm crops majors.

Under the guidance of a departmental adviser the following courses or their equivalent will normally be used to satisfy part of the minimum requirements in the agriculture and biological and physical science curricula of the School of Agriculture:

For all options	*Hours*
Crop Production (FC 211)	5
Cereal Crops (FC 322)	4
Pasture Production (FC 324)	3
Seed Technology (FC 332)	3
Range Resources (Rng 341)	3
Seminar (FC 407)	3
Seed Production (FC 414)	3
Plant Breeding (FC 415)	3
Weed Control (FC 418)	4
Industrial Crops (FC 419)	3
Soils (Sls 210)	5
Farm Business Management (AEc 211)	5
Science Option	
Plant Physiology (Bot 331)	5
Plant Diseases (Bot 450)	5
Plant Ecology (Bot 341)	4
Applied Entomology (Ent 311)	3
Business Option	
Soil Management (Sls 314)	4
Technology Option	
Agricultural Marketing (AEc 311)	5
Plant Physiology (Bot 331)	5
Plant Diseases (Bot 450)	5
Soils	7
Animal Science	7
Horticulture	7

Special interests and goals or other educational background of some students may require limited modification of these minimum requirements with the approval of the student's departmental adviser.

Students interested in range management should turn to RANGE MANAGEMENT section for information on programs of study, facilities, and course offerings.

Graduate Programs for the Master of Science and Doctor of Philosophy degrees provide intensive training under the guidance of nationally known progressive scientists. Crop programs are available in cereal, forage, and turfgrass breeding; production and management; weed control; pasture production and management, and range management; seed production and technology; and crop physiology. Agricultural Experiment Station equipment and facilities and Oregon's unusual diversity of crops, soils, and climates provide an opportunity for extensive research in many phases of crop science.

Lower Division Course

FC 211. **Crop Production.**
5 hours fall or spring. 3 ① 2 ②
Fundamental principles and illustrative facts; planting, culture, rotation, production, hazards, quality, and improvement of cereals, forages, and other agronomic crops. Identification of crop and weed plants and seeds. For all students. Prerequisite: Bot 201.

Upper Division Courses
Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

FC 311. **Potato Growing.**
2 hours winter. 2 ①
Production; improvement; storage; cost; marketing; distribution; uses; experimental work; varietal studies; identification, judging, and scoring. Prerequisite: FC 211 or Hrt 111, or Bot 201.

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. Prerequisite: FC 211 or Hrt 111, or Bot 201. Offered alternate years. Offered 1970-71.

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. Prerequisite: FC 211.

FC 324. **Pasture Production and Management.**
3 hours spring. 2 ① 1 ②
Cultivated forage species, varieties, and mixtures; pasture establishment, production, and grazing management; hay and silage production. Prerequisite: FC 211.

FC 332. **Seed Technology.**
5 hours winter. 2 ① 3 ②
Identification of agriculturally important crop and weed seeds. Measuring quality by checking viability, vigor, physiological development, storability, and contaminants. Prerequisite: FC 211; Bot 201,202.

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. **Seed Crop Inspection.** (G)
3 hours spring. 3 ①
Procedures and techniques involved in providing superior quality seed through seed certification with particular attention to maintenance of genetic and mechanical quality of seeds during growth, harvesting, cleaning, processing, and shipping. Prerequisite: FC 211.

FC 414. **Seed Production.** (G)
4 hours spring. 3 ① 1 ②
Production, management, and utilization of seed crops; certification, marketing, and legislation. Prerequisite: FC 211; senior standing.

FC 415. **Plant Breeding.** (g)
3 hours spring. 2 ① 1 ②
An introduction with emphasis on genetic and cytological principles used in plant improvement. Prerequisite: Z 341.

FC 418. **Weed Control.** (g)
4 hours fall. 3 ① 1 ②
Principles of weed control by cultural, biological, and chemical means; weed identification, introduction to herbicides and factors influencing their use. Prerequisite: one year of biological science; one course in organic chemistry.

FC 419. **Industrial Crops.** (g)
3 hours winter. 3 ①
Production; emphasis on adaptation, agronomic practices, and special qualities. Prerequisite: FC 322.

Graduate Courses
See also courses marked (*g*) and (*G*) above.

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 511. **Advanced Crop Production.**
3 hours winter. 3 ①
Crop growth, production, and management in relation to environmental and physiological factors and their interrelationships; current literature. Prerequisite: plant ecology and plant physiology courses. Offered alternate years. Offered 1970-71.

FC 515. **Plant Breeding.**
3 hours spring. 3 ①
Genetic and cytogenetic principles, methodologies, and theories in improvement of cereal and forage crops. Current literature. Prerequisite: Z 341; FC 517 or equivalent.

FC 516. **Field-Plot Technique.**
5 hours winter. 4 ① 1 ②
Experimental procedures, methods, and techniques; application to field-crop research; interpretation of results.

FC 517. **Plant Genetics.**
3 hours fall. 2 ① 1 ②
Theories and principles; polyploidy; qualitative and quantitative inheritance. Prerequisite: Z 341.

FC 518. **Herbicide Science.**
4 hours winter. 4 ①
Classification and structures of herbicides; physiological effects; mode of action; factors influencing herbicide performance. Prerequisite: FC 418; Bot 331.

FC 519. **Crop Seed Physiology.**
5 hours winter. 3 ① 2 ②
Metabolic changes and affecting factors during stages of seed development, storage, and germination. Prerequisite: Bot 331,431; Ch 252. Offered alternate years. Offered 1970-71.

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. Offered alternate years. Not offered 1970-71.

FC 521. **Concepts of Crop Science.**
3 hours spring. 3 ①
History and current literature. Offered alternate years. Offered 1970-71.

FC 528. **Advanced Weed Control.**
3 hours spring. 3 ①
Principles and methods of weed control. Industries, institutions, organizations, and regulatory agencies dealing with weed control products and measures. Relationship of weed control to agricultural production, labor utilization, and industrial functions. Prerequisite: FC 518.

FISHERIES AND WILDLIFE

This department prepares students 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 department offers work leading to the B.S., M.S., and Ph.D. degrees.

After the freshman year the student may elect one of these curriculum options: (1) fisheries science or (2) wildlife science.

The wildlife science option emphasizes the ecological requirements of wild birds and mammals in relation to multiple-use principles of land and water management. It also orients the student for graduate study and research.

The fisheries science option is designed for students planning to enter graduate study or the research and management fields of commercial and game fisheries.

The curricula include courses in botany, zoology, and veterinary medicine in addition to departmental courses. All undergraduate students in the department are required to complete the following: Wildlife Conservation, 3 hours; Wildlife Management, 3 hours; Economic Ichthyology, 5 hours; Fish Biology, Culture, and Limnology, 9 hours. In addition, fisheries science majors take 4 hours of Economic Ichthyology, 4 hours of Parasites and Diseases of Fish, 5 hours of Commercial Fisheries, and 4 hours of Invertebrate Fisheries; whereas all wildlife management students complete the following: Biology and Management of Game Birds, 9 hours; Biology and Management of Big Game, 6 hours, and Vertebrate Pest Control, 4 hours. Copies of the curricula may be obtained by writing to the Department of Fisheries and Wildlife, Extension Hall 315.

Students planning to transfer to one of these curricula should try to obtain courses in General Zoology, General Botany or Biology, Wildlife Conservation, General Chemistry, Physics, or Mathematics during their freshman and sophomore years.

Strategically located for the study of fisheries and wildlife, Oregon State University has within easy access state fish hatcheries, a game farm, refuges, including the Wm. L. Finley National Waterfowl Refuge, the E. E. Wilson Game Management Area, the Pacific Cooperative Water Pollution and Fisheries Research Laboratories, an experimental stream, experimental ponds, and the Marine Science Center at Newport. Most forms of Oregon's varied wildlife are only a few hours' travel from Corvallis. Research by the Oregon State Game Commission conducted at OSU in cooperation with the Agricultural Experiment Station is of basic value to the instructional programs.

Graduate programs **leading to the Master of Science or Doctor of Philosophy degrees in Fisheries or in Wildlife Science permit intensive study in special areas of interest under the guidance of nationally known scientists. Advanced study in Fisheries Science may be pursued in water pollution biology, aquiculture, ecology of marine and freshwater fishes, taxonomy and systematics, genet-**

ics, parasites, and diseases. Advanced study in wildlife science is resource management oriented and can involve almost any bird or mammal species presenting management problems in the Northwest. Research emphasis may be placed on population dynamics and utilization, life history and ecology, population control, food habits and nutrition, and behavior. Opportunities exist for work with both terrestrial and marine species.

The research program of the Oregon Cooperative Fishery Unit forms an important aspect of graduate training.

Lower Division Courses

Wld 251. **Wildlife Conservation.**
3 hours any term. 3 ①
Wildlife as a valuable economic and recreational resource, need for its conservation and utilization through scientific administration and manipulation; career opportunities in wildlife conservation and management. LONG.

Wld 261. **Wildlife Recreational Techniques.**
3 hours fall or spring. 3 ① 1 ②
Equipment and techniques used by sportsmen and biologists in harvest, field care, and utilization of the fish and game crops. LONG.

Fsh 274. **Economic Ichthyology.**
5 hours. 3 ① 2 ②
Identification, anatomy, life history of economically important fishes of Oregon and the Pacific Northwest; the relationship of these fishes to the world fish fauna. Prerequisite: Z 203.

Fsh 275. **Economic Ichthyology.**
3 hours winter. 3 ① 1 ②
Classification, distribution, and uses of orders and families of fishes having economic or other significance. Prerequisite: Fsh 274.

Wld 281. **Wildlife Management.**
3 hours. 2 ① 1 ②
Principles; measurements of animal populations and productivity; refuge management, hunting and predator control, food and cover improvements, and other techniques used in controlling wild animal populations. Prerequisite: Z 203; Wld 251. KUHN.

Upper Division Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

Wld 310. **Wildlife Resources: Mammals.** (See Fsh 312.)
3 hours. 2 ① 1 ②

Wld 311. **Wildlife Resources: Birds.**
(See Fsh 312.) 3 hours. 2 ① 1 ②

Fsh 312. **Wildlife Resources: Fish.**
3 hours. 3 ①
Identification; life histories; environmental relationships; management principles and techniques for North American wildlife. *Wld 310:* big game, furbearers, predators, and rodents. *Wld 311:* waterfowl and upland game birds. *Fsh 312:* fishes. Not open to fisheries and wildlife majors. KUHN, WIGHT, HORTON.

Wld 319. **History and Literature of Wildlife Management.**
3 hours winter. 3 ①
Brief history of wildlife and fishery management; literature and its sources; author information. Prerequisite: junior standing. LONG.

Fsh or Wld 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 SPECIAL FEES section.

Fsh or Wld 341. **Wildlife Law Enforcement.** 3 hours winter. 2 ① 1 ②
State and Federal fish and game laws and regulations and the scientific methods used to collect, preserve, and present evidence in the enforcement of these laws and regulations. Prerequisite: Wld 281 or 2 years of biology. KUHN.

Fsh or Wld 401. **Research.**
Terms and hours to be arranged.

Fsh or Wld 405. **Reading and Conference.** Terms and hours to be arranged.

Fsh or Wld 407. **Seminar.**
Terms and hours to be arranged.

Wld 420. **Vertebrate Pest Control.** (G)
4 hours winter. 3 ① 1 ②
Techniques, methods, and procedures used to control vertebrate pests including fish, furbearing animals, birds, and rodents where they become nuisance animals or important in transmitting disease, damaging property, or destroying agricultural or forest crops. Prerequisite: Z 371; Wld 281; senior standing. KUHN.

Fsh or Wld 440. **Field Studies.** (G)
1 to 6 hours to be arranged.
Meets specific needs of senior and graduate students assigned to field stations. Prerequisite: Wld 282 or equivalent.

Wld 451. **Biology of Game Birds.** (G)
5 hours. 3 ① 2 ②
Identification, distribution, life histories, and ecology of game birds. Prerequisite: Wld 281. LONG.

Wld 452. **Management of Game Birds.**
(G) 4 hours. 3 ① 1 ③
Game bird management practices and techniques. Prerequisite: Wld 451. WIGHT.

Fsh 454. **Fishery Biology.** (G)
3 hours fall. 2 ① 1 ②
Principles, theories, and methods used in studying the biology of fishes; relationship of biology to management. Prerequisite: Fsh 274. DONALDSON.

Z 454. **Principles of Symbiosis.** (G)
4 hours. 2 ① 2 ②
For course description see Zoology.

Fsh 455. **Fish Culture.** (G)
3 hours winter. 2 ① 1 ②
Theories and practices underlying the use of hatcheries and ponds to produce fish for sport and other purposes; environmental modifications affecting fish production and management. Prerequisite: Fsh 274. DONALDSON.

Fsh 456. **Fishery Limnology.** (G)
3 hours spring. 3 ①
Limnological concepts and techniques related to fishery research and management. Prerequisite: senior standing. DONALDSON.

Fsh 457. **Fishery Limnology Laboratory.** (G)
2 hours. 2 ③
Methods and techniques of limnological investigation. Prerequisite or corequisite: Fsh 456.

Wld 457. **Biology of Big Game Animals.** (G) 3 hours fall. 2 ① 1 ②
Biology, taxonomy, distribution, importance, sex and age classification of North American big game mammals. Prerequisite: Z 371; Wld 281; senior standing.

Wld 458. **Management of Big Game Animals.** (G)
3 hours spring. 2 ① 1 ②
Practices and procedures including census, food habits, damage controls, limiting factors. Prerequisite: Wld 457.

Wld 460. **Management of Fur Bearers.** (G) 3 hours winter. 2 ① 1 ②
Wild fur-bearing mammals; identification, life histories, habits, distributions, economic importance, and management. Prerequisite: Z 372; Wld 282. KUHN.

Wld 461. **Wildlife Investigational Techniques.** (G)
4 hours. 3 ②
New and currently used techniques for capturing, handling, and marking wildlife species; methods of estimating population levels, determining productivity, determining sex and age, and following movements of animals. Prerequisite: senior standing.

Fsh 465. **Commercial Fisheries.** (G)
5 hours. 2 ② 1 ②
Classical commercial fishery management techniques, international problems, two-day field trip. Prerequisite: Fsh 274. HORTON.

Fsh 466. **Invertebrate Fisheries.** (G)
4 hours. 2 ① 2 ②
Economic invertebrates, life histories, harvesting, values, management problems and procedures. Prerequisite: Fsh 274. HORTON.

Fsh 470. **Water Pollution Biology.** (G)
3 hours fall. 2 ① 1 ③
Application of biological principles to the solution of water pollution problems taking into account both engineering and economic considerations. Prerequisite: senior standing. WARREN.

Fsh 490. **Parasites and Diseases of Fish.** (G) 4 hours fall. 2 ① 2 ②
Identification, life history, pathology, diagnosis, treatment, control, and economic importance of pathogenic microorganisms and animal parasites of fish. Prerequisite: two years of biology. MILLEMANN.

Graduate Courses

See also courses marked (*g*) and (*G*) above.

Fsh or Wld 501. **Research.**
Terms and hours to be arranged.

Fsh or Wld 503. **Thesis.**
Terms and hours to be arranged.

Fsh or Wld 505. **Reading and Conference.** Terms and hours to be arranged.

Fsh or Wld 507. **Seminar.**
Terms and hours to be arranged.

Fsh 555. **Fish Genetics.**
3 hours fall. 3 ①
Examples from population genetics through molecular genetics with emphasis on fish evolution applied to problems of speciation and rare formation, hatchery biology, fish taxonomy, and management of natural populations. Prerequisite: Bi 341. SIMON.

Fsh or Wld 567,568,569. **Research Methods.** 4 hours each term. 4 ①
Ecology of fish and wildlife populations. *Fall:* environment, physiology, and growth. *Winter:* behavior, distribution, and energy relations. *Spring:* population dynamics and exploitation. WARREN, HALL.

Fsh 570. **Pollution Problems in Fisheries.** 3 hours winter. 2 ① 1 ②
Polluted waters as they affect fisheries; sources, measures, biological indices, and abatement of water pollution; water requirement and toxicology of fishes and associated aquatic organisms. Prerequisite: Fsh 470. DOUDOROFF.

Z 571,572,573. **Ichthyology.** 3 hours each term. 2 ① 1 ③
For course description see ZOOLOGY. BOND.

FOOD SCIENCE AND TECHNOLOGY

Food Science and Technology is the application of the sciences and engineering to the manufacture, preservation, storage, transportation, and consumer use of food products.

Processing of the basic raw materials—milk, fruits, vegetables, seafoods, meats, and grains—into consumer products by canning, freezing, dehydrating, fermenting, and fabrication is taught with emphasis on basic chemical, microbiological, and physical principles rather than on specific procedures. Because of this, those who complete a major in this department have excellent opportunities in or associated with the largest industry in the world—the food industry. These opportunities include research and development in industry, government, colleges, and universities; regulation of food quality through government agencies and within companies; and management or operation of food products manufacturing plants.

The undergraduate four-year program leads to the *Bachelor of Science degree in Food Science and Technology* under the agricultural science option, and educates the student in respect to all principal food commodity groups and all technologies used in processing them commercially. Students wishing to study a specific phase of foods should enroll for a fifth year leading to the Master of Science degree. Completing the undergraduate curriculum gives an excellent background for graduate studies as well as for employment.

Students wishing a Master of Business Administration, to provide special qualifications for employment in food company management, should take certain additional courses in business during the undergraduate years, then enroll for a fifth year in the School of Business and Technology for the M. B. A.

Graduate programs leading to the *Master of Science or Doctor of Philosophy degrees in Food Science* permit intensified study in the subject areas of special interest. The food science program is concerned with basic science and research involving the chemical, physical, and biological aspects of foods; it usually relates to the processing, preservation, distribution, and utilization of foods. The Department of Food Science and 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 principally in two modern buildings. These facilities include well-equipped laboratories and pilot plants for instruction and research. The Seafoods Laboratory located at Astoria and the Food Toxicology and Nutrition Laboratory near Corvallis are also maintained as integral parts of the Department.

Recommended curriculum for a Bachelor of Science degree in Food Science and Technology:

	Hours
Freshman Year[1]	
General Chemistry (Ch 204,205,206)	15
Mathematics (Mth 110, 111, 112)	12
Food Processing (FST 221,222)	7
English Composition (Wr 121)	3
Fundamentals of Speech (Sp 111)	3
Nutrition (FN 225)	3
Food Quality Evaluation (FST 111)	2
Physical education, hygiene	3
Sophomore Year[1]	
General Biology (GS 101,102,103)	12
Organic Chemistry (Ch 226,227,228,229)	10
Introduction to Statistics (St 311, 312)	6
Food Processing (FST 223,224)	5
General Microbiology (Mb 304)	5
Quantitative Analysis (Ch 234)	4
English Composition (Wr 222)	3
Approved speech or writing course	3
Physical education	3
Junior Year	
General Physics (Ph 201,202,203)	12
Principles of Economics (Ec 201,202,203)	9
Food Science (FST 411,412)	8
General Biochemistry (BB 450,451)	6
Quality Control Systems (FST 424)	3
Technical Report Writing (Wr 327)	3
[2]Electives and/or Food Packaging (FST 431)	9
Senior Year	
Food Engineering (AE 441,442,443)	10
[3]General Psychology	9
Microbial contamination, food or dairy microbiology (Mb 440,444 or 442)	8
Food Analysis (FST 423)	5
Food Science (FST 413)	4
Approved speech or writing course	3
Federal and State Food Regulations (FST 421)	2
Seminar (FST 407)	2
[2]Electives	9

[1] Students interested in ROTC must consult with their advisers.
[2] If fifth year is planned for a Master of Business Administration or a Master of Science degree, see adviser for list of elective courses.
[3] Other humanities and social sciences may be substituted for psychology with adviser approval.

Lower Division Courses

FST 111. Food Quality Evaluation.
2 hours spring. 2 ②
Standards and quality grading; detection, extraction, and identification of extraneous materials in foods. BEAVERS.

FST 221. Food Processing.
3 hours fall. 2 ① 1 ③
Fruit and vegetable processing with related unit operations and unit processes. KRUMPERMAN.

FST 222. Food Processing.
4 hours winter. 3 ① 1 ③
Cereal foods, confections, beverages, meats, and seafood processing with related unit operations and unit processes; food plant sanitation and waste disposal. KRUMPERMAN.

FST 223. Food Processing.
3 hours winter. 3 ①
Milk and dairy food processing with related unit operations and unit processes. SCANLAN.

FST 224. Food Processing Laboratory.
2 hours winter. 2 ③
Prerequisite: FST 223 previously or parallel.

FST 271. Food Grades and Standards.
2 hours spring. 2 ②
Food inspection; standards and quality grading. For students in fields other than food science and technology. BEAVERS, SCANLAN.

Upper Division Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

FST 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: FST 224.

FST 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 an opportunity to take any other FST course.

FST 350. Food Technology.
4 hours fall. 3 ① 1 ③
Principles of preservation and deterioration. For students in fields other than food science and technology. Prerequisite: one year of general chemistry; FST 221. SAMUELS.

FST 401. Research.
Terms and hours to be arranged.

FST 403. Thesis.
Terms and hours to be arranged.

FST 405. Reading and Conference.
Terms and hours to be arranged.

FST 407. Seminar.
1 hour each term. 1 ①

FST 411,412. Food Science. (g)
4 hours each term. 3 ① 1 ③
Food components and additives affecting taste, texture, odor, color, nutrients, and toxicity of non-dairy foods. Prerequisite: FST 221, 222; Mb 304; BB 350, 351. SAMUELS.

FST 413. Food Science. (g)
4 hours fall. 3 ① 1 ③
Physical, chemical, and biological principles governing processing, preservation, and deterioration of milk and dairy foods. Prerequisite: FST 222,223; BB 350,351. BILLS.

FST 421. Federal and State Food Regulations. (g)
2 hours winter. 2 ①
Laws and regulations dealing with the manufacture of foods; labeling, adulteration, misbranding, food standards, case problems. Prerequisite: senior standing. SCHULTZ.

FST 423. Food Analysis. (g)
5 hours winter. 3 ① 2 ③
Chemical and physical analysis. Prerequisite: FST 412,413; Ch 234; BB 350,351. WROLSTAD.

FST 424. Quality Control Systems. (G)
3 hours fall. 2 ① 1 ③
Principles, organization, sampling plans, and statistical applications in food processing plants. Prerequisite: FST 111,221; St 312 or 451. VARSEVELD.

FST 431. Food Packaging. (G)
3 hours winter. 2 ① 1 ②
Objectives and requirements of packaging; composition, characteristics, chemical and physical properties, selection and adaptation of packaging materials and packages. Prerequisite: FST 221,223,411; Ch 226. SAMUELS.

AET 441,442,443. Food Engineering.
See DEPARTMENT OF AGRICULTURAL ENGINEERING TECHNOLOGY.

Mb 440. **Microbial Contamination Control.**
See DEPARTMENT OF MICROBIOLOGY.

Mb 442. **Dairy Microbiology.**
See DEPARTMENT OF MICROBIOLOGY.

Mb 444. **Food Microbiology.**
See DEPARTMENT OF MICROBIOLOGY.

Graduate Courses

See also courses marked (*g*) and (*G*) above.

FST 501. **Research.**
Terms and hours to be arranged.

FST 503. **Thesis.**
Terms and hours to be arranged.

FST 505. **Reading and Conference.**
Terms and hours to be arranged.

FST 507. **Seminar.**
1 hour each term. 1 ①

FST 531. **Carbohydrates in Foods.**
3 hours winter. 3 ①
Chemical and physical properties; changes during processing and storage. Prerequisite: Ch 228; BB 351 or 451 or 491. Offered alternate years. Not offered 1970-71. WROLSTAD.

FST 532. **Food Flavors and Evaluation.** 3 hours spring. 2 ① 1 ③
Chemical definition; flavor development, preservation, and deterioration; subjective methods for evaluation. Prerequisite: Ch 428; St 312 or 451. Offered alternate years. Not offered 1970-71.

FST 533. **Lipids in Foods.**
3 hours fall. 2 ① 1 ③
Function, composition, preservation, deterioration, and analysis. Prerequisite: Ch 428; BB 351 or 451 or 491. Not offered 1970-71.

FST 551. **Food Preservation.**
4 hours winter. 3 ① 1 ③
Thermal process evaluation for canned foods; freezing, dehydration, freeze-drying, and other methods. Prerequisite: Mb 444; Mth 111; Ph 203. Not offered 1970-71. KRUMPERMAN.

FST 561. **Pigments and Color Evaluation.**
3 hours fall. 2 ① 1 ③
Detection and measurement of food pigments and synthetic food colors; effects of food processing; color perception and evaluation. Prerequisite: BB 351 or 451 or 491. Offered 1970-71. WROLSTAD, CAIN.

FST 562. **Proteins in Foods.** 3 hours winter. 2 ① 1 ③
Food protein systems; reactions with other food components; changes in proteins and how they affect the chemical and physical properties of foods. Prerequisite: Ch 428; BB 351 or 451 or 491. Offered 1970-71. ANGLEMIER.

FST 563. **Enzymes of Foods.**
3 hours spring. 2 ① 1 ③
Effect of processing methods on enzymes of foods; use of enzymes in food processing. Prerequisite: Ch 428; BB 351 or 451 or 491. Offered 1970-71. MONTGOMERY.

HORTICULTURE

The Department of Horticulture offers two types of curricula within the School of Agriculture options in science, business, and technology. One type covers production, marketing, and distribution of fruits, nuts, vegetable crops, flowers, and ornamental shrubs. The other prepares for professional careers in the laying out, planting, care, and supervision of parks, playground areas, and highway and home landscaping.

All majors in horticulture, except those in landscape construction and maintenance, must complete the following courses:

	Hours
Basic Horticulture (Hrt 215,216)	6
Soils (Sls 210)	5
Economic Entomology (Ent 314)	4
Plant Physiology (Bot 331)	5
Plant Pathology (Bot 351)	5
Horticultural Plant Breeding (Hrt 413)	3

They must also take one of the following groups of courses, depending on their areas of specialization:

Nursery Management

	Hours
Plant Propagation (Hrt 311)	3
Nursery Management (Hrt 361,362)	8

Pomology

	Hours
Plant Propagation (Hrt 311)	3
Small Fruit Production (Hrt 332)	4
Fruit and Nut Production (Hrt 333)	4
Fruit Handling and Distribution (Hrt 431)	4

Vegetable Crops

	Hours
Vegetable Production (Hrt 341)	4
Commercial Veg Production (Hrt 342)	4
Systematic Vegetable Crops (Hrt 443)	3

Floriculture

	Hours
Plant Propagation (Hrt 311)	3
Commercial Floriculture (Hrt 351,352,353)	9

Majors in landscape construction and maintenance must fulfill the following minimum requirements:

	Hours
Agriculture	36
Communications	9
Humanities and social science (includes landscape)	64
Business	6
Biological and physical science	36
Engineering	6
Physical education	6
Electives	29

A two-year terminal curriculum in nursery management is also available. This curriculum provides instruction and training for those students interested in general nursery management work as nursery foremen, propagators, planting foremen, assistant nursery superintendents, and related positions.

Programs leading to the M.S. and Ph.D. degrees are offered by the Department of Horticulture. Students whose undergraduate major follows the science option in horticulture have the best background for graduate training, although advanced degree programs are not limited solely to those students electing this option.

Lower Division Courses

Hrt 111. **Elements of Horticulture.**
3 hours. 2 ① 1 ②
Introduction to field. Propagation, culture, and utilization of fruits, nuts, vegetables, and ornamental plants.

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. Offered alternate years. Offered 1970-71.

Hrt 215,216. **Basic Horticulture.**
3 hours fall and winter. 2 ① 1 ②
Culture of horticultural plants: soil, water, climate in relation to growth, yield, and quality; vegetative propagation and post-harvest physiology.

Hrt 253. **Flower Arrangement.**
3 hours fall or spring. 2 ① 1 ②
Basic principles as applied to florist work.

Upper Division Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

Hrt 311. **Plant Propagation.**
3 hours winter. 1 ① 2 ②
Propagating or perpetuating plants by means of seeds, cuttings, layers, tubers, bulbs, budding, grafting; practice in greenhouse, nursery, field, and orchard.

Hrt 313. **Greenhouse Construction and Management.**
3 hours spring. 2 ① 1 ②
Planning, layout, construction, and heating of modern greenhouses; factors involved in the efficient operation of a greenhouse range. Offered alternate years. Offered 1970-71.

Hrt 332. **Small Fruit Production.**
4 hours fall. 3 ① 1 ②
Production, economic and geographic distribution; temperature, water, light, and nutritional requirements and limitations; growth and development; cultural techniques; fruit and fruiting characteristics. Prerequisite: Hrt 216. Offered alternate years. Not offered 1970-71.

Hrt 333. **Fruit and Nut Production.**
4 hours spring. 3 ① 1 ②
Geographic distribution of deciduous orchards; temperature, water, light, and nutritional requirements and limitations; soil management, pollination, thinning and pruning; native and applied auxins and growth regulators as related to fruit set and growth; influence of rootstocks on tree growth, productivity, and fruit quality; indices of fruit maturity and special problems of production. Prerequisite: Hrt 216. Offered alternate years. Offered 1970-71.

Hrt 341. **Vegetable Production.**
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; economic aspects; environmental effects; seed, plant production, irrigation, nutrition, and other aspects of major vegetable crop plants. Offered alternate years. Not offered 1970-71.

Hrt 351,352,353. **Commercial Floriculture.**
3 hours each term. 2 ① 1 ②
Cut flowers, pot plants, and forced bulbous crops; modern techniques and recent research findings. Offered alternate years. Not offered 1970-71.

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. Offered alternate years. Not offered 1970-71.

Hrt 361,362. **Nursery Management.**
4 hours fall and winter. 3 ① 1 ②
Propagation, planting, culture, digging, packing, and storing of nursery stock; inspection, quarantine regulations; transportation and marketing. Prerequisite: Hrt 216. Offered alternate years. Not offered 1970-71.

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
Improvement of horticultural varieties; breeding techniques, handling, storage, and viability of pollen; origin of horticultural strains, bud sports and chimeras; polyploidy, sterility and incompatibility phenomena in horticultural plants. Prerequisite: Hrt 216. Offered alternate years. Offered 1970-71.

Hrt 415. **Spraying, Dusting, and Fumigation.** (G)
3 hours fall. 2 ① 1 ②
Properties and uses of pesticides and related agricultural chemicals in relation to production of horticultural crops; application methods and equipment.

Hrt 416. **Horticultural Plant Nutrition.**
(G) 4 hours winter. 3 ① 1 ②
Factors influencing nutrient absorption and composition of horticultural crops; criteria of essentiality and roles of elements; concepts of nutritional status and nutrient balance; techniques for determining nutritional status; effects of fertility programs on nutritional status. Prerequisite: Hrt 216; Bot 331. Offered alternate years. Offered 1970-71.

Hrt 431. **Fruit Handling and Distribution.** (g)
4 hours winter. 3 ① 1 ②
Problems of fruit handling; harvesting, grading, packing, inspection, storage, transportation, and marketing. Composition and physiology of fruits. Prerequisite: Hrt 216.

Hrt 433. **Systematic Pomology.** (G)
4 hours fall. 2 ① 2 ②
Fruit groups, botanical relationships and taxonomy; variety description, nomenclature, identification and classification; variety adaptation and evaluation; origin and improvement of fruit varieties. Offered alternate years. Offered 1970-71.

Hrt 443. **Systematic Vegetable Crops.**
(G) 3 hours fall. 2 ① 1 ②
Nomenclature and classification; nature and importance of horticultural characteristics; varietal differentiation and identification; origins and uses. Offered alternate years. Not offered 1970-71.

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. Offered 1970-71.

Hrt 453. **Handling and Distribution of Florist Crops.**
3 hours winter. 2 ① 1 ②
Problems of precooling, packaging, storing, transporting, and distributing florist crops. Offered alternate years. Offered 1970-71.

Graduate Courses
See also courses marked (g) and (G) above.

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 511,512. **Horticultural Genetics.**
4 hours fall and winter. 3 ① 1 ②
Basic genetic phenomena and their utilization in plant breeding, with special emphasis on horticultural crops; cytological phenomena and interspecific hybridization as sources of variation in natural populations and their use in plant breeding. Prerequisite: Z 341; Hrt 413. Offered alternate years. Not offered 1970-71.

Hrt 521,522. **Horticultural Plant Growth and Development.**
4 hours fall and winter. 3 ① 1 ②
Seasonal growth, dormancy, correlative organ development, juvenility, floral initiation, photoperiodic effects, root regeneration, organ maturation, and abscission in horticultural plants; effects of plant growth regulators. Prerequisite: Hrt 216; Bot 331; organic chemistry. Offered alternate years. Not offered 1970-71.

Hrt 531. **Post-Harvest Physiology.**
5 hours spring. 4 ① 1 ②
Post-harvest physiology as it relates to fruits, vegetables, and ornamental crops; influence of pre-harvest conditions on post-harvest behavior; maturation as related to storage behavior; effects of storage atmosphere, temperature, and ethylene on ripening, respiration, and intermediary metabolism; physiological disorders of stored horticultural products. Prerequisite: Hrt 522. Offered alternate years. Not offered 1970-71.

Hrt 541,542,543. **Selected Topics in Horticulture.**
4 hours each term. 4 ①
Breeding and genetics, physiology, environment and nutrition; lectures, current research, literature, review and discussion; offered in the areas of vegetable crops, small fruits, ornamentals, and tree fruits. Prerequisite: Hrt 216. Consent of instructor required.

POULTRY SCIENCE

With the rapid development of the poultry industry has come a demand for persons trained in poultry science. 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 and adequate laboratories for instruction and research.

Poultry science majors electing the agricultural science option are required to complete a minimum of 18 hours of Poultry Science Department courses; those electing the agricultural business or the agricultural technology options, 23 hours. Poultry science majors are required to complete a minimum of 6 hours of course work in the Department of Veterinary Medicine including 3 hours in anatomy and physiology and 3 hours in avian diseases, both of which may be used to partially satisfy the biological and physical science requirements. Through the generous use of electives, the poultry science curricula are flexible enough to meet the individual needs and abilities of the students.

Lower Division Course

P 121. **Poultry Production.**
3 hours any term. 3 ①
Various phases of poultry industry; physiology, reproduction, feeding, housing, brooding, and management practices. PARKER.

Upper Division Courses
Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

P 321. **The Chick Embryo.**
3 hours winter. 3 ①
Development and environmental requirements of embryos of the domestic fowl. Prerequisite: P 121 or Z 201 or GS 101. Offered alternate years. Offered 1970-71.

P 322. **Chick Embryo Laboratory.**
2 hours spring. 2 ②
Laboratory work to complement P 321. Offered alternate years. Offered 1970-71. BERNIER.

P 323. **Brooding and Broiler Production.** 3 hours spring. 3 ①
Brooding requirements of chickens and turkey poults; types of brooding equipment; commercial broiler production. DORMINEY.

P 341. **Poultry Judging.**
3 hours winter. 2 ① 1 ②
Judging poultry for standard and production qualities. Prerequisite: P 121. Offered alternate years. Not offered 1970-71. PARKER.

P 351. **Turkey Management.**
3 hours fall. 2 ① 1 ②
Practical details in the breeding, feeding, rearing, and marketing of turkeys. Offered alternate years. Offered 1970-71. 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 Feeds and Feeding.** (g)
3 hours. 3 ①
Nutritional requirements; formulation of rations; common nutritional deficiencies; feeding practices. Prerequisite: P 121 or GS 101 or Z 201 or Ch 226. 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: P 411 or AnS 311 or Ch 226. ARSCOTT.

P 421. **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 or GS 101 or Z 201. Offered alternate years. Not offered 1970-71. HARPER.

P 441. **Poultry Breeding.** (g)
3 hours fall. 3 ①
Inheritance of egg and meat production in domestic fowl. Prerequisite: P 121 or GS 101 or Z 201. Offered alternate years. Not offered 1970-71. 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 452. 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
See also courses marked (g) and (G) above.

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.

RANGE MANAGEMENT

Range resource management is one of the family of natural resources professions important to the social, economic, and political development of Oregon and the nation. It is concerned with the improvement, conservation, and use of forage and related resources. Since range management is practiced on lands providing forage, animal products, timber, water, and recreation, concepts of multiple-use management and a familiarity with these allied fields are included in the program of training. A good balance among crop, soil, domestic animal, and wildlife science is also realized. The Bachelor of Science curriculum in range management is offered under the science and business options in the School of Agriculture. Resources of both departments available to the students and the research program include greenhouse, field plot, pasture, range, and animal facilities both on campus and at two experiment stations in eastern Oregon.

Graduate work is offered at M.S., M.Agr., and Ph.D. levels. Graduate programs may involve domestic or game animals, range nutrition, range ecology, physiology of range plants, range improvement, range utilization and management, or range resource analysis and monitoring. The latter especially involves ecology and the rapidly developing field of remote sensing. Graduate work may also be done at either of our field experiment stations under the guidance of the field station staff who are also members of the Range Resource Science faculty.

Field trips are taken in conjunction with specific courses, and summer employment with the Federal government and on research projects make it possible to earn while you learn. Opportunities for employment include resource management and research, extension, ranch management, college and university teaching, business and industry with activities relating to range resources, and foreign agricultural and resource development assistance. See ANIMAL SCIENCE and FARM CROPS sections.

Upper Division Courses
Courses numbered (g) and (G) may be taken for graduate credit.

Rng 341. Range Resources.
3 hours. 3 ①
Nature and management of range forages in relation to other land uses. Prerequisite: junior standing.

Rng 342. Range Improvement.
3 hours winter. 2 ① 1 ②
Range development, cultural treatment, and management systems used to improve grazing lands. Field trip. Prerequisite: Rng 341.

Rng 343. Range Plants.
3 hours spring. 2 ③
Occurrence, physiology, ecology, and nutritive value of important grass, forb, and browse plants on U.S. and Oregon ranges. Prerequisite: Bot 321; Rng 341.

Rng 401. Research.
Terms and hours to be arranged.

Rng 405. Reading and Conference.
Terms and hours to be arranged.

Rng 406. Projects.
Terms and hours to be arranged.

Rng 407. Seminar.
Terms and hours to be arranged.

Rng 408. Workshop.
Terms and hours to be arranged.
Biological principles and/or management practices as they relate to selected topics in range and related resource management.

Graduate Courses
See also courses marked (g) and (G) above.

Rng 441. Range Methods. (g)
4 hours fall. 3 ① 1 ③
Evaluating ranges; forage utilization, range condition, trend and inventory; field problems; use of aerial photographs and sampling theory; field trip. Prerequisite: Rng 341.

Rng 442. Range Topics. (g)
3 hours winter. 1 ① 2 ②
Current technical developments, both domestic and foreign. Prerequisite: Rng 341.

Rng 443. Range Management Planning. (G)
3 hours spring. 2 ① 1 ②
Administration and management of range lands; actual problems and plan execution; field trip. Prerequisite: Rng 441.

Rng 501. Research.
Terms and hours to be arranged.

Rng 503. Thesis.
Terms and hours to be arranged.

Rng 505. Reading and Conference.
Terms and hours to be arranged.

Rng 506. Projects.
Terms and hours to be arranged.

Rng 507. Seminar. 1 hour winter.

Rng 541. Range Research Methods.
3 hours winter. 3 ①
Problem analysis approach; integration of plant and animal research. Prerequisite: Rng 441; one course in statistics. Offered alternate years. Not offered 1970-71.

Rng 542. Range Ecology.
4 hours spring. 2 ① 2 ②
Application of ecology in range and related resource management; field trip. Prerequisite: systematic botany, Bot 441,442. Offered alternate years. Not offered 1970-71.

Rng 543. Range Management.
3 hours winter. 1 ① 2 ②
Physiological, sociological, and nutritional problems. Land-use philosophies on a worldwide basis. Offered alternate years. Offered 1970-71.

SOILS

The study of soil, one of the basic natural resources, is based on knowledge of geology, chemistry, physics, biology, and mathematics. The objective of the curricula in soils is to give students a scientific and practical understanding of soils and their management.

Students may elect any one of the three School of Agriculture options—agricultural science, agricultural business, or agricultural technology. Those planning to take graduate work leading to research or college teaching or in working in soil surveys should elect the science option. Those preparing for work in chemical industries, other commercial organizations, and farming may wish to elect the business option. The technology option leads to careers in soil conservation planning, extension, land appraisal, field work for industrial and commercial organizations, and farming.

Soils majors must take 18-25 hours of soils courses and at least one course each in quantitative analysis, plant physiology, general microbiology, and geology.

Graduate work in soils may lead either to the M.S. or Ph.D. degree or graduate minors for students in other fields. Soil fertility, soil physics, soil chemistry, irrigation, forest soils, plant nutrition, or soil genesis, morphology, and classification may be emphasized in graduate programs.

Lower Division Courses

Sls 210. Soils.
5 hours fall or winter. 2 ①, 1 ①, 2 ②
Origin, formation, classification; physical, chemical, and biological characteristics; effects of soil management on agricultural and forest crop production. Prerequisite: Ch 203; Mth 51 or equivalent. DAWSON, YOUNGBERG.

Upper Division Courses
Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

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. One all-day field trip required. Prerequisite: Sls 210. BOERSMA.

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. Weekend field trip to be arranged. Prerequisite: Sls 210. 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. Soil 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 210; Ch 234 or equivalent. VOLK.

Sls 413. Soil Chemical Analysis. (G)
2 hours fall. 2 ③
Application of analytical chemistry and instrumentation: ion extraction and fixation, exchange capacity, free sesquioxides, organic matter, exchange acidity, lime requirement, mineral identification, conductivity. Taken concurrently with Sls 412. Prerequisite: Sls 210; Ch 234 or equivalent. VOLK.

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 210; Ph 211. BOERSMA.

Sls 422. Soil Physics Laboratory. (G)
2 hours winter. 2 ③
Techniques for examining or evaluating various physical properties of soil. Prerequisite: Sls 421. BOERSMA.

Sls 424. Soil Fertility. (g)
4 hours winter. 3 ① 1 ③
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 210. JACKSON.

Sls 432. Soil Morphology and Survey.
(g) 4 hours spring. 3 ① 1 ③
Soils in place; distribution patterns; morphology of major groups; soil survey techniques. Saturday field trips required. Prerequisite: Sls 210 and course in geology. KNOX.

Mb 452, Soil Microbiology. (G)
5 hours. 3 ① 2 ③
See MICROBIOLOGY for course description.

Graduate Courses
See also courses marked (g) and (G) above.

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 winter. 3 ①
Genetic features and their formation; mineral weathering principles of classification; classification systems. One all-day field trip required. Prerequisite: Sls 432. Offered alternate years. Offered 1970-71. KNOX.

Sls 512. Soil Colloids.
3 hours winter. 3 ①
Physical and colloidal chemistry of soils: hydration, BET theory, application of thermodynamics, theory of ion exchange phenomena, electrochemical behavior, double layer theory, membrane phenomena, theory of pH determinations. Prerequisite: Sls 412; Ch 442. Offered alternate years. Not offered 1970-71. MOORE.

Sls 513. Soil Fertility.
3 hours winter. 3 ①
Concepts and approaches; relations of soil chemistry, plant physiology, and crop sciences; current literature. Prerequisite: Sls 412, 424; St 452. Offered alternate years. Offered 1970-71. ROBERTS.

Sls 514. Forest Soils.
3 hours winter. 3 ①
Soil as a medium for forest growth. Relation of physical, chemical, and biological properties of soil to site and the occurrence and growth of forest vegetation. Soil survey and forest ecology courses recommended. Offered alternate years. Not offered 1970-71. 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. Not offered 1970-71. 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. Offered 1970-71. BOERSMA.

Sls 523. Clay Mineralogy.
3 hours spring. 2 ① 1 ③
Principles of structure; structure of phyllosilicates; theory and practice of identification by X-ray diffraction, differential thermal analyses, chemical and physical properties; formation, alteration, and occurrence of clays. Chemistry, physics, and mineralogy courses recommended. Offered alternate years. Not offered 1970-71. HARWARD.

VETERINARY MEDICINE

Courses in veterinary medicine are designed for students who expect to handle or manage both domestic and game animals. Anatomy and physiology of animals familiarize the student with the normal form, structure, and function of the animal body. Comparisons are made between the domestic and the common species of game animals. Diseases are considered from viewpoint of owner or manager of animals. The epizoology and nature of disease, hygiene and sanitation, care of sick animals, quarantine and segregation, and the importance of State and Federal programs for the control and eradication of contagious and infectious animal diseases are considered. Students are not trained to enter the veterinary profession.

Upper Division Courses
Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

VM 311. Anatomy and Physiology of the Fowl. 3 hours winter. 2 ① 1 ②
Structure and physiology of body of fowl. Offered alternate years. Not offered 1970-71.

VM 320,321. Anatomy and Physiology of Domestic Animals. 4 hours fall and winter. 3 ① 1 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 441. Animal Diseases and Control.
(g) 5 hours spring. 3 ① 2 ②
Predisposing and primary causes of disease, epizoology, and practical disease control. Prerequisite: VM 321.

VM 451. Avian Diseases. (g)
3 hours spring. 3 ①
The pathology of avian diseases; program for control. Prerequisite: VM 311.

VM 452. Avian Diseases Laboratory.
(g) 2 hours spring. 2 ②
Laboratory studies to accompany VM 451. Prerequisite: VM 311.

Z 454. Principles of Symbiosis. (g)
4 hours spring. 2 ① 2 ②
(See Zoology)

VM 461. Parasitic Diseases of Domestic and Game Animals. (G)
4 hours winter. 2 ① 1 ②
Principles of the parasite-host complex with special emphasis on etiology, immunity, and control. Prerequisite: Z 203 or VM 321 or equivalent.

Graduate Courses

VM 501. Research.
Terms and hours to be arranged.

VM 503. Thesis.
Terms and hours to be arranged.

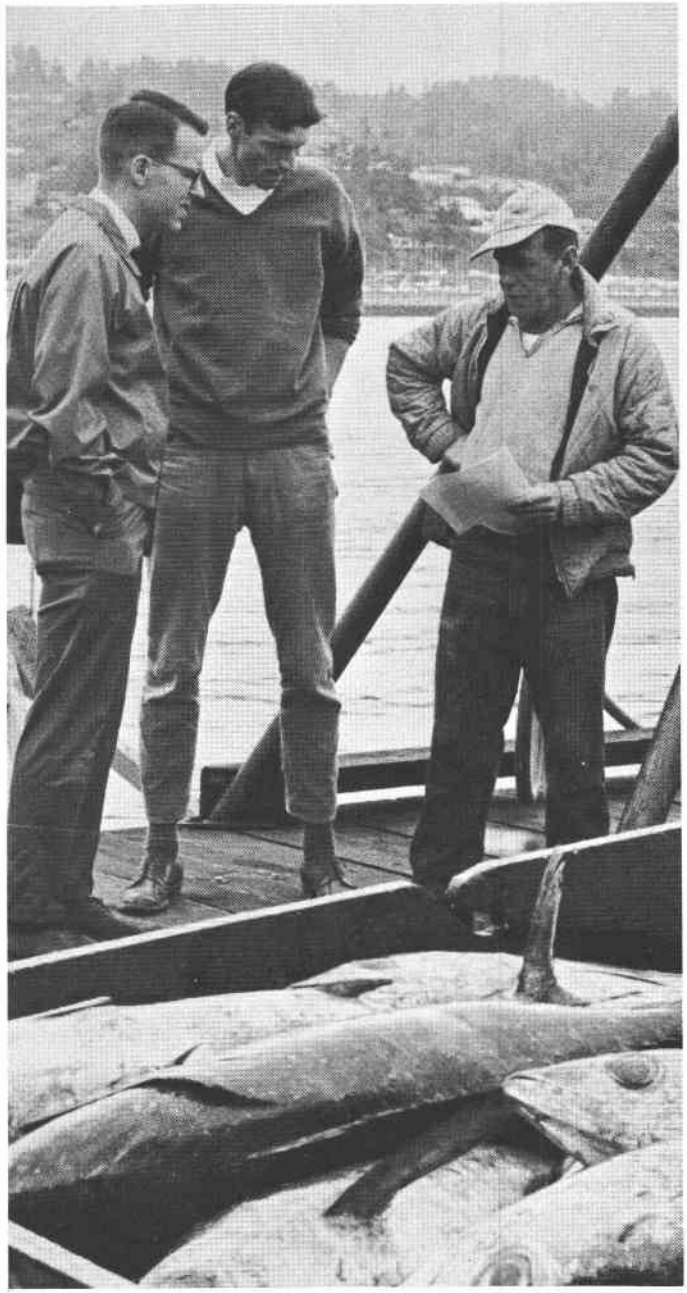
VM 505. Reading and Conference.
Terms and hours to be arranged.

VM 507. Seminar.
Terms and hours to be arranged.

VM 511,512,513. Systematic Pathology.
3 hours each term. 1 ① 2 ②
VM 511: Reticulo-endothelial system: tissue changes in parasitic, allergic, and granulomatous conditions. *VM 512:* digestive system, liver, and pancreas. *VM 513:* urinary, genital, respiratory, and hemopoietic systems. Prerequisite: 12 hours of pathology. Taken in any sequence. Offered alternate years. Offered 1970-71.

VM 521,522,523. Systematic Pathology.
3 hours each term. 1 ① 2 ②
VM 521: Nervous, circulatory, endocrine, and muscular systems. *VM 522:* Skeletal system, organs of special sense and common integument. *VM 523:* Exotic diseases. Special pathology of laboratory animals, fur-bearers and birds. Prerequisite: 12 hours of pathology. Taken in any sequence. Offered alternate years. Not offered 1970-71.

Marine Science at OSU



LONG A LEADER in making man's knowledge useful to people, Oregon State University has programs aimed specifically at helping to use what is known about the ocean and its resources. A staff member of the OSU Seafoods Laboratory in Astoria conducts experimental tests (above left) aimed at fuller industrial use of fish meat left after filleting. An extension marine economist meets with home demonstration agents (left) and county agents in a training session designed to familiarize them with seafood marketing and preparation. A marine extension agent and oceanographer visit with an albacore tuna fisherman in an Oregon coastal port (above). The university had a major part in developing a fishing advisory service for the Pacific albacore fleet. (*See also pages 32, 145, 161.*)

THE OBJECTIVE OF THE School of Business and Technology is to provide students with the professional preparation necessary for successful careers in modern business. Emphasis is placed not only upon the concepts and analytical techniques of business decision making, but also upon the obligations and opportunities of businessmen for effective service to society.

The School is accredited by the American Association of Collegiate Schools of Business.

School of Business and Technology

FACULTY

As of January 1970

EARL GODDARD, D.B.A., Dean of the School of Business and Technology.

EDISON E. EASTON, D.B.A., Associate Dean of the School of Business and Technology.

LOUIS L. EDWARDS, M.E., Placement Director.

ROBERT F. MCCAIN, Ph.D., Head Adviser.

Departments in business administration

Accounting and Management Science: Associate Professor MARTIN (department chairman).
Professors EASTON, NEWTON.
Associate Professors EDWARDS, MCFARLANE, SHIRLEY.
Assistant Professors ABRASSART, CURRY, FULLMER, PASCHKE, ROBINSON, SOLOMON, WEILER, WOODWORTH.
Instructors AAEN, BENSON, BOGDANOFF, DAVIES.

Marketing, Finance, and Production: Associate Professor WIDICUS (department chairman).
Professors DANE, PFANNER, SEATON, STRICKLER.
Associate Professors EGAN, GRAY, SCHARY, STITZEL, STONEHILL.
Assistant Professors BROWNE, MONKS.
Instructor CRUM.

Business Environment and Organizational Behavior: Associate Professor GRAHAM (department chairman).
Professors GODDARD, RETTIG.
Associate Professors MCCAIN, SCHREIMA, SOULE.
Assistant Professors AMANO, DECKARD, DUFF, PARK, SMITH.
Instructors KOLOSSEUS, NIBLER, OGDEN, POST.

Other departments

Business Education: Professors YERIAN (department head), LARSE, WINGER.
Associate Professors CHRISMER, JONES.
Assistant Professors LARSON.

Secretarial Science: Professors YERIAN (department head), LARSE, WINGER.
Associate Professor JONES.
Assistant Professor LARSON.
Instructors HOUGHTON, KASHUBA, MARKSHEFFEL, PALMER, RONDEAU, SCHOESLER, SKAFF.

General Statement

The School of Business and Technology offers three degree programs:

Business Administration, with areas of concentration in accounting, financial management, production management, management science, marketing management, personnel management, agribusiness, internnational business, and general business. Minors, which are taken along with the major in business administration, are available in science, mathematics, and science-technology.

Business Education, with areas of emphasis in office occupations education, distributive education, and basic business and bookkeeping-accounting education.

Secretarial Science

High School Preparation

The following high school courses are recommended for students planning to enroll in the School of Business and Technology: English, four years; mathematics, four years; history and social studies, three years; typing, one year; natural science, two years.

University Honors Program

The Honors Program in this School is coordinated with the programs in other Schools and administered by the Director of the University Honors Program (see page 28). Information concerning eligibility and application forms may be obtained from the Director.

Transfer Students

Students planning to transfer into the School of Business and Technology should, when feasible, do so prior to or during the sophomore year. Those planning to transfer from a community college should consult a business adviser at the community college to determine the recommended courses to be completed prior to transfer.

Counseling and Placement

The School of Business and Technology has a centralized counseling program. Experienced counselors are available in the areas of curriculum and job placement, and faculty members are always ready to assist students in any way they can.

The services of the Placement Director of the School of Business and Technology are available to all students seeking information concerning placement opportunities, interviews with visiting firms, and general information concerning career objectives.

Degrees Offered

The Bachelor of Arts (B.A.) and Bachelor of Science (B.S.) degrees are offered in all curricula; the Master of Business Administration (M.B.A.) in business administration; the Master of Science (M.S.) in management science; the Master of Arts (M.A.), Master of Science (M.S.), and Master of Education (Ed.M.) in business education. For advanced degrees see GRADUATE SCHOOL.

Concurrent Degrees

Students who wish to obtain a degree in Business Administration, in combination with a degree in other areas in which degrees are offered at Oregon State University, can enroll in the double-degree program. The requirements which students need to fulfill in order to qualify for two degrees are listed elsewhere in this Catalog. Students who intend to obtain one of their degrees in Business Administration should see the Head Adviser of the School of Business and Technology as soon as possible.

Curricula in Business Administration

Business Administration

The major curriculum in Business Administration reflects the increasingly complex economic, social, and technological aspects of modern business decision-making. The major in Business Administration is combined with a minor in science, or science-technology, and with work in the social sciences. In all course work, emphasis is given to the development of effective decision-making, including an understanding of personal values and motivation, and an awareness of the interrelationship between business and society.

Freshman Year	*Hours*
Introduction to Business (BA 101)	4
Introduction to Business Data Processing (BA 131)	3
[1] Mathematics (Mth 161,162,163)	12
English Composition (Wr 121)	3
[2] Electives *or* officer education	23
Physical education or general hygiene	3
	48

Sophomore Year	
Principles of Economics (Ec 213,214)	8
Quantitative Business Methods (BA 235)	4
Introduction to Management Science (BA 238)	4
Financial Accounting (BA 211)	4
Managerial Accounting (BA 212)	4
[3] Minor	9
English Composition (Wr 222)	3
[2] Electives *or* officer education	9
Physical education	3
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Junior Year	
Organization and Management Theory (BA 302)	4
Production (BA 311)	4
Marketing (BA 312)	4
Finance (BA 313)	4
Business Law (BA 315)	4
Human Relations in Business (BA 361)	4
English Composition (Wr 323)	3
[3] Minor	9
[2] Electives	12
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Senior Year	
Business and Its Environment (BA 495)	4
Business Policy (BA 499)	4
[4] Business administration (concentration)	18
[3] Minor	9
[2] Electives	13
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Areas of Concentration

Students in Business Administration must complete 17-21 term hours of upper division business administration or related courses in one of the areas of concentration listed below.

ACCOUNTING AND COST CONTROL

Junior Year	*Hours*
Advanced Accounting (BA 417,418,419)	9

Senior Year	
Cost Accounting (BA 421,422)	6
Auditing (BA 427)	3
Taxation and Business (BA 438) or the Federal Tax System (BA 425)	3

RELATED COURSES

Cost Accounting (BA 423)
Anal of Fin Statements (BA 424)
The Federal Tax System (BA 425)
Accounting Theory (BA 426)
Auditing Case Studies (BA 428)
Controllership (BA 429)
Tech Report Writing (Wr 327)

FINANCIAL MANAGEMENT

BUSINESS FINANCE OPTION

Senior Year	*Hours*
Advanced Accounting (BA 417,418)	6
Financial Management (BA 447)	5
Related courses	6

RELATED COURSES

Cost Accounting (BA 421)
Money and Capital Markets (BA 442)
Investment Management (BA 443)
Investment Analysis (BA 444)
Taxation and Business (BA 438)
Insurance and Risk Management (BA 445)
Life and Health Ins (BA 446)
International Financial Mgmt (BA 485)

INSTITUTIONAL FINANCE OPTION

Senior Year	*Hours*
Financial Institutions (BA 441)	3
Money and Capital Markets (BA 442)	3
Financial Management (BA 447)	5
Related courses	6

RELATED COURSES

Investment Management (BA 443)
Investment Analysis (BA 444)
Insurance and Risk Mgmt (BA 445)
Life and Health Ins (BA 446)
Public Finance (Ec 429)
Public Finance (Ec 430)
International Financial Mgmt (BA 485)

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[1] Students minoring in mathematics or industrial engineering should substitute Mth 110 for Mth 163.

[2] In selecting their electives, students seeking the B.S. degree must be sure they satisfy the science requirement (36 hours in either science or social science, or 45 hours in both).

[3] Beginning with their sophomore year, students in business administration are required to register in an approved minor in science or science-technology or mathematics (see pages 104-105). Courses in the following areas are *not* acceptable in fulfillment of the minor requirements; geography, nursing, photography, science education.

[4] Students majoring in business administration are required to choose an area of concentration no later than beginning of the senior year.

MANAGEMENT SCIENCE

Senior Year

Business Systems (BA 436)	4
Business Systems (BA 437)	4
Management Science (BA 434)	4
Management Science (BA 435)	4
Business Research Methods (BA 488)	4

RELATED COURSES

Business Research (BA 489)
Simulation in Business (BA 455)
Business Data Processing Systems (BA 331)
Data Processing (ST 331)

MARKETING MANAGEMENT

Senior Year	Hours
Marketing Management (BA 477)	5
Related courses	12

RELATED COURSES

Selling and Promotion (BA 471)
Advertising (BA 472)
Retail Management (BA 474)
Case Prob in Marketing Mgmt (BA 479)
Business Logistics (BA 481)
International Marketing (BA 484)

PRODUCTION MANAGEMENT

Senior Year	Hours
Cost Accounting (BA 421)	3
Production Management (BA 457, 458)	6
Case Problems in Production Management (BA 459)	3
Related courses	6

RELATED COURSES

Business Systems (BA 436, 437)
Management Science (BA 434, 435)
Business Research Methods (BA 488)
Symbolic and Machine Language Programming (Mth 351,352)
Plant Efficiency Analysis (AEc 421)
Psychology (Psy 330,331,332,361, 446)
Simulation in Business (BA 455)

PERSONNEL MANAGEMENT AND INDUSTRIAL RELATIONS

Senior Year	Hours
Labor Problems (Ec 425)	3
Labor Legislation (Ec 426)	3
Labor Economics (Ec 427)	3
Personnel Management (BA 467, 468)	6
Case Problems in Personnel Management (BA 469)	3

RELATED COURSES

Courses in psychology
Courses in sociology
Courses in industrial engineering
Office Organization and Management (SS 422)

INTERNATIONAL BUSINESS

Senior Year	Hours
International Marketing (BA 484)	4
International Financial Management (BA 485)	4
International Business Environment and Management (BA 486)	4
Related Courses	6–8

RELATED COURSES

International Economics (Ec 440,441, 442)
Economic Development (Ec 445,446)
Concepts of Internat Rel (PS 417)
International Law (PS 442)
The Far East (Hst 391,392,393)
Europe Since 1789 (Hst 343)
Latin-American Civ (Hst 350, 351,352)
Economic Survey of Latin America (Ec 448)
Comparative Economic Systems (Ec 450,451)
Economic History of Modern Europe (Ec 454)

AGRICULTURAL BUSINESS MANAGEMENT

Senior Year	Hours
Agricultural Marketing (AEc 311)	5
Plant Efficiency Analysis (AEc 421)	3
Land and Water Economics (AEc 461)	3
Public Policy in Agriculture (AEc 411)	3
Agricultural Finance (AEc 431)	3

RELATED COURSES

Agri Econ Anal (AEc 312)
Livestock Economics (AEc 440)
International Agri Dev (AEc 462)
Monetary and Banking Theory (Ec 411,412)

GENERAL BUSINESS

The student electing the general business concentration must take 18 hours of upper division business administration or related courses. A maximum of three approved upper division courses in economics may be accepted in lieu of business administration courses.

Minors

A minor in either science or science-technology is taken by all students majoring in business administration. Minors are designed to assist students to become effective business executives by acquainting them with the increasingly important scientific and technological considerations in modern business decisions.

Students may select a minor which: (a) covers broad, basic scientific concepts related to many different business areas or industries, (i.e., science or chemistry), *or* (b) relates to career interests in specific industries, (i.e., forestry or food technology), *or* (c) contributes directly to improved professional competence in business, (i.e., applied mathematics or industrial engineering).

Minors available to business administration majors are listed below. In addition, special minors may be arranged in agriculture, engineering, home economics, and naval science to fit the needs of individual students. Students who are interested in a special minor should consult the Head Adviser of the School of Business and Technology.

SCIENCE

Sophomore Year	Term hours F	W	S
[1] Natural science sequence	3–4	3–4	3–4
Junior Year			
[1] Three natural science courses, dependent upon or related to the sophomore-year natural science courses or Natural science sequence in another area	3–4	3–4	3–4
Senior Year			
Natural science courses, related to each other and dependent upon or related to the sophomore-year and/or the junior-year natural science courses or [2] Science in Antiquity (GS 411) and [2] The Scientific Revolution (GS 412) and [2] Nineteenth-Century Scientific Thought (GS 413)	3–4	3–4	3–4

APPLIED MATHEMATICS

Professor EDWARD KAPLAN, Adviser

Freshman Year	Term hours F	W	S
Trigonometry (Mth 60)	(2)	2	....
Analytic Geometry (Mth 110)	....	(4)	4
Sophomore Year			
Calculus (Mth 111,112,113)	4	4	4
Junior Year			
[3] Approved courses in mathematics or statistics	3–4	3–4	3–4

AGRICULTURE

Sophomore Year	Term hours F	W	S
Science courses related to junior- and/or senior-year minor courses	3	3	3
Junior Year			
Science courses basic to, or prerequisite to, senior-year minor courses	3	3	3
Senior Year			
Related courses	3	3	3

The related courses must be chosen from *one* of the following departments of the School of Agriculture: ANIMAL SCIENCE, FARM CROPS, FISHERIES AND WILDLIFE, HORTICULTURE, POULTRY SCIENCE, SOILS, or AGRICULTURAL ENGINEERING

[1] Chemistry and physics especially recommended. Courses in geography, mathematics, nursing, science education, and statistics are not acceptable.

[2] Business students enrolled in the science minor will be permitted to submit 18 hours of natural science and 9 hours of History of Western Civilization in fulfillment of the prerequisites listed for GS 411,412, and 413.

[3] Courses approved by the Head Adviser, School of Business and Technology.

FOOD TECHNOLOGY

Professor C. E. SAMUELS, Adviser

Sophomore Year	Term hours F	W	S
General Chemistry (Ch 104,105)	5	4	....
or			
General Chemistry (Ch 201,202,203)	3	3	3
Junior Year			
Food Processing (FST 221)	3	....	....
Food Processing (FST 222 *or* 223)	....	4–3	....
Food Grades and Standards (FST 271)	....	....	2
Senior Year			
Food Technology (FST 350)	4	....	....
[1]General Microbiology (Mb 304) or Introductory Microbiology (Mb 130)	....	....	5–3
Related course	....	3	....

RELATED COURSES

Animal Science (AnS 121)
Meats (AnS 351)
Nutrition (FN 225)
Federal and State Food Regulations (FST 421)
Elements of Horticulture (Hrt 111)

[1] All students who are capable of completing General Microbiology (Mb 304), rather than Introductory Microbiology (Mb 130), should do so.

FORESTRY

Professor W. I. WEST, Adviser

Sophomore Year	Term hours F	W	S
Introduction to Forestry (F 111)	4	....	....
Wood Technology and Utilization (FP 210)	....	4	....
[1] Courses in minor option	....	....	3
Junior Year			
[1] Courses in minor option	3	....	3
Logging Methods (FE 392)	....	3	....
Senior Year			
[1] Courses in minor option	3	3	3

[1] Business administration students minoring in forestry must complete 16-18 hours in one of the following forestry minor options: Forest management; natural resource conservation; forest engineering; or wood industry management. Students should consult the head adviser of the School of Business and Technology for the specific courses required in each option.

INDUSTRIAL ENGINEERING

Professor JAMES RIGGS, Adviser

Freshman Year	Term hours F	W	S
Mathematics (Mth 161,162,110)	4	4	4
Trigonometry (Mth 60)	(2)	2	(2)
Sophomore Year			
Calculus (Mth 111,112)	4	4	....
Probability (Mth 361)	....	....	3
Junior Year			
[2] Engineering Economy (IE 381)	3	....	....
Related courses	....	3	3
Senior Year			
Related courses	3	3	3

RELATED COURSES

Systems Analysis (IE 371,372,373)[3] Quality and Reliability Control (IE 491)[3]
Materials Handling (IE 365)
Production Planning and Control (IE 363) *or*

INSTITUTION MANAGEMENT

Professor VIRGINIA HARGER, Adviser

Sophomore Year	Term hours F	W	S
General Chemistry (Ch 104,105)	5	4	....
or			
General Chemistry (Ch 201,202,203)	3	3	3
Junior Year			
Quantity Food Production (IM 311)	4	....	....
Foods (FN 215)	....	5	....
Nutrition (FN 215)	....	..	3
Senior Year			
Related courses	....	3	3

RELATED COURSES

Microbiology (Mb 130 or 304)
Meal Management (FN 313)
Institution Organization and Administration (IM 430)
Purchasing for Institutions (IM 440) or Institution Experience (IM 450)

SPECIAL MINORS

Special Minors must follow the outline below and must be approved by the Head Adviser *before* the second year of the minor begins.

First (or Second) Year	
Natural science sequence, preferably one related to other courses in the minor	9–12
Second (or First) Year	
Science and/or mathematics (in addition to Freshman mathematics requirement) related to other courses in the minor	9–12
Third Year	
Courses in Agriculture, Engineering, Home Economics, preferably within one department	9–12

[1] For those with sufficient math prerequisite it is recommended that Basic Statistics and Operations Research (St 371) be substituted for *Mth 361*. St 371 would then be taken during fall term of the junior year.
[2] ME 460 (Mechanical Engineering) may be taken in place of IE 381 if scheduling problems are encountered.
[3] BA 235,238 acceptable as prerequisite.

Courses in Business Administration

Courses in business administration in the first two years orient the student to the field and in the last two years provide professional preparation. Courses offered in the Department of Economics supplement the work in Business Administration.

Courses numbered in the 400's are restricted to students with junior or senior standing.

Lower Division Coures

BA 101. Introduction to Business.
4 hours. 4 ①
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 102. Survey of American Industry.
3 hours. 3 ①
Structure and development of American industry, including extractive, processing, assembling, construction, and service industries. Not offered 1970-71.

BA 103. Conceptual Foundations of Business.
3 hours. 3 ①
Major institutions and ideas which form an important part of the business environment, such as freedom, competition, justice, values, and social responsibility. Not offered 1970-71.

BA 131. Introduction to Business Data Processing.
3 hours. 3 ①
Concepts, elements, and structure of business data processing systems; classifying, calculating, and reporting functions; programming, computer fundamentals.

BA 211. Financial Accounting.
4 hours. 4 ①
Financial reporting to outsiders. The accounting cycle: income determination/asset valuation. Financial statement preparation and analysis.

BA 212. Managerial Accounting.
4 hours. 4 ①
Providing information for management decisions. Data accumulation for product costing, for performance evaluation and control, and for planning. Prerequisite: BA 211.

BA 215. Contemporary Issues in Accounting.
4 hours. 4 ①
Understanding the structure within which accounting confronts and adapts to a changing environment. Interrelationship between valuation and income measurement. Accounting flows of income, funds, and cash. Prerequisite: BA 212.

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.

BA 231. Business Data Processing.
4 hours. 4 ①
Application of computers to business data processing using COBOL. The development of a common business-oriented computer language and its use in modern business organizations. Comparison of COBOL with other automatic programming languages. Prerequisite: BA 131.

BA 235. Quantitative Business Methods.
4 hours. 4 ①
Management decision processes utilizing statistical methods; use and application of probability concepts, sampling procedures, parameter estimation, regression analysis, etc. to the analysis and solution of such business problems as income and cost estimation, sales forecasting, performance evaluation, inventory analysis, and quality control. Prerequisite: Mth 161.

BA 238. Introduction to Management Science.
4 hours. 4 ①
Management decision processes utilizing mathematical models; use and application of modeling techniques, mathematical programming, decision theory, and simulation to the analysis and solution of such business problems as inventory control, capital budgeting, consumer behavior, and resource allocation. Prerequisite: Mth 163.

Upper Division Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

BA 301. Business Conditions Analysis.
4 hours. 4 ①
Forecasting business conditions; business cycle theories; forecasting techniques including econometrics, input-output, indicators, naive and qualitative models. Not offered 1970-71.

BA 302. Organization and Management Theory. 4 hours 4 ①
Organization structure and management practice. Basic functions of management and related aspects of organization.

BA 311. Production.
4 hours. 4 ①
Decision making methods in the management of production of goods and services. Equipment justification, system analysis, inventory management, simulation, quality control, work methods, facilities selection. Prerequisite: BA 238 or equivalent.

BA 312. Marketing.
4 hours. 4 ①
Industrial and consumer markets and activities and enterprises involved in distributing goods to those markets. Objective to develop understanding of distribution processes, marketing problems and principles.

BA 313. Finance.
4 hours. 4 ①
Role and functions of financial manager in modern business firm; environment in which he operates; formulation of financial objectives and policies; financial analysis, forecasting, planning, and control; cash, credit, and asset management; acquisition of funds through short term and long term borrowing, leasing, stock issue, and by internal means; dividend policy and other aspects of dealing with business owners. Prerequisite: BA 212.

BA 315. Business Law.
4 hours. 4 ①
Nature and function of the law in our business society; obligations arising out of tort; formation, performance, and discharge of contracts.

BA 331. Business Data Processing Systems.
4 hours. 4 ①
Role of manager in a data processing organization. Analysis and design of data systems. File structures, real time applications, I/O features of multiprogramming systems, forms design, and report generation. Prerequisite: BA 131.

BA 361. Human Relations in Business.
4 hours. 4 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: junior standing.

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 413. Business Law.
3 hours. 3 ①
Legal aspects of property rights, commercial transactions, and forms of business organizations. Prerequisite: BA 315.

BA 414. Real Estate Law.
3 hours. 3 ①
Creation and rights of ownership under various estates, title protection, deeds, wills, and inheritance; property transactions related thereto, including contracts, mortgages, leases, and brokerage.

BA 415. Environmental Law: Water and Air. (g) 3 hours. 3 ①
Legal relationships arising out of rights to natural resources: rights to air, water, and navigable streams; control of pollution and the impact of federal and state legislation. Perequisite: senior standing.

BA 417,418,419. Advanced Accounting.
3 hours each term. 3 ①
Basic accounting theory and conventional accounting procedures. More difficult problems encountered in accumulation and presentation of financial data; balance sheets and other financial reports, measuring costs and revenues, partnership accounting, installments, consignments, agency and branch accounting consolidations and fiduciary accounting. Prerequisite: BA 212.

BA 421,422,423. Cost Accounting. (G)
3 hours each term. 3 ①
First Term: Material, labor, and overhead costs; job order and process cost accounting systems; standard costs.
Second Term: Estimated and standard costs; standard cost accounting systems; variances and their disposition; in-depth coverage of first-term topics.
Third Term: Distribution costs; analysis and use of break-even points, differential costs, and other cost data.
Prerequisite: BA 212.

BA 424. Analysis of Financial Statements. (G)
3 hours. 3 ①
Preparation, analysis, and interpretation of balance sheets and operating reports for effective management and control of industrial and trading concerns. Prerequisite: BA 419. Not offered 1970-71.

BA 425. The Federal Tax System. (G)
3 hours. 3 ①
Taxation principles; economics and philosophies of the federal system, current and historical; processes of tax legislation, administration, and judicial review at federal level with reference to overlap at state level; determination of tax liabilities; revenue-raising sources; taxation of incomes. Prerequisite: BA 212; Ec 214.

BA 426. Accounting Theory. (G)
3 hours. 3 ①
Economic factors, law, and administrative ruling; concepts and procedures for measuring income, cost, value, and results of price level change; accounting ethics. Prerequisite: BA 419.

BA 427. Auditing. (G)
3 hours. 3 ①
Review of financial statements and expression of an opinion on reliability and adequacy of management disclosures in statements; auditing standards followed by independent professional accountants in conducting the review; conditions and responsibilities accepted by auditor in offering his opinion. Prerequisite: BA 419.

BA 428. Auditing Case Studies. (G)
3 hours. 3 ①
Cases involving the attest function which illustrate work of the independent professional accountant and circumstances within which the work is performed. Prerequisite: BA 427. Not offered 1970-71.

BA 429. Controllership. (G)
3 hours. 3 ①
The controller and his organization; coordination and control of accounting, budgeting, and planning; controllership's contribution to management and responsibilities for office organization and procedures. Prerequisite: BA 419. Not offered 1970-71.

BA 434, 435. Management Science.
4 hours each term. 4 ①
BA 434: Application of the philosophy and methods of management science to deterministic business problems. *BA 435:* Application to nondeterministic business problems. Prerequisite: St 312 or equivalent.

BA 436,437. Business Systems.
4 hours each term. 4 ①
BA 436: General systems theory. The elements, relationships, and procedures comprising goal-directed systems. Techniques for system definition, analysis, and control. Modeling concepts and the feedback system. Prerequisite: BA 238. *BA 437:* The business organization as an integrated information system. Identification, evaluation, and modification of information sources and needs as required for effective managerial decision-making. Information theory and case study. Prerequisite: BA 212.

BA 438. Taxation and Business. (G)
3 hours. 3 ①
The roles of taxes in business decisions; tax system; taxation problems; tax incidence and burden theories. Tax implication in selection of legal business organizational form, plant location, depreciation, executive compensation, raising funds, the contemporary scene. Prerequisite: BA 313.

BA 441. Financial Institutions. (G)
3 hours. 3 ①
Development, organization, and operations of important domestic financial institutions; their roles in savings and investment processes; their implications for monetary policy. Prerequisite: BA 313.

BA 442. Money and Capital Markets. (G) 3 hours. 2 (1½)
Theory and structure of money and capital markets; role of financial markets in channeling of investment funds throughout the economy; market structure of interest rates; flow of funds analysis. Prerequisite: BA 313.

BA 443. Investment Management. (G) 3 hours. 3 ①
Investment instruments; financial, interest-rate, purchasing-power, and market risks; common types of investment policies; securities exchanges and over-the-counter market; measurement of investment results. Prerequisite: BA 313.

BA 444. Investment Analysis. (G) 3 hours. 3 ①
Industry analysis; market analysis; theory of common stock valuation; growth stock valuation; risk and uncertainty in portfolio selections; integration of technical analysis with fundamental analysis. Prerequisite: BA 443.

BA 445. Insurance and Risk Management. (G) 3 hours. 3 ①
Property and liability risks and their treatment, especially by insurance. Risk concepts; risk management in the firm; risk analyses; non-insurance treatment; insurance coverages; companies, marketing, pricing, and regulation.

BA 446. Life and Health Insurance. (G) 4 hours. 4 ①
Business use of life insurance, health insurance, and pension media: roles, principles, coverages, carrier selection, costs, markets, administration; social insurance.

BA 447. Financial Management. (G) 5 hours. 5 ①
Advanced treatment in a business firm; the finance function in business; financial planning and control; raising of funds; other responsibilities of financial managers. Prerequisite: BA 313.

BA 455. Simulation in Business. (G) 4 hours. 4 ①
Application of simulation techniques to the solution of business problems. The concepts and technical aspects of design, construction, operation, and analysis of business simulation models. Student projects to analyze a business situation using simulation concepts and models. Prerequisite: Computer program language; senior standing.

BA 457,458. Production Management. (G) 3 hours each term. 3 ①
Overview of system theory, application of system theory to production systems, detailed development of the production system—depth study of material covered in BA 311. Decision models used in the management of production of goods and services. Prerequisite: BA 311. Need not be taken in sequence.

BA 459. Case Problems in Production Management. (G) 3 hours. 3 ①
To enable student to formulate an over-all picture of interrelationship of major aspects of production; actual cases drawn from industry. Prerequisite: BA 457,458.

BA 467,468. Personnel Management. (G) 3 hours each term. 3 ①
First Term: Survey of the field, including analysis of personnel objectives, functions, and practices as they relate to overall objectives of an organization.
Second Term: Deeper study of key areas covered in BA 467, with emphasis on the professional periodical literature in the field. Either term may be taken separately.

BA 469. Case Problems in Personnel Management. (G) 3 hours. 3 ①
Cases involving personnel problems and policy, drawn from real situations in business and industry. The student is given an opportunity to apply material learned in BA 467 and BA 468. Prerequisite: BA 467 or BA 468.

BA 471. Selling and Promotion. 3 hours. 3 ①
Role of selling and promotion as marketing activities; concepts and practices involved in the several selling methods; special function(s) each method may have in the selling program. Emphasis on personal selling, display, demonstration, and publicity.

BA 472. Advertising. 3 hours. 3 ①
A tool of marketing management; preparation of advertisements; copy, illustration, and layout; use of media: newspapers, magazines, direct mail, radio, and television.

BA 473. Sales Management. (G) 3 hours. 3 ①
Functions in marketing process; administrative and executive duties; analysis of market, policy formulation; recruiting, selecting, contracting, training, equipping, compensating, supervising, and evaluating salesmen.

BA 474. Retail Management. (G) 3 hours. 3 ①
Organizing and operating retail institutions; store location, store layout, buying and selling, operating activities, personnel and control.

BA 475. Marketing Research Procedures. (G) 3 hours. 3 ①
The role of marketing research in the management of marketing in consumer and industrial areas; a study of research methods and procedures; the application of research methods to the solution of typical marketing problems; development of a research project by members of the class. Prerequisite: BA 312.

BA 476. Consumer and Buyer Behavior. (G) 3 hours. 2 (1½)
Selected behavioral concepts and theories concerning individuals and groups, as they relate to marketing: motivation, learning, beliefs, attitudes, habits, taste, custom, fashion, social class, reference group influences, value, and utility theory. Prerequisite: BA 312.

BA 477. Marketing Management. (G) 5 hours. 3 (1½)
Study of marketing management decision making, including use of model concepts and techniques. Emphasis upon the development and implementation of marketing strategies and programs. Prerequisite: BA 312.

BA 478. Marketing Models. (G) 4 hours. 4 ①
Analysis and application of marketing models to marketing decisions: includes consumer behavior, segmentation, product pricing, promotion, and distribution. Prerequisite: BA 312.

BA 479. Case Problems in Marketing Management. (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. Prerequisite: BA 478.

BA 481. Business Logistics. (G) 3 hours. 3 ①
Interrelationship of traffic management, warehousing, materials handling, and packaging.

BA 484. International Marketing. (G) 4 hours. 4 ①
Influence of foreign environments on choice of the marketing mix: product policy, pricing, channels of distribution, delivery, servicing, promotion, advertising, credit, and insurance; export and overseas marketing. Prerequisite: BA 312.

BA 485. International Financial Management. (G) 4 hours. 4 ①
International monetary environment; source and availability of funds to finance trade and multinational operations; taxation; accounting, controlling, and reporting; capital budgeting; methods of risk absorption; evaluation of performance. Prerequisite: BA 313.

BA 486. International Environment and Management. (G) 4 hours. 4 ①
Political, economic, cultural, and legal constraints on the management of multinational corporations; the colonial legacy; political and economic integration; economic planning; commercial policies; personnel and community relations; legal systems, arbitration and antitrust; organization structure. Prerequisite: senior standing.

BA 488. Business Research Methods. 4 hours. 4 ①
Business research methodology with emphasis upon student's area of concentration; creation of research design for specific project. Prerequisite: BA 201.

BA 489. Business Research. 4 hours. 4 ①
Development and execution of research project. Prerequisite: BA 488.

BA 490. Fundamentals of Accounting. 4 hours. 4 ①
The basic postulates of accounting: theory and system for classification of economic activities of the firm. Form, content, and meaning of various financial statements and reports, including analytical ratios, trends, and interpretation. Cash flow, systems, cost accounting, and managerial uses of accounting data. Prerequisite: graduate standing or approval of Director of Graduate Studies in Business.

BA 491. Applied Business Statistics. 4 hours. 4 ①
Business information, business data, statistical inference, and hypothesis testing applied to business problems, index numbers, time series analysis, and business forecasting. Prerequisite: graduate standing or approval of Director of Graduate Studies in Business.

BA 492. Mathematics for Business Analysis. 4 hours. 4 ①
Mathematical methods, including differential and integral calculus, used in the analysis of business problems. Prerequisite: graduate standing or approval of Director of Graduate Studies in Business.

BA 495. Business and Its Environment. 4 hours. 4 ①
Social, political, economic, legal, ethic, and other environmental considerations relevant to the management of a business enterprise. Interaction between the societal environment and the business enterprise, including the social considerations in, and consequences of, managerial decisions.

BA 498. Government Relations in Business. (G) 3 hours. 3 ①
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 recognition of government aids and services to business community. Prerequisite: senior standing.

BA 499. Business Policy. 4 hours. 2 ②
Advanced integrative course in analysis of top-management decisions, executive responsibilities, and company objectives. Policymaking is studied through business cases. Prerequisite: senior standing.

Graduate Courses
See also courses marked (g) and (G) above.

BA 501. Research.
Terms and hours to be arranged.

BA 505. Reading and Conference.
Terms and hours to be arranged.

BA 507. Seminar.
Terms and hours to be arranged.

BA 511. Analytical Techniques in Business Decision Making.
3 hours. 3 ①
Analytical techniques and concepts necessary in making business decisions concerning marketing, costs, profits, pricing, competition, production, and capital management. Forecasting techniques as related to decision making under conditions primarily of uncertainty. Prerequisite: 6 hours of undergraduate economics or Ec 499.

BA 512. Management and Organization Theories. 3 hours. 3 ①
Study of organization theories and concepts with the purpose of developing an integrated philosophy of management. Emphasis upon current research and concepts.

BA 513. Behavior in Business Organizations. 3 hours. 1 ③
A study of various aspects of formal and informal organizations, communications, motivation, leadership, individual and group behavior, and the administrator's role in interpersonal relationships as they influence and are influenced by business organizations.

BA 517. Conceptual Foundations of Business. 3 hours. 2 ①½
Development of business as an institution from earliest times to present; changes in the concept (social, religious, political, etc.) of business and reasons for these changes.

BA 520. Administrative Accounting.
3 hours. 3 ①
The adaptation of accounting to managerial operational planning, decision-making, and control. Concepts of cost, profits, value, control, planning, decision-making, uncertainty are itner-related. Prerequisite: 6 hours of undergraduate accounting or BA 490.

BA 528. Business Conditions Analysis.
3 hours. 2 ①½
Application of methods of economics and mathematics to analysis and forecasting of general business conditions; models in aggregate income analysis, business fluctuations and growth, and such forecasting techniques as input-output analysis, the "indicators" approach, statistical and econometric methods. Prerequisite: 6 hours of undergraduate economics or Ec 499.

BA 531,532,533. Quantitative Business Analysis.
3 hours each term. 3 ①
First Term: Electronics processing of business information; unified business data systems, computer concepts, systems analysis and design, management considerations involving the use of computers. Prerequisite: Elementary knowledge of Fortran.

Second and Third Terms: Quantitative methods of analyzing business problems; mathematical model building, deterministic models, stochastic models, advanced business statistics, simulation techniques and management uses of quantitative methods. Prerequisite: elementary knowledge of one computer programing language, preferably FORTRAN; two terms of calculus or BA 492.

BA 541. Management Systems.
3 hours. 1 ③
Philosophy of systems; system and problem-solving methodology; theory of information feedback systems; analysis of total business system by interactions between flows and levels of information, money, personnel, capital equipment; development of experimental models to study system behavior and principles.

BA 542. Information Systems.
3 hours. 1 ③
Concept of total information system; relationships between informational needs and the organization's structure, objectives, decision centers, information retrieval requirements; information needs to service management planning, execution and control; informational systems integrating various viewpoints. Prerequisite: one term of undergraduate accounting.

BA 545,546. Management Problem Solving.
3 hours each term. 1 ③
Supervised research; analysis of a major problem area confronting a cooperating business firm; comprehensive written report on research undertaken and proposed solution or solutions. Prerequisite: graduate standing in business administration.

BA 599. Business Policy Formulation.
3 hours. 1 ③
Setting of organizational goals and formulation, evaluation, and implementation of alternative strategies to realize goals; case studies of companies in different industries of differing size and current condition to provide basis for basic organizational policies; opportunity to deal simultaneously with many interrelated aspects of company operation. Prerequisite: graduate standing in business administration.

Business Education, Secretarial Science Curricula

Business Education

The Department of Business Education offers a four-year major curriculum designed to prepare high school business teachers. Students completing this curriculum are prepared to enter both the teaching and the secretarial fields. Both fields offer excellent opportunities to men and women.

Freshman Year	Hours
[1] Stenography (SS 111,112,113)	9
[1] Typing (SS 121,122,123)	6
Introduction to Business (BA 101)	4
Intro to Business Data Proc (BA 131)	3
Literature or science/math	9
English Composition (Wr 121)	3
Physical education	4
[2] Electives	10
	48

Sophomore Year	
English Composition (Wr 222)	3
School in American Life (Ed 310)	3
General Psychology (Psy 200)	5
Applied Stenography (SS 211,212,213)	9
Financial Accounting (BA 211)	4
Managerial Accounting (BA 212)	4
Principles of Economics (Ec 213,214)	8
Fundamentals of Speech (Sp 111)	3
[3] Physical education	3
Electives	3
	45

Junior Year	
English Composition (Wr 323)	3
Office Procedure (SS 311,312,313)	12
Special Secondary Methods (Ed 408c) (Bookkeeping and Nonskill)	3
Spec Sec Methods (Ed 408c) (Typing)	3
Spec Sec Methods (Ed 408c) (Shorthand)	3
Educational Psychology (Ed 312)	3
Business English (Wr 214)	3
Business Law (BA 315)	4
Quantitative Business Methods (BA 235)	4
Methods of Reading (Ed 350)	3
Electives	9
	50

Senior Year	
Office Organ and Mgmt (SS 421,422)	6
[4] Secretarial Problems (SS 411)	3
Organ and Mgmt Theory (BA 302)	4
Marketing (BA 312)	4
Finance (BA 313)	4
Seminar (SS 407)	1
Psychology of Adolescence (Ed 461)	3
Student Teaching Secondary (Ed 416)	12
Seminars (Student Teaching, BEd 407)	4
Electives	8
	49

[1] Students who have had previous study in stenography and typing will be placed in classes commensurate with their abilities.

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. Many high school graduates with previous training in typing and stenography are permitted to begin with second-year stenography.

Freshman Year	Hours
Stenography (SS 111,112,113)	9
Typing (SS 121,122,123)	6
Introduction to Business (BA 101)	4
Intro to Business Data Proc (BA 131)	3
Literature or science/math	9
English Composition (Wr 121)	3
Physical education	4
[2] Electives	9
	47

Sophomore Year	
English Composition (Wr 222)	3
Applied Stenography (SS 211,212,213)	9
Financial Accounting (BA 211)	4
Managerial Accounting (BA 212)	4
Principles of Economics (Ec 213,214)	8
Business English (Wr 214)	3
[3] Physical education	3
Electives	15
	49

Junior Year	
English Composition (Wr 323)	3
Office Procedures (SS 311,312,313)	12
General Psychology (Psy 200)	5
Human Adjustment (Psy 314)	3
Business Law (BA 315)	4
Quantitative Business Methods (BA 235)	4
Electives	18
	49

Senior Year	
[4] Office Organ and Mgmt (SS 421,422)	6
Secretarial Problems (SS 411)	3
Secretarial Practice (SS 412)	3
Technical Reporting (SS 321)	3
Organ and Management Theory (BA 302)	4
Marketing (BA 312)	4
Finance (BA 313)	4
Seminar (SS 407)	1
Electives	19
	47

[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 the 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; SS 422 offered fall and spring terms only.

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 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. The requirements for a State High School Teacher's Certificate are listed under 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 EDUCATION.)

BEd 450. Distributive Education. (G)
3 hours. 3 ①
Principles of an educational program in marketing and distribution: development, philosophy, legislation; functions within the total educational program.

BEd 451. Coordination Techniques in Business Education. (G)
3 hours. 3 ①
Establishing and conducting a functioning relationship between the classroom and on-the-job experiences.

BEd 452. Adult Programs in Business Education. (G)
3 hours. 3 ①
Principles of adult education applied to business education. Prerequisite: senior standing.

Graduate Courses

OA 501. Research.
Terms and hours to be arranged.

BEd 503. Thesis.
Terms and hours to be arranged.

OA 505. Reading and Conference.
Terms and hours to be arranged.

OA 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.

OA 508. Workshop.
Terms and hours to be arranged.

BEd 536. Problems and Research Techniques in Business Education.
3 hours. 3 ①
Philosophy and trends in business education; 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; testing in specific areas; construction of sample tests; available testing materials; use of tests in diagnostic and remedial teaching. Prerequisite: Ed 408; BEd 536, or teaching experience in business subjects in lieu of Ed 408.

OA 538. Current Trends in Office Procedure.
3 hours. 3 ①
Clerical and secretarial procedure programs used in secondary and collegiate schools; course content, teaching methods and materials; organization of laboratories; objectives, standards, instruction sheets, courses of study, and miscellaneous teaching aids. Prerequisite: Ed 408; BEd 536.

OA 539. Current Trends in Basic Business Subjects.
3 hours. 3 ①

BEd 540. Administration and Supervision of Business Education.
3 hours. 3 ①

OA 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.

OA 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.

Ed 547. Cooperative Programs in Vocational Education. (See School of EDUCATION.)

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 machine shorthand. 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; 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 recommendation of instructor.

SS 124. Typing.
2 hours. 5 ①
Speed, accuracy, figures, and remedial techniques. Use 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.
3 hours. 3 ②
Rotary and printing calculators, key-punch machine, adding machines, addressing machines, voice-writing machines, stencil and fluid-process duplicators, electric typewriters. Prerequisite: one year of typing.

Upper Division Courses

SS 311,312,313. Office Procedure.
4 hours each term. 2 ① 2 ②
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 winter and spring. 3 ②
Advanced stenographic training in specialized business fields. Prerequisite: SS 123,213.

SS 407. Seminar.
1 hour fall or winter or spring 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: senior standing.

SS 412. Secretarial Practice.
3 hours any term. 3 ①
Practical office experience. Ninety hours laboratory work in campus offices. Prerequisite: senior standing.

SS 421,422. Office Organization and Management.
3 hours each term. 3 ①
SS 421: fall or winter, *SS 422:* fall or spring. Scientific office management; organization; arrangement; operation; employment and training of office workers; efficiency problems; business ethics. Prerequisite: SS 313 or consent of instructor.

THE SCHOOL OF EDUCATION at Oregon State University 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 the highest degree approved. The school offers both undergraduate and graduate work in elementary and secondary education and provides instruction, principally at the graduate level, in guidance and personnel work. It cooperates with the Graduate School in the preparation of college and university teachers.

School of Education

FACULTY

as of January 1970

KEITH GOLDHAMMER, Ph.D., Dean of the School of Education.

FORREST GATHERCOAL, Teacher Placement Director.

BERLAN LEMON, Head Adviser, Director, Office of Student Personnel.
Professors GOODE, MUNFORD.
Associate Professor T. BROWN, Director, Field Relations.
Instructor R. SMITH, Administrative Assistant.
Emeritus Professors LANGTON, SEEN; Associate Professor K. SMITH; Assistant Professor WORKINGER.

Elementary Education:
Professors LEELAND (acting division director), HALL, REES.
Associate Professors CROSS, SEVEREIDE, STROWBRIDGE, WHITE.
Assistant Professors BRITTON, PACKER, D. SMITH.
Instructors CLAUSEN, CRAWFORD, FARRELL, I. GARCIA, P. GARCIA, KEY, PETRIE, PRUITT, SNYDER.

Foundations and Educational Specialists: Professors ANNA MEEKS (division director), BARON, CHICK, MARKSHEFFEL, POLING, STEVENS, TOLLEFSON, TROW, ZERAN.
Associate Professors ALDRIDGE, BECKER, DUNCAN, LEMAY, LEMON, LUMPKIN, NICHOLAS, PAHR.
Assistant Professors BILLEY, BRITTON, G. CLARK, FULLER, GIFFORD, HAUN.
Instructors FOOTE, HOYSER, R. SMITH, TAYLOR, WITHYCOMBE.

Humanities and Social Sciences Education:
Professors BEALS (division director), KARR, J. KELTNER, O'CONNER.
Associate Professors CRAWFORD, KING, LUSETTI, TAMLER, WOOD.
Assistant Professors DOBBINS, MADDOX, RICARD, SCHAPER.
Instructors CURRAN, GRIFFITHS, A. KELTNER, LARREY, MALANGO, C. SMITH, THETFORD, VISGATIS.

Science Education and Physical Education:
Professors WILLIAMSON (division director), C. L. ANDERSON, BERGSTROM, FOSTER, FOX, KOSKI, LONG, SLEZAK.
Associate Professors G. ANDERSON, CRAVEN, ELLIS, MARKHAM, MILLIKEN, OWEN, PETERSON, WILSON.
Assistant Professors EVANS, GAWER, HOUSTON, LAWSON, NICE, PHELPS, TANNER.
Instructors GORSUCH, NEAL.

Vocational, Adult, and Community College Education:
Professors TEN PAS (division director), ANDREWS, ATTEBERRY, DAVIS, DUBOIS, HOYT, LARSE, MCQUESTEN, SHERBURNE, E. SMITH, WINGER, YERIAN.
Associate Professors T. BROWN, CHRISMER, LEE, SHIRLEY, VAN LOAN, WOLANSKY.
Assistant Professors ADIX, DEBROEKERT, GRIEVE, HEATH, LAVENBURG, MILLER, WALLIS.
Instructors ARNOLD, DAUGHERTY, HEILMAN, KUNZMAN, LINDAHL, MATTHEWS, SCHMIDT, SHAW, SPARKS, SUNDSTROM.

INSTRUCTIONAL ORGANIZATION

The School of Education is organized into five instructional divisions: The division of **Elementary Education** includes all programs in elementary education. The division of **Foundations and Educational Specialists** includes (1) those courses that are common to all teacher preparation programs, and (2) advanced study that leads to elementary and secondary school counseling, reading specializations, and the administration of student personnel in higher education. The division of **Humanities and Social Sciences Education** includes teacher preparation programs in art, English, modern languages, music, journalism, speech, and social studies. The division of **Science and Physical Education** includes teacher preparation programs in science, mathematics, physical education, health education, and recreation. The division of **Vocational, Adult, and Community College Education** includes teacher education programs in business, health occupations, home economics, agriculture, and industrial education, and advanced work toward specialization in adult, vocational, and community college education.

DEGREE PROGRAMS

The School of Education provides both undergraduate and graduate work in elementary and secondary education, with the B.A., B.S., M.A., M.S., Ed.M., Ed.D., and Ph.D. degrees offered, and provides graduate instruction in guidance and personnel work with the M.A., M.S., Ed.M., Ed.D., and Ph.D. degrees available.

The Master of Education degree with a major in health education is granted through the School of Education (see DIVISION OF HEALTH AND PHYSICAL EDUCATION).

Regulations and requirements for completing work for an advanced degree are given in the GRADUATE SCHOOL section of this catalog and in the separate Graduate School catalog.

To qualify for the Ph.D. or Ed.D. degree, a candidate must complete a graduate major and two graduate minors, one of which must be in a field outside education. For the Ed.D. degree, he must submit a record of successful paid teaching experience of at least two years at the elementary or secondary level.

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 to work on the doctorate. Transcripts, 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.

ELEMENTARY EDUCATION

A student preparing to teach in elementary schools must complete the courses listed in the curriculum below and in one of the nine areas of concentration programed by his adviser.

General psychology is prerequisite to upper division education courses and should be completed by the end of the sophomore year. It is the only course in psychology which may be counted as part of the education major of 36 term hours.

CURRICULUM

Freshman Year

English Composition (Wr 121)	3
History of American Civilization (Hst 224,225,226)	9
Introductory Geography (Geog 105,106)	6
Speech (Sp 111,120, or 121)	3
Physical Education Activities (PE 180 or 190)	2
Hygiene (PE 160)	2
*Electives and Area of Concentration	17
	48

Sophomore Year

English Composition (Wr 222)	3
Literature (any two courses)	6
General psychology	5
General Biology (GS 101,102)	8
Educational Psychology: Learning (Ed 312)	3
Music for Elementary Teachers (Mus 371)	4
Mathematics for Elementary Teachers (Mth 191,192)	6
School in American Life (Ed 310)	3
Physical Education (PE 180 or 190)	3
*Electives and area of concentration	15
	48

Junior Year

English Composition (Wr 323)	3
Methods in Reading (Ed 350)	3
Methods and Materials:	
Language Arts (Ed 367)	3
Mathematics (Ed 368)	3
Social Science (Ed 369)	3
Science (Ed 370)	3
Physical Science (GS 104 and 105 or 106)	8
Elementary School Physical Education (PE 320)	3
*Electives and area of concentration	17–19
	48

Senior Year

Student Teaching: Elementary (Ed 415)	12
Student Teaching: Seminar (Ed 407)	3
Psychology of Childhood (Ed 460)	3
Children's Literature (Eng 487)	3
School Health Education (SEd 321)	3
Basic Design (AA 195,196,197)	6
* Electives and area of concentration	18
	48

* Areas of Concentration (36 to 42 hours within the total 192) in: Art, English, Math, Modern Languages, Music, P.E., Science, Social Sciences, Speech.

GENERAL NORMS

A. ELEMENTARY TEACHERS: (Kindergarten through grade 8 of the elementary school.)

1. Standard Norm (five-year)
   a. 30 quarter hours of elementary teacher education taken in a standard elementary teacher education institution, to include:
      (1) Child psychology
      (2) Educational psychology
      (3) Elementary school methods, including the teaching of reading
      (4) Elementary supervised teaching
   b. 15 quarter hours in education to be distributed in the following areas:
      (1) Philosophy and/or history of education
      (2) Elementary teaching methods, in addition to those required for the Basic Norm.
      (3) Adolescent psychology
      (4) Any two of the following: (a) curriculum, (b) evaluation of learning, (c) guidance and counseling, (d) social foundations of education, (e) education of the exceptional child, (f) educational teaching media.
   c. College preparation in each of the following areas, with a concentration of 30 quarter hours or more in one of the areas:
      (1) Language arts
      (2) Social science
      (3) Mathematics
      (4) Health and physical education
      (5) Art
      (6) Music
      (7) Science
      (Foreign language is not required of elementary teachers; however, they may have an area of concentration in this field.)

2. Basic Norm (four-year): 30 hours in elementary teacher education taken in a standard elementary teacher education institution, to include:
   a. Child psychology
   b. Educational psychology
   c. Elementary school methods, including the teaching of reading
   d. Elementary supervised teaching

FOUNDATIONS AND EDUCATIONAL SPECIALISTS

Guidance and Personnel Work

OSU offers a comprehensive graduate program in guidance and personnel work, preparing students for work as counselors in schools and colleges, as deans of boys and girls and men and women, and as directors of student personnel, counselor educators, and supervisors of guidance.

Doctoral programs

A candidate for the Doctor of Education degree in guidance and personnel work must have had at least two years' paid teaching experience at an appropriate level and, in addition, two years of paid counseling experience in a school or college. A candidate for the Doctor of Philosophy degree in this field must have had two years of paid counseling experience in a school or college. The teaching experience requirement varies with the ultimate goal of the candidate. For further requirements in the doctoral programs, see GRADUATE SCHOOL.

Master's degree program

A candidate for a Master of Education degree in guidance must elect Option B. Course work must include 24 hours of prescribed courses in guidance and 21 hours of electives.

Prescribed courses in guidance

	Hours
Ed 485. Principles and Practices of Guidance Services	3
Ed 486. Occupational and Educational Information	3
Ed 487. Counseling Techniques	3
Ed 588. Supervised Counseling Techniques	6
Ed 589. Organization and Administration of Guidance Services	3
Ed 469. Diagnostic Techniques in Reading	3
Ed 512. Research Procedures in Education or,	
Ed 424. Measurement in Education or, a graduate course in statistics	3

Electives

Electives to the number of 21 hours will be selected under the direction of the guidance adviser. The electives—no more than 9 hours in any one field—must be drawn from the fields of anthropology, economics, philosophy, psychology, sociology, and family life, and from education courses relating to guidance, i.e., Ed 432,460, 461,532,533,561,581,582.

BASIC NORM PROGRAM

The Basic Norm in counseling consists of a total of 24 hours with at least one course in each of the following areas:

Basic principles of guidance—Ed 485

Educational, occupational, social, and personal information—Ed 486, 533

Counseling techniques—Ed 487, 577

The individual—Psy 413, 435, 485, 462

School programs and the community—Ed 589

Research and measurements—Ed 424, 512; St 421; Psy 421, 422, 423

Supervised counseling experience—Ed 588; Psy 481, 482

The Standard Norm in counseling consists of a total of 48 hours with at least one course in each of the above areas.

HUMANITIES AND SOCIAL SCIENCES

Secondary Education

A student preparing to teach in secondary school must complete the courses listed below and also complete requirements for a Basic Norm in a teaching field. If he can supervise at least one student activity, he will find job opportunities better when he graduates. Activities which provide excellent training and experience for prospective teachers include intercollegiate and intramural sports, journalism, art, dramatics, debating, oratory, orchestra, band, chorus and other vocal groups, writing and producing radio and television programs, and student government. The electives recommended for freshmen and sophomores help broaden the educational experience and preparation and may be used as a starting point in student activities.

NORM REQUIREMENTS

JUNIOR HIGH SCHOOL TEACHERS
(Grades 7 and 8 or 7, 8, and 9 of a regularly organized junior high school; grades 8 and 9 of a five-year high school or 7, 8, and 9 of a six-year high school)

1. *Standard Norm* (five-year)
   a. 45 quarter hours in teacher preparation taken in a standard teacher education institution, to include:
      (1) Educational psychology
      (2) Child psychology
      (3) Adolescent psychology
      (4) Teaching of reading
      (5) Methods of teaching including special emphasis in a subject taught in junior high school
      (6) The junior high school, its role in education, and its curriculum
      (7) Guidance and counseling
      (8) Philosophy and/or history of education
      (9) Diagnostic and remedial techniques in the basic skills
      (10) Supervised teaching in the elementary, junior high, or senior high school
   b. Two Basic Norms or one Standard Norm in subject fields taught in junior high school, or a Basic Norm in language arts —social studies.
2. *Basic Norm* (four-year)
   a. 30 quarter hours of secondary teacher preparation taken in a standard teacher education institution, to include:
      (1) Educational psychology
      (2) Child psychology
      (3) Adolescent psychology
      (4) Teaching of reading
      (5) Methods of teaching including special emphasis in a subject taught in junior high school
      (6) The junior high school, its role in education, and its curriculum
      (7) Supervised teaching in the elementary, junior high, or senior high school
   b. One Basic Norm in a subject field taught in junior high school, or a Basic Norm in language arts-social studies

SENIOR HIGH SCHOOL TEACHERS
(Three- and four-year high schools)

1. *Standard Norm* (five-year)
   a. 36 quarter hours of secondary teacher preparation to be completed in a standard teacher education institution and to include:
      (1) Educational psychology
      (2) Child psychology
      (3) Adolescent psychology
      (4) Methods of teaching including special emphasis in a subject taught in senior high school
      (5) Philosophy and/or history of education
      (6) Teaching of reading
      (7) Two of the following areas: (a) Curriculum, (b) Evaluation of learning, (c) Guidance and counseling, (d) Social foundations of education, (e) Education of the exceptional child, (f) Educational teaching media
      (8) High school supervised teaching which may be completed in grades 7-12 when grades 7 and 8 are departmentalized
   b. A Standard Norm or college major in a subject taught in high school
2. *Basic Norm* (four-year)
   a. 21 quarter hours of secondary teacher preparation taken in a standard secondary teacher education institution and to include:
      (1) Educational psychology
      (2) Adolescent psychology
      (3) Methods of teaching including special emphasis in a subject taught in senior high school
      (4) High school supervised teaching which may be completed in grades 7-12 when grades 7 and 8 are departmentalized
   b. A Basic Norm or a college major in a subject taught in high school

CURRICULUM

Freshman Year

English Composition (Wr 121)	3
Mathematics or a laboratory science other than psychology with laboratory (one-year sequence)	9–15
ROTC or elective	3–9
Physical education and hygiene	3
Courses in Basic Norm	9–15
Other electives	9–15

Sophomore Year

School in American Life (Ed 310)	3
English Composition (Wr 222)	3
General Psychology (Psy 200)	5
Literature	9
Speech	3
History of American Civilization (Hst 224,225,226)	9
ROTC or elective	3–9
Physical education	3
Courses in basic teaching norms	6–12

Junior Year

English Composition (Wr 323)	3
Educational Psychology (Ed 312)	3
Methods in Reading (Ed 350)	3
Outlines of Economics (Ec 115) or Economic Development of United States (Ec 215)	3
American Governments (PS 200)	5
General Sociology (Soc 204)	3
Electives in teaching norms	18
Other electives	15

Senior Year

Psychology of Adolescence (Ed 461)	3
Special Secondary Methods (Ed 408)	3
Student Teaching: Secondary (Ed 416)	9–15
Electives	30

Fifth Year

Students preparing to enter counseling, guidance, and personnel work must qualify for a master's degree. Fifth-year students desiring to meet certification requirements only need not work toward a master's degree, but they should realize that a master's degree is desirable for most high school positions.

BASIC NORMS

Art

	Hours
Basic Design (Art 195,196,197)	6
Basic Drawing (Art 105,106,107)	6
Introduction to Art History (Art 261, 262,263)	9
Lower division art studio courses selected from seven of the following to include one 6-credit-hour sequence: Advertising Design, Art Crafts, Ceramics, Drawing, Metal Design and Jewelry, Painting, Printmaking, Sculpture, Three-Dimensional Design	18
History of Art (Art 364,365,366)	9
Art studio (300 level)	9
Art studio (400 level)	9
Art electives	6
	72

English

COMPLETION OF A MAJOR IN ENGLISH WHICH MUST INCLUDE:

Survey of English Literature (Eng 101,102, 103) or World Literature (Eng 107,108, 109)	9
Shakespeare	9
Upper division literature courses before 1800	9
Upper division literature courses after 1800	9
Upper division English Department courses —excluding Wr 411 and Library courses	9

COURSES IN ADDITION TO THE ENGLISH MAJOR:

Composition for Teachers (Wr 411) or Advanced Expository Writing (Wr 316 or Wr 317)	3
*Literature for Teachers (Eng 488)	3
*Structure of the English Language (Eng 491)	3
American Literature (Eng 254 or 255)	3
*World Literature (Eng 107,108,109)	3
Speech	3
	63

* These courses have to be taken to satisfy requirements for certification if they are not included in the English major; if included in major, a corresponding number of hours of electives in the English Department must be taken in order to meet the 63-hour total required for the Basic Norm.

Journalism

Students taking a Norm in Journalism are advised also to have a Basic Norm in another teaching field, e.g., English.

Journalism (J 111,112)	6
Journalism Laboratory (J 121)	1
Copyediting (J 214)	3
The Press and Society (J 450)	3
Editorial Writing (J 223)	3
Public Information Methods (J 318)	3
Photo-Journalism (J 334)	3
Electives chosen from J 317, 319, 351, 352, 353; Wr 319, 411; Sp 260, 366	8

Language Arts-Social Studies*

Survey of American Literature (Eng 253,254,255)	9
Survey of English Literature (Eng 101,102,103)	9
World Literature (Eng 107,108,109)	9
Shakespeare (Eng 201,202,203)	9
Advanced Expository Writing (Wr 316 or Wr 317)	3
Composition for Teachers (Wr 411)	3
Development of the English Language (Eng 490)	3
Speech	3
History of American Civilization (Hst 224,225,226)	9
History of Western Civilization (Hst 101,102,103)	9
Introductory Geography (Geog 105,106,107)	9
Six quarter hours in one or more of the following fields: political science, economics, sociology, anthropology	6
	81

* Students in this norm have joint advisers in English and Social Studies, must take Ed 408, Special Secondary Methods, in both English and Social Studies and do student teaching in both areas supervised by both departments.

Modern Languages

Students for whom the Second-Year course is waived or who are qualified to begin the program at a higher level will satisfy the Basic Norm of 45 hours with 9 additional hours of approved electives.

FRENCH

Second-Year French (RL 101,102,103)	9
French Conversation (RL 114,115,116)	6
Intermed French Comp and Conv (RL 314,315,316)	9
Survey of French Literature (RL 311, 312,313)	9
French Pronunciation and Phonetics (RL 331)	3
Approved electives from the following: Directed Reading in French (RL 307, 308,309) French Culture and Civilization (RL 328) Nineteenth-Century French Literature (RL 417,418,419) Twentieth-Century French Literature (RL 423,424,425)	9
	45

GERMAN

Second-Year German (GL 101,102,103)	9
German Conversation (GL 111,112,113)	6
German Pronunciation and Phonetics (GL 331)	3
Intermed German Comp and Conv (GL 334,335,336)	9
Survey of German Literature (GL 343, 344,345)	9
Approved electives from the following: Directed Reading in German (GL 311,312,313) Age of Goethe (GL 411,412) The German Novelle (GL 416) German Lit of the Twentieth-Century (GL 421,422,423)	9
	45

SPANISH

Second-Year Spanish (RL 107,108,109)	9
Spanish Conversation (RL 117,118,119)	6
Survey of Spanish Lit (RL 341,342,343) *or* Survey of Span-Amer Lit (RL 444,445, 446)	9
Intermed Spanish Comp and Conv (RL 347,348,349)	9
Spanish Pronunciation and Phonetics (RL 350)	3
Approved electives from the following: Directed Reading in Spanish (RL 344, 345,346) Survey of Spanish-American Lit (RL 444,445,446) Survey of Spanish Lit (RL 341,342,343)	9
	45

RUSSIAN

Second-Year Russian (SL 101,102,103)	9
Russian Conversation (SL 111,112,113)	6
Readings in Russian Literature (SL 311, 312,313)	9
Intermed Russian Comp and Conv (SL 314, 315,316)	9
Russian Pronunciation and Phonetics (SL 330)	3
Approved electives from the following: Directed Reading in Russian (SL 317, 318,319) Introduction to Russian Culture (RS 227, 228)	10
	46

Music

Music Theory I (Mus 112,113)	8
Music Theory II (Mus 211,212,213)	9
Keyboard Harmony (Mus 214,215,216)	3
Introduction to Music and its Literature (Mus 221,222)	6
Conducting (Mus 323)	2
Choral Conducting (Mus 324)	2
Applied Music (Mus 190-490) or Class Lessons—as directed	12
	42

A piano proficiency examination, to be completed by the end of the junior year, is required of all students. Participation in a performance group is expected.

Social Studies

History of Western Civilization (Hst 101, 102,103)	9
History of American Civilization (Hst 224, 225,226)	9
Introductory Geography (Geog 105,106, 107)	9
Principles of Economics (Ec 201,202, or 203)	6
American Governments (PS 201,202, or 203)	6
General Sociology (Soc 204,205, or 206) or Cultural Anthropology (Anth 207,208)	6
Seminar (SSc 407)	6
Upper division history electives	9
Social science electives, at least 6 of which must be upper division hours. No more than 6 may be in history	15
	75

Speech

The Basic Norm in speech provides three options:
1. General Oral Communication
2. Public Speaking and Group Communication
3. Dramatics

	Option 1	Option 2	Option 3
Fundamentals of Speech (Sp 111,112,113)	6(9)	9	6
Phonetics (Sp 370)	3	3	3
Voice and Articulation (Sp 120)	....	3	....
Interpretation (Sp 121,122)	6	....	6
Radio Speaking (Sp 361)	3	3	3
Fundamentals of Acting (Sp 248)	3	....	3
Fundamentals of Play Direction (Sp 354)	3	....	3
Conduct of Meetings (Sp 231)	....	3	....
Reasoning and Evidence in Controversy (Sp 321)	....	3	....
Persuasion (Sp 322)	....	3	....
Group Discussion Processes (Sp 323)	....	3	....
Scenecrafts (Sp 244)	....	....	3
Stage Make-up (Sp 247), Adv Interp (Sp 311), or Stage and Scene Design (Sp 346)	....	....	3
Speech Science (Sp 371)	3	3	3
Speech in the Secondary School (Sp 414)	3	3	3
Speech and theater workshops (2 areas)	6	6	6
Public address courses: 231, 321,322,323	6(3)	....	....
Approved electives	3	3	3
	45	45	45

Core courses recommended: 201,202,203,420

SPEECH CORRECTION

1. A basic general elementary or basic general secondary norm.

2. Recommendation by OSU School of Education.

3. Basic courses in speech as required: 15 hours.

4. State certification requires a minimum of 27 hours in speech and hearing including work in each of the following: Phonetics (Sp 370), 3 hours; Speech Science (Sp 371), 3 hours; Speech Pathology (Sp 481,482,483), or Principles and Techniques of Speech Correction (Sp 393) for Sp 481, 9 hours; Clinical Methods in Speech Correction (Sp 484,485,486), 9 hours; Audiology (Sp 487,488), 6 hours; Lip Reading (Sp 490), 3 hours; Practicum in speech and hearing theory in the public schools (Sp 401), 2 hours.

5. Students planning to meet ASHA requirements must complete at least 230 clock hours of actual clinical practice. The minimum requirement shall be 6 hours in the OSU Clinic and 2 hours in the public schools (½ day per week).

STANDARD NORMS

English

Basic Norm in English	63
Graduate courses to include work in advanced writing or linguistics and literary criticism	21
Additional hours, with approval of adviser	9
	93

Language Arts-Social Studies*

Basic Norm in language arts-social studies	81
Advanced writing, linguistics, and other language arts	21
Upper division and graduate courses in history	9
Other upper division and graduate courses in social studies	3
	114

* Students in this norm have joint advisers in English and Social Studies, must take Ed 408, Special Secondary Methods, in both English and Social Studies and do student teaching in both areas supervised by both departments.

Social Studies

Basic Norm in social studies	75
Required upper division or graduate courses in history	9–12
Required upper division or graduate courses in history, geography, sociology or anthropology, political science or economics	18–21
	105

SCIENCE EDUCATION AND PHYSICAL EDUCATION

Professional preparation for prospective teachers of biological and physical science, junior high school science, mathematics, and physical education and health is offered in the Science and Physical Education division, which has two major sections: the Department of Science Education, a joint department within the School of Education and the School of Science, and the Division of Health and Physical Education.

Science Education

A student preparing to apply for a teaching credential to teach science either in junior high school or in senior high school must complete the *common program* listed below. Those preparing to teach in junior high schools have the option of specializing in biological science, earth science, or physical science. Those preparing to teach in senior high schools must fulfill requirements in one of the basic norms in high school science, either in biology, chemistry, physics, or mathematics.

Students may register either in the School of Education or in the School of Science. The required common program and basic norms are the same in both schools.

The following courses are required for all secondary school science teachers.

COMMON PROGRAM

General biology (one sequence)	9–15
General chemistry (one sequence)	9–15
Geology (one sequence)	9–12
General physics (one sequence)	12
Algebra (Mth 51 or 111)	4

JUNIOR HIGH SCHOOL SCIENCE

A student preparing to teach junior high school science must select one of the following basic norms:

BASIC NORMS

OPTION 1 (Biological Science)

General microbiology	5
Genetics (Bi 341)	3
Evolution (Z 345)	3
General Ecology (Bi 370)	5
Upper Division electives in biological science	8–11
	24–7

OPTION 2 (Earth Science)

Geology Laboratory (G 204,205,206)	3
Mineralogy and Rock Study (G 312, 313, 314)	12
Basic Meteorology (AtS 302,203)	6
Introduction to Oceanography (Oc 331)	3
Upper division electives in earth science	3
	27

OPTION 3 (Physical Science)

Organic Chemistry (Ch 334,335,336)	9
Physical Chemistry (Ch 340)	3
General Physics (Ph 311,312,313)	9
Upper division electives in physical science	3–6
	24

SENIOR HIGH SCHOOL SCIENCE

A student preparing to teach senior high school science must select one of the following basic norms:

Biology

General Microbiology (Mb 304)	5
Genetics (Bi 341)	3
Evolution (Z 345)	3
Bioecology (GS 331)	3
Physiology (Z 321,322)	6
Comparative Vertebrate Embryology (Z 324)	4
Comparative Vertebrate Anatomy (Z 325)	4
Organic Chemistry (Ch 226,227,228)	8
	36

Chemistry

Organic Chemistry (Ch 334,335,336)	9
Analytical Chemistry (Ch 320)	4
Introduction to Physical Chemistry (Ch 423,424,425)	9
Upper division electives in chemistry	2–5
Calculus	12
	36–39

Physics

General Physics II (Ph 311,312,313)	9
Selected Topics in Classical Physics (Ph 471,472,473)	12
Electronics (Ph 430)	3
Mathematics (calculus and differential equations)	20
	44

Mathematics

Calculus	12
Geometry	9
Algebra	12
Contemporary mathematics	18
	51
General Physics (Ph 204,205,206) or General Chemistry (Ch 204,205,206)	12–15
General Biology (Gs 101,102,103)	12
	75–78

STANDARD NORM (5th YEAR)

Junior High School Science

Basic Norm (all required science and mathematics)	70–82
Approved upper division and/or graduate courses in science	30
	100–112

Biology

Basic Norm (all required science and mathematics)	79–91
Approved upper division and/or graduate courses in science	30
	109–121

Chemistry

Basic Norm (all required science and mathematics)	79–91
Approved upper division and/or graduate courses in science	30
	109–121

Physics

Basic Norm (all required science and mathematics)	87–99
Approved upper division and/or graduate courses in science	30
	117–129

Mathematics

Basic Norm (all required science and mathematics)	75–78
Approved upper division and/or graduate courses in mathematics	30
	105–108

Health and Physical Education

BASIC NORMS

Health Education

Biological science sequence	9–12
General Chemistry (Ch 201,202,203,207)	11
Physiology (Z 331,332)	6
General Microbiology (Mb 304)	3
Introduction to Health Education (H 123)	3
General Hygiene (H 170)	3
Nutrition (FN 225)	3
Family Relationships (FL 322)	5
School Health Education (H 321)	3
School Health Services (H 322)	3
Sanitation (H 331)	3
Communicable and Noncommunicable Diseases (H 322)	3
First Aid (H 358)	3
Safety Education (H 360)	3
Community Health Promotion (H 424)	3
Driver Education and Training (H 480)	3
	67–70

Health and Physical Education

Biological science sequence	9–12
Elementary Human Anatomy (Z 321,322)	6
Physiology (Z 331,332)	6
Physical Education Foundations (PE 131)	3
Professional Activ (PE 194,294,394,494)	22
Physical Education Practicum (PE 333)	2
Organ of Health and Phys Educ (PE 441)	3
Physical Education Curriculum (PE 442)	3
Evaluation of Physical Education (PE 443)	3
Principles of Physical Education (PE 445)	3
General Hygiene (H 170)	3
Family Living (FL 223)	3
Nutrition (FN 225)	3
School Health Education (H 321)	3
School Health Services (H 322)	3
Communicable and Noncommunicable Diseases (H 333)	3
First Aid (H 358)	3
Safety Education (H 360)	3
Community Health Promotion (H 424)	3
For men: athletic coaching courses	6
For women: PE 334,335,340,362	9
	83–89

Physical Education

Biological science sequence	9–12
Elementary Human Anatomy (Z 321,322)	6
Physiology (Z 331,332)	6
Physical Education Foundations (PE 131)	3
Professional Activ (PE 194,294,394,494)	22
Physical Education Practicum (PE 333)	2
Kinesiology (PE 423)	3
Physiology of Exercise (PE 433)	3
Organ of Hlth and Phys Educ (PE 441)	3
Physical Education Curriculum (PE 442)	3
Evaluation of Physical Education (PE 443)	3
Adapted Physical Education (PE 444)	3
Principles of Physical Education (PE 445)	3
General Hygiene (H 170)	3
Nutrition (FN 225)	3
School Health Services (H 322)	3
First Aid (H 358)	3
For men: athletic coaching courses	6
For women: PE 334,335,340,362	9
	87–93

STANDARD NORMS

Health Education

Basic norm in health education	67–70
Health Service Programs (H 441)	3
Health Instruction Programs (H 442)	3
School Health Administration (H 461)	3
Sex Education (H 444)	3
Physical Growth and Development (H 452)	3
Health Agencies and Programs (H 426)	3
Epidemiology (H 453)	3
Mental health	3
	91–94

Health and Physical Education

Basic norm in health and phys educ	83–89
Kinesiology (PE 423)	3
Physiology of Exercise (PE 433)	3
Adapted Physical Education (PE 444)	3
Tests and Measurements in Physical Education (PE 446)	3
Current Trends and Problems (PE 449)	3
Health Service Programs (H 441)	3
Health Instruction Programs (H 442)	3
Sex Education (H 444)	3
School Health Administration (H 461)	3
Mental health	3
Elective health or physical education	3
	116–122

Physical Education

Basic norm in physical education	87–93
Tests and Measurements in Physical Education (PE 446)	3
Current Trends and Problems (PE 449)	3
Concepts of Physical Activity (PE 447) or History of Phys Educ (PE 452)	3
Administration of Physical Education (PE 448) or Supervision of Physical Education (PE 458)	3
Research in Physical Education (PE 453) or Curriculum Construction (PE 457)	3
Electives in physical education approved by adviser	15
	117–123

VOCATIONAL, ADULT, AND COMMUNITY COLLEGE EDUCATION

A division of Vocational Education serves all of the specialized program areas similar in function to those found in the Federal legislation and under the supervision of the Oregon Board of Education, as well as the post-high-school aspects found in community college and adult programs.

The departments of Agricultural Education, Business Education (office and distributive), Home Economics Education, and Industrial Education (including industrial arts) have been incorporated within this division, along with Adult and Community College Education.

Norms have been established for teacher certification. A master's degree with a major in vocational education is also offered, and a major in vocational education may be planned on the doctoral level. A one-year internship on the graduate level prepares students for positions of leadership in Vocational Education.

Agricultural Education

BASIC NORM

Animal Industries: (AnS 121,311 or 411; P 121) and electives	18
Plant Industries: (FC 211, Sls 210, Hrt 311,) and electives	18
Agricultural Economics: (AEc 111,211, 341) and electives	14
Agricultural Engineering: (AE 211,221, 222,311,391) and electives	18
Program Report Analysis (AEd 411)	2
	70

STANDARD NORM

Subject matter field or fields in agriculture	18
Thesis (AEd 503) or English Composition for Teachers (Wr 411), Development of the English Language (Eng 490) and a research paper	9
Approved electives	3
	30

INTERNSHIP

An intern must hold a bachelor of science degree in agriculture or be within one term of completing such a degree. The internship consists of a minimum of six months clinical experience in a public high school on at least one-half time basis (3 periods per day). The employment is arranged in a public high school with an individualized program developed in cooperation with the State Department of Education, the hiring district, and Oregon State University.

The normal academic load for an intern is nine hours per term for a total of 27 hours over the academic year.

Business Education

BASIC NORM

Stenography (9* hours), typewriting (6*), applied stenography (9), office procedures (12), office organization and management (3), secretarial problems (3), and business fundamentals including introduction to business (4), business law (4), retail management (3), principles of accounting (8), and principles of economics (8) 56–69

* High school preparation may permit 9 to 13 of these hours to be replaced by electives.

STANDARD NORM

Basic Norm in business education	56–59
Electives in graduate courses in economics or business administration	6
Current trends in typewriting (3), in shorthand (3), in basic business (3), in office procedure (3). Measurements in business education (3), practicum in business education (3), administration and supervision of business education (3), problems and research techniques in business education (3)	24
	86–99

Home Economics Education

BASIC NORM

Home Economics

Child Development (FL 225,311,413)	9
Nursery School Child (FL 425)	3
Clothing Construction (CT 210,212)	6
Clothing Selection (CT 211)	3
Textiles (CT 250)	3
Family Relationships (FL 322)	3
Nutrition (FN 225)	3
Foods (FN 215) or for students having Chemistry (FN 220,221)	5–8
Meal Management (FN 313)	3
Management for Family Living (HM 240)	2
Personal and Family Financial Management (HM 341)	3
Home Management House (HM 450) or Management of the Home (HM 460—for married women)	4
Household Equipment (HM 330)	3
Home Furnishings (CT 331)	3
Introduction to Home Economics (HEc 101)	1
Upper division elective	3
	58–60

Required related courses:
Physiology (Z 331,332) 6 hours
Biology or Chemistry, 12-15 hours
Basic Design (AA 195,196,197) 6 hours
House Planning and Architectural Philosophy (AA 178) 3 hours

STANDARD NORM

Home Economics

Students may take any of these courses any time within their 5-year programs. With approval of the Home Economics Education Department, any of these courses which carry graduate credit or equivalent graduate courses may be submitted as a part of a program for a master's degree.

Family Nutrition (FN 325)	2
Advanced family relations course	3
Consumer Economics (HM 412)	3
Seminar: Home Economists Role in Society (HEc 407)	1
House Planning in Relation to Function (HM 335), Socio-Psychological Aspects of Clothing (CT 515), Flat Pattern and Draping (CT 310), or Tailoring (CT 312) if no more than six hours of clothing construction have been taken	3
	12

Industrial Education

Industrial Arts Education

The four-year professional program in industrial arts education, leading to the degree of Bachelor of Science, meets certification requirements of all states except those requiring graduate study as a prerequisite to certification, and at the same time provides an excellent foundation for graduate study. In the curricula which follow, the courses required for a Basic teaching certificate in industrial arts in Oregon are marked with an asterisk. (*) Students should confer with the head of the department for counseling on objectives, program planning, and occupational opportunities.

CURRICULUM

Freshman Year

	Hours
*IA 130. Orientation to Industrial Arts	5
**Methods in Woodwork (TME 112,113)	6
*Forging and Welding (TME 150)	3
*Machine Tool Practices (TME 160)	3
*Graphics (GE 115,116,117)	9
*Industrial Arts Design (Art 225)	3
English Composition (Wr 101)	3
Mathematics (College Algebra, Mth 50; Trigonometry, Mth 60; and Calculus, Mth 111)	12
Fundamentals of Speech (Sp 111)	3
Physical Education (PE 190)	3
	50

Sophomore Year

	Hours
*House Planning and Architectural Philosophy (AA 178)	3
*Machine and Tool Maintenance: Wood Shop (TME 225)	3
*Foundry Practices (TME 340)	3
*General Crafts (IA 321)	3
*Elective in industrial arts	3
Abridged General Physics (Ph 211,212)	8
General Psychology (Psy 201,202)	6
Physical Education (PE 190) and General Hygiene (PE 150)	3
English Composition (Wr 202)	3
Literature electives	9
	44

Junior Year

	Hours
*Power Mechanics (AE 317)	3
*Millwork: Mach Woodwork (TME 311)	3
*Furniture Design and Construction (TME 313)	3
*Wood and Metal Finishing (TME 316)	3
*Machine Shop Practices (TME 360)	3
*Electricity Technology (TME 370)	3
*Metalcrafts (IA 382)	3
*Electives in industrial arts	6
English Composition (Wr 303)	3
School in American Life (Ed 310)	3
Educational Psychology (Ed 312)	3
Methods in Reading (Ed 350)	3
History of American Civilization (Hst 224, 225,226)	9
General Chemistry (Ch 101,102,103)	9
	57

Senior Year

	Hours
*General Metal Processes (IA 381)	3
*Comprehensive General Shop (IA 334)	3
*Industrial Application Lab (IA 335)	3
Special Secondary Methods (Ed 408e)	3
Industrial Arts Organization (IEd 420)	3
Student Teaching: Secondary (Ed 416)	12
Seminar (Ed 407)	3
Psychology of Adolescence (Ed 461)	3
Economic Development of the United States (Ec 215)	3
General Sociology (Soc 204)	3
American Governments (PS 201)	3
	42

BASIC NORM

Courses required in the Basic Norm in industrial arts are marked with an asterisk in the curricula above. Total is 75 term hours.

STANDARD NORM

In addition to the courses in the Basic Norm, a Standard Norm in industrial arts includes History of Industrial Education, IEd 570, or Principles and Objectives of Industrial Education, IEd 571, (3 hours); Tests and Measurements in Industrial Subjects, Ed 532, (3 hours); Graduate thesis, IEd 503, (6 hours) or Problems in Applied Research, IEd 501, (3 hours) and Industrial education elective (3 hours); Shop Planning and Organization, IA 511, (3 hours); and technical subjects to build area of subject matter specialization based on undergraduate preparation; IA 506, IA 508, (15 hours) for a total Standard Norm of 105 hours.

Trade and Industrial Education

All students following the professional curriculum for trade and industrial education will report directly to the head of the department for counseling on objectives, program planning, and occupational opportunities. Appropriate electives in industrial education are selected with the approval of the major adviser.

	Hours
Courses required to meet University and School requirements for a bachelor of science degree	72
Required professional courses: Ed 310,312, 350,408t; IEd 381,382,436,480,482; and 16 hours of approved electives in trade and industrial education	48
Credit through examination: Students with three or more years beyond the standard learning period of trade or industrial experience *may* be granted credit for such experience. The examination covering this experience is based as follows: 10% on length of experience, with a year's experience defined as 48 weeks as a wage earner. (The minimum period of experience acceptable under one employer is three months; in trades or occupations where assignment on short jobs is made through a union hiring hall, the assigning union may be considered the employer; experience in scattered fields is not acceptable.) 10% each on progression in the occupation, spread of experience, method followed to gain competency, and continuous character of occupational experience. 25% each on knowledge of technical content and performance ..... Maximum	48
Upon acceptance to the program and the completion of 45 hours of approved lower division academic course work, an individual may take his trade examination. However, the credits earned as a result of the examination will be entered in the Registrar's Office as *Incompletes* until he has completed 93 academic credit hours, including all lower division courses required in the four-year program.	
General electives	24
	192

CURRICULUM

Freshman Year

	Hours
English Composition (Wr 101)	3
Laboratory science or mathematics	12
Introduction to Industrial Education (IEd 381)	2
Mathematics	4
Speech (Sp 111)	3
Physical education	2
History of American Civilization (Hst 224, 225,226)	9
General Hygiene (PE 150)	1
General Psychology (Psy 201,202)	6
	42

Sophomore Year

	Hours
English Composition (Wr 202)	3
Literature	9
Organization and management of instruction	3
Analysis and Course Construction (IEd 382)	3
Physical education	3
Electives in teaching field	18
Development, Organization, and Use of Instructional Materials (IEd 482)	2
Electives	3
American Governments (PS 201)	3
Economics (Ec 115 or 215)	3
	51

Junior Year

	Hours
English Composition (Wr 303)	3
School in American Life (Ed 310)	3
Educational Psychology (Ed 312)	3
Methods in Reading (Ed 350)	3
General Sociology (Soc 204)	3
Science and/or social science elective	10
Electives in teaching field	20
Audio-Visual Aids (Ed 436)	3
Electives	3
	51

Senior Year

	Hours
Psychology	3
Special Secondary Methods (Ed 408t)	3
Tests and measurements	3
Student Teaching (Ed 416)	12
Electives in teaching field	19
Electives	5
	48

BASIC NORM

Examination in teaching field plus recommended courses in teaching field based on the examination results.	
Required hours in teaching field	24
Electives in subject	9
	33

STANDARD NORM

Development, Organization, and Use of Industrial Materials (IEd 482)	2
Supervision of Trade and Industrial Education (IEd 485)	3
Industrial and Public Relations for Trade and Industrial Teachers (IEd 487)	3
Design and Layout of Industrial Education Facilities (IEd 490)	2
Psychology of Childhood (Ed 460)	3
Organization and Administration of Vocational Education (Ed 495)	3
Conference Leader Training (Ed 508)	3
The Junior College (Ed 550)	3
	22

COOPERATIVE PROGRAM

Outstanding graduates of two-year technical education curricula may be admitted into an Industry-School of Education cooperative program whereby twenty months are spent in industry as part of the teacher education requirements.

The total program requires a minimum of 144 credit hours of classwork plus a maximum of 48 credit hours earned by completing a written and performance examination in the student's subject area. This examination is scored 50% on knowledge of technical content of subject and 50% on performance. A student must complete six terms of industrial experience, be accepted into the program, and have completed 45 academic hours of approved lower division academic course work before he may take his trade examination. However, the credits earned as a result of the examination will be entered in the Registrar's office as *Incompletes* until he has completed 93 academic credit hours, including all lower division courses required in the program. Credits awarded will be applied toward the fulfillment of teaching field electives.

Phase 1

	Hours
English composition	9
Laboratory science or mathematics	12
Intro to vocational educ	2
Mathematics	4
Fundamentals of speech	3
History of American civilization	9
Hygiene and physical educ	3
General psychology	6
	48

Phase 2

	Hours
Literature	9
Organization and management of instruction	3
Analysis and course constr	3
Physical education	3
Electives in teaching field	15
Development, organization, and use of instructional material	2
Electives	6
American governments	3
Economics	3
	48

Phase 3

	Hours
Work experience (3 terms, 40 hours per week)	
School in American life	3
Educational psychology	3
Methods in reading	3
Introduction to sociology	3
Electives in teaching field	20
Audio-visual aids	3
Electives	13
	48

Phase 4

	Hours
Work experience (3 terms, 40 hours per week)	
Psychology	3
Special secondary methods	3
Educ tests and measurements	3
Supervised teaching	15
Electives in teaching field	16
Electives	5
	48

Lower Division Courses

Ed 121. Introduction to Recreation.
See Division of Physical Education.

Ed 263. Camp Counseling.
See Division of Physical Education.

Ed 296. Leadership Training.
2 hours. 2 ①
Interpretation of leadership, understanding functions of group, 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 required.

Upper Division Courses

Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

Ed 310. School in American Life.
3 hours. 3 ①
Elementary and high schools from standpoint of teacher; aims, functions, and characteristics. Prerequisite: Psy 201,202; two weeks of scheduled observation in the public schools in September to be arranged the preceding April; and admission to the teaching credential program.

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 200.

Ed 347,348,349. Field Work.
See Division of Physical Education.

Ed 350. Methods in Reading.
3 hours. 3 ①
Prerequisite: Ed 312; junior standing.

Ed 364. Laboratory Practice in Camping Skills.
See Division of Physical Education.

Ed 365. Camp Management.
See Division of Physical Education.

Ed 366. Public School Camping.
See Division of Physical Education.

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 312; junior standing. For elementary education majors only.

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 312; junior standing. For elementary education majors only.

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) English, (k) social science, (l) junior high school science, (m) modern languages, (n) art, (o) music, (p) journalism, (s) speech, (t) trade and industrial education. Prerequisite: Ed 310,312,350. (6 hours maximum allowed toward certification.) Ed 350 prerequisite or concurrent.

Ed 414. Student Teaching: Kindergarten. 3 hours.
Open only to students in Elementary Education. Prerequisite: Ed 415 (Elementary) minimum of 6 quarter hours; Ed 450, Kindergarten Education; 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.
12 to 15 hours.
Open only to students in Elementary Education. Senior standing in Elementary Education and 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) English, (k) social science, (l) junior high school science, (m) modern languages, (n) art, (o) music, (p) journalism, (s) speech, (t) trade and industrial education. Prerequisite: Ed 408 and consent of director of teacher education. *Student must have grade-point average of 2.50 in his teaching norm at the beginning of the term in which he does student teaching and must not be on probation.*

Ed 421. Principles and Philosophy of Recreation. (g)
See Division of Physical Education.

Ed 422. Recreation Programs. (g)
See Division of Physical Education.

Ed 423. Organization and Administration of Recreation. (g)
See Division of Physical Education.

Ed 424. Measurement in Education.
(G) 3 hours. 3 ①
Standard tests and scales; statistical method. Prerequisite: senior standing.

Ed 425. Youth Agencies. (G)
See Division of Physical Education.

Ed 426. Community Recreation. (G)
See Division of Physical Education.

Ed 429. Principles of Remedial Education. (G)
3 hours. 3 ①
Extreme school learning problems; underachievement; diagnosis and remediation, diagnostic instruments and remedial resources. Applies to both elementary and secondary education. Prerequisite: Ed 350; senior standing.

Ed 430. The Junior High School. (G)
3 hours. 3 ①
Development and program as it relates to total educational system and to social and educational needs of adolescent youth. Emphasis given to changing patterns of junior high school in terms of cultural needs and developments. Prerequisite: senior standing.

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: senior standing.

Ed 432. Junior High School Guidance.
(G) 3 hours. 3 ①
The individual pupil; his abilities, interests, and aptitudes. Organization and administration of program; role of teachers and auxiliary-service staff. Prerequisite: senior standing.

Ed 435. Audio-Visual Aids. (G)
3 hours. 1 ① 2 ②
Film, slide, chart, and other visual materials; operation of projectors and other equipment. Prerequisite: senior standing. Students who do not have senior standing must have consent of instructor.

Ed 436. Preparation of Audio-Visual Aids. (G)
3 hours. 1 ① 2 ②
Aids for more efficient teaching in large and diversified classes; charts, graphs, illustrated materials, flat and three-dimensional materials for display or projection; audio-teaching aids. Prerequisite: senior standing. Students who do not have senior standing must have consent of instructor.

Ed 439. The Gifted Child. (G)
3 hours. 3 ①
Psychology, education, and guidance of the mentally superior and the extraordinarily gifted child. Senior standing required.

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 350; student teaching. Elementary education majors only.

Ed 460. Psychology of Childhood.
(G) 3 hours. 3 ①
Behavior during the prenatal period, infancy, and childhood; muscular activities, perception, emotional adjustment, intelligence, language, and social behavior. 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; home, school, and community in relation to child's mental health. Prerequisite: senior standing in education.

Ed 464. The Mentally Retarded Child. (G) 3 hours. 3 ①
Psychology, education, and guidance of the mentally retarded child. Prerequisite: senior standing in education.

Ed 465. Diagnostic and Corrective Techniques in the Basic Skills. (G)
3 hours. 3 ①
Diagnostic, remedial, and corrective techniques in basic skills exclusive of reading. Prerequisite: senior standing in education.

Ed 467. Reading in the Elementary School: Advanced. (G)
3 hours. 3 ① 1 ①
Seminar and practicum teaching small groups corrective and developmental reading in elementary classrooms. Prerequisite: Ed 350 and teaching experience or student teaching.

Ed 468. Principles and Practices in Remedial Reading. (G)
3 hours. 3 ①
Review of research on causal factors in reading disability; procedures and materials for correction of reading problems and development of reading skills; organization and administration of remedial programs. Prerequisite: Ed 350.

Ed 469. Diagnostic Techniques in Reading. (G)
3 hours. 1 ② 1 ①
Lecture-discussion and laboratory; use of standardized tests; construction and use of informal measures for estimating reading achievement and specific needs. Instruction differentiated for elementary, secondary, and college teachers. Prerequisite: Ed 350.

Ed 470. Education of the Exceptional Child. (G)
3 hours. 3 ①
The emotionally disturbed, the mentally accelerated, the slow learner, and the physically handicapped. Visits are made to state institutions and agencies to acquaint students with service available. Prerequisite: senior standing.

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.

Ed 479. Clinical Practicum in Remedial Reading. (G)
3 hours each term, 3 terms. 3 ①
Diagnostic tests; remedial techniques in reading; diagnosis; corrective procedures. Consent of instructor required. Prerequisite: Ed 468 and/or Ed 469.

Ed 480. The Psychology of Reading Instruction. (G)
3 hours. 3 ①
Psychological and physiological aspects and their application to classroom procedure.

Ed 481. Reading in the Secondary School: Advanced. (G)
3 hours. 3 ①
Practicum and seminar. Teaching small groups of corrective and developmental readers in secondary school classrooms. Prerequisite: Ed 350.

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; present trends; value and usefulness for high school and college students. Prerequisite: senior standing.

Ed 487. Counseling Techniques. (G)
3 hours. 3 ①
Development of philosophical concepts, psychological constructs, goals, and methodology basic to counseling theory and practice. Prerequisite: Ed 485 or consent of instructor.

Ed 494. Principles and Objectives of Vocational Education. (G)
3 hours. 3 ①
Basic principles and development; history and legislation; vocational schools and vocational programs in relationship to the total educational program. Consent of instructor required.

Ed 495. Organization and Administration of Vocational Education. (G)
3 hours. 3 ①
Federal vocational education acts; state boards; local boards; laws, regulations, policies; problems and principles as related to organization, administration, cooperating personnel, agencies, finances, budgets and committees. Consent of instructor required.

Phl 446. Philosophy of Education. (G) See PHILOSOPHY.

Graduate Courses
See also courses marked (*g*) and (*G*) above.

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—BEALS.
Problems in Educational Psychology—RYAN.
Problems in Guidance—ZERAN.
Problems in Higher Education—GOODE and MUNFORD.
Problems in History or Philosophy of Education—WUBBEN, HOVLAND.
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—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; scientific method; locating and formulating problems; solving problems; necessary statistical tools; collection and interpretation of data; preparing research reports.

Ed 522. Secondary School Curriculum.
3 hours. 3 ①
Study of the basic structure of the secondary school curriculum and the process of reconstruction as related to social and cultural change and need. Consideration also given to the extracurricular program.

Ed 524. Construction and Use of Objective Examinations.
3 hours. 3 ①
Selection of test items; types of examinations; validity; administering, scoring, grouping results. Prerequisite: graduate standing.

Ed 527. Secondary School Administration and Supervision.
3 hours. 3 ①
Emphasis on the important principles of secondary school administration and supervision and on involving faculty, students, and parents in the work of the school. Attention will be given to ways of improving the total curricular program.

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-Sociological Aspects of Vocations.
3 hours. 3 ①
Choice of occupations; adjusting, or aiding others in adjusting; 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 developments with special reference to education. Prerequisite: graduate standing in education.

Ed 546. Philosophy of Vocational Education.
3 hours. 3 ①
Relationship of vocational, technical, and special education to general education and philosophy; concept of work, effect of Industrial Revolution; man's quest for dignity and work in a democratic and technological society.

Ed 547. Cooperative Programs in Vocational Education.
3 hours. 3 ①
Principles of cooperative education and factors leading to such emphasis in vocational education. Analysis of cooperative programs in vocational education.

Ed 550. The Community College.
3 hours. 3 ①
Community college movement; aims and functions, curriculum, and organization; relation to secondary and higher education.

Ed 551. Community College Curriculum.
3 hours. 1 ③
Curriculum as related to function of community junior college; transfer, terminal, vocational, and adult education programs; research and firsthand evaluation of community junior college curricula. Prerequisite: graduate standing; Ed 550.

Ed 552. **Administration and Supervision of the Community College.**
3 hours. 1 ③
Campus planning; budget and finance; board relations; community involvement; administrative organization; personnel relations; program development. Prerequisite: Ed 550,551.

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.

Ed 554. **Elementary School Supervision and Administration.**
4 hours. 4 ①
Role, duties, needs, problems; evaluation and improvement of teaching-learning. Prerequisite: elementary certification, one year of elementary teaching experience.

Ed 555,556,557. **Student Personnel Services in Higher Education.**
3 hours each term. 3 ①
Ed 555: Historical, philosophical, and sociological foundations; educational role; functional patterns and organizational structures; student diversity. Admissions, orientation, academic advisement, registration, academic records, and related student personnel functions. Consent of instructor required.
Ed 557: Changing role of students; rights, freedoms, and responsibilities; rules and policies. Focus upon student life functions including student activities, student government, the college union, residence hall programs, fraternities and sororities, other off-campus housing, discipline, and judicial processes. Prerequisite: Ed 555.
Ed 557: Services to students with special needs; psychological services, health services, remedial clinics, financial aids, graduate placement, foreign student and international student programs. Evaluation and research functions; relationship to instructional and central administrative services. Prerequisite: Ed 556.

Ed 558. **The Student and the University.**
3 hours fall. 3 ①
The student in relation to the total campus environment. Topics include student characteristics; campus cultures; students' rights, freedoms, and responsibilities; attitudes, expectations, and influences of faculty and administration; and values systems and morality as sources of conflict in higher education. Emphasis on utilization of research reports and investigative techniques.

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 of 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 of teaching experience.

Ed 576. **School Buildings.**
3 hours. 3 ①
Problems involved in planning, financing, and construction; care and maintenance; problems of equipment. Includes analysis of problems of a specific district. Prerequisite: elementary or secondary certification *and* one year of 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; leader's role in group; attitudinal change and its results; group and play therapy; 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 Term. Prerequisite: Ed 485,487.

Ed 584. **College Union Administration.**
3 hours. 3 ①
Historical and philosophical study of the college union around the world with special emphasis upon current principles and practices in college union administration in the United States. Prerequisite: Ed 556.

Ed 585. **Student Activities Administration.**
3 hours. 3 ①
Historical and philosophical study of student activities with particular emphasis upon current principles and practices in student activities administration and advising. Prerequisite: Ed 556.

Ed 586. **Living Group Advising.**
1 hour each term, two terms. 1 ②
Philosophy and theory of working with students; college housing programs; relationship of living unit to total college program, and other phases of student personnel services. Case studies and role playing emphasized. Attention to training, supervision, and evaluation of personnel. Limited to those holding an assistantship in area of student personnel.

Ed 587. **Practicum in Student Personnel Work in Higher Education.**
3 hours each term, two terms. 3 ①
Primarily for those professionally interested in student personnel who have been in Practicum in Living Group Advising. Offices providing laboratory experiences include: Dean of Students, Dean of Men, Dean of Women, Registrar's Office, Admissions Office, Counseling Center, Health Service, Housing Office, Financial Aid, Foreign Students, and Memorial Union (activities). Students expected to spend some time each week in offices mentioned and to participate in a seminar meeting each week. Limited to those holding an assistantship in area of student personnel.

Ed 588. **Supervised Counseling Techniques.**
3 hours each term, two terms. 3 ①
Provides actual counseling experience in counseling laboratory and in schools or related areas. Ed 487 prerequisite or concurrent.

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.

Ed 597,598,599. **Education and Contemporary Trends in Thought.**
3 hours each term. 3 ①
Six major intellectual movements that have formed the ethos for the contemporary period, their impact upon the nature of the educational system of the United States, and their implications for the future. *Ed 597:* Social Darwinism and Nineteenth-Century Scientism; Pragmatism, Pragmaticism, and Instrumentalism. *Ed 598:* Marxism; Freud and Psychoanalytic Thought. *Ed 599:* Science in the Twentieth Cenutry; Existentialism.

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 day schools. 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. Field activities, followup for new teachers, and preparation of instructional material for agricultural instructors are handled by this department in cooperation with the staff of the School of Agriculture and the State Board of Education.

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:

Graduate from a college of agriculture of standard rank.

Seventy-five 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 37 term hours in the 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 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
Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

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.
Section 1: Supervised Farming, FFA. *Section 2:* Shop and Manipulative Skills.

AEd 411. **Program Report Analysis.**
2 hours fall or spring. 2 ①
Federal, State, and local reports and records prepared by the Vocational Agriculture Teacher.

AEd 417. **The Agricultural Curriculum.** (G) 3 hours. 3 ①
Course content and types of course organization with reference to objectives to be attained in the field. Prerequisite: Ed 312,416.

AEd 418. **Adult Education in Agriculture.** (G)
3 hours. 3 ①
Programs for young and adult farmer groups; classes for young farmers, for older farmers, and for farm veterans and special classes of veterans. Prerequisite: AEd 417.

Graduate Courses
See also courses marked (*g*) and (*G*) above.

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 Education.**
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; 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.

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 45 term hours required 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 curriculum and description of courses see SCHOOL OF BUSINESS AND TECHNOLOGY.

HOME ECONOMICS EDUCATION

Professional preparation for teachers of home economics is provided by the Department of Home Economics Education, a joint department of the School of Education and the School of Home Economics. A student in either school may meet certification requirements. Before registering for teacher preparation courses, however, every student should consult the home economics education staff.

Since the OSU teacher-education program is approved by the National Council for the Accreditation of Teacher Education, students who have completed the requirements for teaching in Oregon will be certified in other states where NCATE-approved teacher-education programs are required.

A program of graduate study leading to a master's degree will be developed to meet individual needs.

Upper Division Courses
Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

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.

HEd 422. **Organization and Administration of Homemaking Education.** (G)
3 hours. 3 ①
Organization 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.
Programs of home and family living for extending secondary homemaking departments into school and community. Development of home and family life education at all levels of day-school and adult-education programs under vocational education. Prerequisite: Ed 408d.

Graduate Courses
See also courses marked (*g*) and (*G*) above.

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
In-service and preservice home economics supervision. Prerequisite: Ed 408d and teaching experience.

HEd 513. **Special Student Groups.**
3 hours. 3 ①
Curriculum programs and teaching methods for the gifted, disadvantaged, handicapped, or mentally retarded child. Prerequisite: Ed 408d.

HEd 514. **Curriculum Designs in Home Economics Education.**
3 hours. 3 ①
Curriculum programing emphasizing both useful and gainful aspects of homemaking education; current trends such as flexible scheduling and team teaching; curriculum designs for boys and coeducational classes in homemaking. Prerequisite: Ed 408d.

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

The Department of Industrial Education prepares teachers and supervisors in industrial arts education and in trade and industrial education. The department is organized as a part of the School of Education. The industrial arts curriculum is made up of technical courses offered by the department and those selected from several departments and schools that serve its needs. The department is responsible for the professional curriculum and for teacher education courses and applied teaching methods. Trade and industrial education is provided jointly by resident staff and the State Department of Education in Salem.

Trade and Industrial Education

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 be engaged in teaching (or about to be so engaged), or be employed as a vocational supervisor. He must also present a letter from the State Supervisor of Trade and Industrial Education, Salem, Oregon, accepting him into the program.

Graduate Study

Programs of study leading to the degree of Master of Science or Master of Education are offered by this department.

COURSES IN INDUSTRIAL ARTS EDUCATION

See also courses in the Department of Education including Ed 408e, and Ed 416, and courses in technical subject matter appropriate to the industrial teacher education program in manufacturing engineering technology, general engineering (School of Engineering), and architecture.

Lower Division Courses

IA 130. Orientation to Industrial Arts.
5 hours. 1 ② 4 ②
Basic tools, processes, and materials as they relate to the solution of problems in the industrial society. History, development, and application of industrial arts concepts. For industrial arts majors.

IA 217. Technical Design.
5 hours. 2 ② 3 ②
The technical-industrial design process. Statement of a design problem and application of design process to the solution.

Upper Division Courses

Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

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.

IA 321. General Crafts.
3 hours. 1 ① 2 ③
Basic understandings, technical and teaching skills in general crafts. Crafts as a means of developing student interest in avocational activities.

IA 334. Comprehensive General Shop.
3 hours. 1 ① 2 ③
To extend skills and understandings in wood, metal, graphics, power, and electricity. Instructional organization and teaching procedures of a multiple-activity shop that integrates unlike technical fields. Prerequisite: junior standing.

IA 335. Industrial Applications Laboratory.
3 hours. 2 ① 1 ③
Experimental adaptation of industrial procedures, materials, and processes to meet industrial arts instructional needs. Instructional procedures, materials, and devices that reflect and interpret modern technology. Prerequisite: junior standing.

IA 352,353,354. Graphic Arts.
3 hours each term. 1 ① 2 ③
IA 352: Fundamental operations of graphic arts processes; organizational and teaching procedures through laboratory and lecture activities; relief printing, offset printing, intaglio printing, paint printing, screenless illustration printing, bindery. Prerequisite: Art 225.
IA 353: Letterpress process with introduction to the offset process; history, development, design, layout, presswork, and bindery; progressively more complex work experiences with emphasis upon typographic arrangement and composition. Prerequisite: IA 352.
IA 354: Advanced course in offset lithography, cold-type composition, related photography, process camera operations, line work and halftones, plate making, small offset press operations, and production methods. Assignments involving work in color, layout, and publications. Prerequisite: IA 353.

IA 371. Applied Electricity.
4 hours. 2 ① 2 ③
Fundamentals of electricity; theory and laws for direct current and alternating circuits; generation, distribution A.C. power; principles of electric motors; application of theory to practical problems; use of test procedures; electrical components; construction techniques. For industrial arts instructors who teach applied electricity courses in secondary schools.

IA 372,373,374. Applied Electronics.
4 hours each term. 2 ① 2 ③
Basic electronics, electronic communication circuits, and elements of electronic control; practical application; electronic concepts, laboratory experiments, and construction of electronic devices. Prerequisite: IA 371.

IA 381. General Metals Processes.
3 hours. 1 ① 2 ③
Application of metal processes in an integrated program representative of modern industrial practices. Prerequisite: junior standing; basic metals courses.

IA 382. General Metalcrafts.
3 hours. 1 ① 2 ③
Technical aspects of sheetmetal, artmetal, and benchmetal. Instructional procedures and organization suitable for multiple-activity programs. Prerequisite: Art 225; GE 117; junior standing.

IA 388. Lapidary Techniques and Processes.
2 hours. 1 ① 1 ④
Gem materials and methods used to process rough material into display specimens or mounted jewelry pieces. For industrial arts teachers. Prerequisite: AA 281; IA 382.

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.

IA 406. Projects.
Terms and hours to be arranged.

IEd 407. Seminar.
Terms and hours to be arranged.

IA 408. Workshop.
Terms and hours to be arranged.

IEd 420. Industrial Arts Organization.
(g) 3 hours. 3 ①
Diversified programs for smaller high schools; jobs, projects, and class problems; appropriate teaching aids; professional relationships. Prerequisite: Ed 408e and senior standing.

IEd 472. Industrial and Occupational Analysis. (G)
3 hours. 3 ①
Analysis of industries, occupations, trades; development of jobs into component parts for instructional use. Development of teaching units derived through analysis. Prerequisite: Ed 408e.

IEd 474. Industrial Arts for the Intermediate Grades. (G)
3 hours. 3 ①
Scope and sequence of industrial arts curricula. Organization, content, methods, applied learning experiences, materials, and physical setting. Prerequisite: senior standing; teaching experience in industrial arts.

IEd 475. Project Selection and Analysis.
(G) 3 hours. 3 ①
Projects for use in teaching industrial arts based on objectives, processes, and function. Prerequisite: IEd 472 or equivalent.

IEd 477. Safety in Industrial Education. (G)
3 hours. 3 ①
Application of industrial safety procedures in developing safety programs for industrial education laboratory activities. Prerequisite: Ed 408e.

IEd 479. Adult Programs in Industrial Education. (G)
3 hours. 3 ①
The role of industrial education in adult education. Content, instructional procedures, and physical facility needs of adult programs. Prerequisite: senior standing.

Graduate Courses

For both industrial arts and trade education students. See also courses marked (g) and (G) above.

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.

IA 506. Projects.
Terms and hours to be arranged.

IA 508. Workshop.
Terms and hours to be arranged.

IA 511. Shop Planning and Organization.
3 hours. 3 ①
Different types of school shops; school-shop layout for effective teaching; drafting equipment required. Students who bring floor plans of their shops and equipment may use them as laboratory problems for possible improvement. Graduate standing and teaching experience in industrial arts required.

IA 525. Recreational Handicrafts.
3 hours. 1 ① 2 ③
Materials, projects, and procedures in developing a program in secondary schools, on an extracurricular or curricular basis, and in evening adult classes; laboratory applications. For industrial arts teachers. Prerequisite: Ed 408 and courses in woodwork and metalwork equivalent to PT 220,313, and 380.

IEd 570. History of Industrial Education.
3 hours. 3 ①
Development and aims of industrial arts and vocational-industrial education.

IEd 571. Principles and Objectives of Industrial Education.
3 hours. 3 ①
Fundamental problems and values in industrial education as it relates to education generally; possible solutions and trends. Prerequisite: graduate standing in education.

IEd 573. The General Shop.
3 hours. 3 ①
Type of organization; advantages and limitations; probable future; content, organization, and presentation of subject matter; class control. Prerequisite: Ed 408e.

IEd 574. Curriculum Practices and Trends in Industrial Education.
3 hours. 3 ①
Principles underlying curriculum research and development; coordination of industrial education programs; trends in state and national programs; long-range planning and improvement. Prerequisite: graduate standing and teaching experience in industrial education.

IEd 576. Supervision of Industrial Education.
3 hours. 3 ①
Functions, techniques of supervisor; supervision principles from teacher's viewpoint; teacher-supervisor relationships. Prerequisite: graduate standing and teaching experience in industrial arts.

IA 587. Metalcraft Problems.
3 hours. 1 ① 2 ③
Semiprecious metals in school and home shop work; metal spinning and craft work in copper, brass, and Britannia metal; processes applied to projects of practical value and artistic merit. For industrial arts teachers. Prerequisite: Ed 408; AA 281,282; and PT 387.

COURSES FOR TRADE AND INDUSTRIAL EDUCATION STUDENTS

Upper Division Courses
Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.
See also IEd 501-507 on previous page.

IEd 381. Introduction to Industrial Education.
2 hours. 2 ①
Vocational education emphasizing trade and industrial aspects; organizing materials, planning lessons, and developing teaching techniques. Prerequisite: three years of practical trade experience.

IEd 382. Analysis and Course Construction.
3 hours. 3 ①
Trade analysis: 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
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 vocation instructor.

IEd 480. Shop Organization and Management. (g)
3 hours. 3 ①
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 their evaluation, preparation, and use; 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
Instruction sheets and reference materials. 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; 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; 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
Local and State-level programs. Supervisory needs for individual situations; planning supervisory programs. 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; number of workers in trade, working conditions, rates of compensation, special laws, opportunities for advancement, and necessary preparation for promotion and success in different phases. Prerequisite: IEd 382 or equivalent.

IEd 487. Industrial and Public Relations for Trade and Industrial Teachers.
(G) 3 hours. 3 ①
Industrial, civic, and labor organizations; techniques to promote wholesome relationships with 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; methods of handling individual and group relations. Prerequisite: IEd 484 or IEd 485 or equivalent.

IEd 490. Shop Design and Layout for Trade and Industrial Teachers. (G)
2 hours. 2 ①
Applied to vocational or trade school; vocational-type shops. Prerequisite: IEd 480 or equivalent.

IEd 491. Testing for Trade and Industrial Teachers. (g)
3 hours. 3 ①
Tests to measure effectiveness of trade teacher and advancement of pupils; types of tests; construction and administration; possibilities and limitations; reliability and validity. Prerequisite: IEd 382,482, or equivalent.

PHYSICAL EDUCATION

See the DIVISION OF HEALTH AND PYHSICAL EDUCATION for the major program in Health and 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 of emphasis on subject 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 basic and standard norms in science on page 109 may be supplemented by additional courses in the several fields. Teaching majors in general biology, general science, mathematics, chemistry, and physics 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.

Upper Division Courses
Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

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 481. **Alcohol Studies in School Curriculum.** (G)
3 hours. 3 ①
Scientific information about alcohol; physiological, psychological, sociological, and legal aspects of alcoholism. Prerequisite: 24 hours of upper division education.

Graduate Courses
See also courses marked (g) and (G) above.

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
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
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 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 science education programs; individual problems studied. 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. Prerequisite: 24 hours of upper division education including Ed 416. WILLIAMSON.

ENGINEERING IS A LICENSED PROFESSION, AND EDUCATIONAL PATTERNS must meet certain professional standards. Such standards are assured by periodic inspection of the School by off-campus teams operating under the Engineers' Council for Professional Development (E.C.P.D.), a national, unified accreditation organization. If the periodic inspection and evaluation so indicates, curricula are "accredited." Curricula keep the accredited rating as long as repeated inspections indicate that standards are maintained and that the objectives of the School in its relationship to the University are being met.

Major curricula at Oregon State are accredited with Civil, Electrical and Electronics, and Mechanical Engineering being accredited in 1937, Chemical Engineering in 1942, Agricultural Engineering in 1949, and Industrial Engineering in 1950. Each department has maintained its accredited status since the initial date.

School of Engineering

FACULTY

As of January 1970

GEORGE WALTER GLEESON, Ch.E., Dean of the School of Engineering; Director, Engineering Experiment Station.

JAMES GEORGE KNUDSEN, Ph.D., Assistant Dean of the School of Engineering; Professor of Chemical Engineering; In Charge of the Engineering Experiment Station.

SOLON ALLEN STONE, B.S., Assistant to the Dean; Professor of Electrical and Electronics Engineering.

MARVIN REYNOLDS HAITH, B.S., Personnel and Placement Officer; Associate Professor of General Engineering.

Professors Emeritus ALBERT, COCKERLINE, COX, HOLCOMB, MARTIN, MERRYFIELD, MEYER, PARKINSON, PAUL, RODGERS, THOMAS.

Agricultural Engineering: Professors KIRK (acting department head), CROPSEY, LONG, LUNDE, SINNARD, WOLFE.
Associate Professors BOOSTER, BROOKS, CHRISTENSEN, PAGE.
Assistant Professor BACKUS.

Chemical Engineering: Professors WICKS (acting department head), LEVENSPIEL, MRAZEK.
Associate Professor MEREDITH.
Assistant Professor MYERS.
Instructor HOVEY.

Civil Engineering: Professors BURGESS (department head), BELL, LAURSEN, MCCLELLAN, PHILLIPS.
Associate Professors BEECROFT, KLINGEMAN, LABAUN, NORTHCRAFT, PETERSON, PRITCHETT, SCHAUMBERG, SCHULTZ, SEADERS, SLOTTA.
Assistant Professors BELLA, FILMER, GLENNE, MEZERA, PHELPS, SCHROEDER, WHITE.
Instructors HAMERNIK, JAMES, MASSIE, STEPHENS, WILLIAMSON.

Electrical and Electronics Engineering: Professors L. N. STONE (department head), ENGLE, FEIKERT, MAGNUSSON, SHORT, S. A. STONE, WEBER.
Associate Professors ALEXANDER, AMORT, JENSEN, KELLEY, LOONEY, MICHAEL, OORTHUYS, PERKINS, SAUGEN.
Assistant Professors CHANG, DAVIS, HERZOG, HOLMES, PARK.

Engineering Physics: Professor BOEDTKER (in charge).

General Engineering: Associate Professor CAMPBELL (department head).
Professor JARVI.
Associate Professors GRAY, STATON.
Assistant Professors BUCY, CROFF, GARRARD.

Industrial Engineering: Professors RIGGS (department head), ENGESSER.
Associate Professor INOUE.
Assistant Professor Nebergall.

Mechanical and Nuclear Engineering: Professors SLEGEL (department head), BOUBEL, BUPP, HUGHES, LARSON, MINGLE, W. W. SMITH, THORNBURGH, WELTY, ZAWORSKI.
Associate Professors DAHLKE, DAVIS, L. JOHNSON, MORRIS, RINGLE, ROBINSON, C. E. SMITH, WILSON.
Assistant Professors KINNEY, MOORE.

Metallurgical Engineering: Professors OLLEMAN (acting department head), BAINBRIDGE, PAASCHE.
Associate Professor MCMULLEN.
Assistant Professor MCCOMB.

Manufacturing Engineering Technology: Professor SHEELY (department head).
Associate Professors FRAZIER, RIESLAND, ROBLEY.
Assistant Professors HOEYE, WILSON.

THE SCHOOL OF ENGINEERING at Oregon State University was established more than seventy years ago. Since the inception, the School has awarded 8,846 B.S. or B.A. degrees, 722 M.S. or M.A. degrees, 70 professional degrees, and 72 Ph.D. degrees. Every effort is directed toward excellence of instruction, at both the undergraduate and graduate level. The reputations of the more than ten thousand degree holders attest the accomplishment.

Opportunity in Engineering

For many years, there has been a shortage of properly educated technical people. In spite of periodic fluctuations in employment, the technical nature of the industrial complex indicates extensive opportunities in the future. Companies search constantly for men and women capable of assuming responsibility in production, operation, construction, research and development, maintenance, consulting, administration, and sales and service. Salary and rate of advancement compare favorably with those in other recognized professions.

Engineers apply science. They apply scientific knowledge and principles to the design and operation of machines and systems; to the design of structures or public works; to the design of manufacturing processes; to the planning and organization of engineering operations; to the selection of materials; to the most profitable use of manpower and money; and to the generation, distribution, and control of energy.

Most engineers eventually specialize in one of the more than fifty-two branches of the profession or they may specialize in the particular problems of one type of industry. There are many subdivisions of the profession defined by either the general divisions of the technology or the specific areas of application. The basic knowledge required for all areas of engineering provides flexibility and makes it possible to shift from one field of specialization to another. In fact, the strong and rigorous pattern of education for the profession provides sound preparation for many pursuits other than engineering.

Admission

New students must meet the customary requirements of the University for admission. To engage in the regular engineering program at the freshman level, they must have demonstrated by score on the Scholastic Aptitude Tests a satisfactory knowledge of mathematics with which placement in physics is correlated. Students without adequate high school courses in physics and mathematics cannot expect to start the regular program without some remedial preparation. Students with low SAT scores and low high school grades are advised not to attempt the regular freshman year without some remedial preparation.

In addition to a satisfactory grade-point average, transfer students from non-E.C.P.D. accredited 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.

Because of the technical and professional requirements of engineering curricula patterns, which in some instances are above the minimum requirements of the University, the administration of the School of Engineering reserves the right of final determination in matters of admission, retention, reinstatement, placement, and transfer of students.

Departments and Degree Offerings

The School of Engineering is divided into several departments. Freshmen choose their major from among the curricula of the agricultural, civil, electrical and electronics, general, industrial, mechanical, metallurgical, or nuclear engineering departments. Options in computer science under electrical and electronics engineering and aerospace engineering under mechanical engineering are offered. A cooperative curriculum is available in engineering physics. Freshman students who have no firm, specialized interest will be assigned to General Engineering the first year.

Bachelor of Science (B.S.) degrees are awarded from each of the above-named departments. In addition, the flexibility of the curricular pattern in general engineering makes it possible, by judicious selection of electives in the junior-senior years, to obtain a B.S. degree in optional specialties.

It should be emphasized that designated degrees, offered either by departments or as optional patterns, do not involve a great deal of specialization. Careful examination of the curricula of all departments will show core patterns comprised of basic science, mathematics, engineering science, and humanities and social science. If the student wishes some specialization, about one-fourth of the total credit hours may be chosen from departmental subject matter which is offered largely in the junior and senior years.

Technologies

Intimately associated with Engineering are the technology curricula which are terminal at the B.S. level. Each of the technology patterns is designed to provide support personnel for professional engineering. Curricula are offered in Manufacturing Engineering Technology, Civil Engineering Technology, Electric Power Technology, Mechanical Technology, and Nuclear Technology. Prospective students should make inquiry regarding opportunities, requirements, and limitations of the technology patterns. Curricula outlines and course descriptions are included at the end of the engineering section of the catalog.

Cooperative Programs

In some subject matter areas, cooperative programs are available by arrangement between various industries or agencies and the University. These programs provide an opportunity for on-the-job experience, subsequent to the sophomore year. Students who have an interest in such programs should consult their adviser or inquire at the office of the Dean of Engineering.

University Honors Program

The Honors Program in this School is coordinated with the programs in other Schools and administered by the Director of the University Honors Program (see page 28). Information concerning eligibility and application forms may be obtained from the Director.

Graduate Study

With the increased complexity and sophistication of technology has come a great demand, particularly in the engineering applications, for persons with education beyond the B.S. degree. The School of Engineering offers advanced degrees of Master of Science (M.S.), Master of Arts (M.A.), Master of Engineering, Master of Material Science, Professional degrees, and Doctor of Philosophy (Ph.D.). Advanced degree programs, in all instances, are developed with faculty advisement to meet the interests and objectives of the individual candidate. Students who have established satisfactory undergraduate records and are looking for the greatest opportunity in the professional field should consider continuation of their education at the graduate level. General regulations and requirements for all advanced degrees, including professional degrees and off-campus programs, are printed under the GRADUATE SCHOOL.

Advisement and Placement

Each student in the School of Engineering is assigned to a faculty adviser. Details and procedures dealing with registration, course selection, professional opportunities, personal problems, academic regulations, etc., should be discussed with the adviser. All advisement functions are coordinated by the Personnel Officer assigned to the office of the Dean of Engineering.

The Personnel Officer is responsible for supervision of registration, and for counseling of persons in academic difficulty.

Such advisement within the School results from many years of experience dealing with similar situations. At times, students do not wish to accept such advisement. In such cases, the student may be requested to sign a waiver of such advice and the waiver will be placed in the student file. The waiver relieves the adviser of the responsibility for the consequences of failure by the student to accept the advisement.

Since the engineering profession has high regard for ethics and personal behavior, it is expected that each student will conduct himself in a corresponding manner. Cases of deviation from expected behavior will be dealt with from the offices of the Dean of Students and Dean of Engineering.

In some cases of academic difficulty, students are permitted to remain in the School upon a contract basis with either the Dean or the Personnel Officer. The terms of such contracts are considered to be binding upon the student.

The School of Engineering, under the Personnel and Placement Officer, maintains an organized placement service. This service is available to industrial organizations, undergraduate and graduate students, and alumni. Services are not restricted to engineering, but are available in all associated fields. Upon file in the placement office are listings of positions available, descriptions of industrial organizations and governmental agencies, interview schedules, opportunity literature, and guidance material. No charges are made for the placement service.

Curricula in Engineering and Technology

Degrees Offered

Undergraduate curricula in engineering and related technologies lead to the Bachelor of Science (B.S.) or Bachelor of Arts (B.A.) degree. Through the Graduate School the following advanced degrees in Engineering are authorized: The professional degrees of Agricultural Engineer (A.E.), Chemical Engineer (Ch.E.), Civil Engineer (C.E.), Electrical Engineer (E.E.), Industrial Engineer (I.E.), Mechanical Engineer (M.E.), Metallurgical Engineer (Met.E.), Mining Engineer (Min.E.); the Master of Arts (M.A.), Master of Science (M.S.), Master of Engineering (M.Eng.), Master of Material Science (M.Mat.Sc.), and Master of Ocean Engineering (M.Oc.E.) degrees; and the Doctor of Philosophy (Ph.D.) degree.

Agricultural Engineering

E.C.P.D. Accredited

Freshman Year

	Hours
Engineering Orientation (GE 101,102,103)	6
Calculus (Mth 111,112,113)	12
General Physics (Ph 211,212,213)	12
English Composition (Wr 121)	3
Humanities and social science	15
Officer education or other elective	3–9
Physical education and general hygiene	3

Sophomore Year

Calculus (Mth 211)	4
Applied Differential Equations (Mth 321)	4
General Chemistry (Ch 201,202,203)	9
General Science (GS 101,102,103)	12
Mechanics of Solids (GE 211,212,213)	9
English Composition (Wr 222)	3
Principles of Economics (Ec 201,202)	6
Officer education or other elective	3–9
Physical education	3

Junior Year

Electrical Fundamentals (GE 201,202,203)	9
Mechanics of Fluids (GE 301,302)	6
Surveying Theory (CE 361)	3
Soils (Sls 210)	5
Computer Applications (AE 356)	2
English Composition (Wr 323)	3
Principles of Economics (Ec 203)	3
Humanities and social science	3
[1]Restricted electives	15

Senior Year

Soil and Water Conservation (AE 471)	3
Rural Electrification (AE 431)	3
Farm Structures (AE 461)	3
Seminar (AE 407)	2
[1]Restricted electives	39

[1] Restricted electives by departmental advisement of subjects necessary to complete selected option.

Chemical Engineering

E.C.P.D. Accredited

Freshman Year

	Hours
Engineering Orientation (GE 101,102,103)	6
Calculus (Mth 111,112,113)	12
General Chemistry (Ch 204,205,206)	15
English Composition (Wr 121)	3
Humanities and social sciences	6
Officer education or other electives	3–9
Physical education and general hygiene	3

Sophomore Year

Calculus of Several Variables (Mth 211)	4
Applied Differential Equations (Mth 321)	4
General Physics I (Ph 211,212,213)	12
Organic Chemistry (Ch 334,335,336)	9
Stoichiometry and Thermodynamics (ChE 211,212)	4
Measurement and Instrumentation (ChE 213)	2
Mechanics of Solids (GE 211,212)	6
English Composition (Wr 222)	3
Humanities and social science	3
Officer education or other electives	3–9
Physical education	3

Junior Year

Mechanics of Solids (GE 213)	3
Chemical Engineering Problems (ChE 325)	3
Thermodynamics (GE 311,312,313)	9
Transfer and Rate Processes (GE 331,332, 333)	9
Physical Chemistry (Ch 440,441,442)	9
Organic Chemistry Laboratory (Ch 337)	2
English Composition (Wr 323)	3
Humanities and social sciences	6
Electrical Fundamentals (GE 201,202)	6

Senior Year

Unit Operations (ChE 411,412)	6
Chemical Engineering Laboratory (ChE 414,415)	6
Chemical Engineering Economics (ChE 442)	2
Chemical Process Kinetics (ChE 443)	2
Chemical Plant Design (ChE 431)	3
Process Dynamics and Control (ChE 461)	3
[1]Chemical Engineering Calculations (ChE 425,426)	6
Electrical Fundamentals (GE 203)	3
Physical Chemistry Laboratory (Ch 443)	2
Instrumental Analysis (Ch 421)	4
Humanities and social sciences	12
Unrestricted electives	6
Field trip	0

[1] May be omitted if Chemical Plant Design (ChE 432) and additional three hours of restricted electives are completed and with the advisement of the departmental faculty.

Civil Engineering

E.C.P.D. Accredited

Freshman Year

	Hours
[1]Engineering Orientation (GE 101, 102, 103)	6
Analytic Geometry (Mth 110)	4
Calculus (Mth 111,112)	8
General Physics I (Ph 201,202,203 or Ph 211,212,213)	12
[2]Humanities and social science electives	12
English Composition (Wr 121)	3
Officer education or other elective	3–9
Physical education and general hygiene	3

Sophomore Year

Mechanics of Solids (GE 211,212,213)	9
Electrical Fundamentals (GE 201,202, 203)	9
Calculus (Mth 113,211)	8
Applied Differential Equations (Mth 321)	4
[2]Humanities and social sciences electives	3
English Composition (Wr 222)	3
General Chemistry (Ch 201,202,203)	9
Officer education or other elective	3–9
Physical education and general hygiene	3

Junior Year

Hydraulics (CE 312)	3
Surveying Theory (CE 361)	3
Photogrammetry (CE 362)	3
Engineering Surveys (CE 363)	3
Soil Mechanics (CE 372,373)	6
Structural Theory (CE 381,382,383)	9
Mechanics of Fluids (GE 301,302)	6
Nature and Behavior of Materials (GE 321,322,323)	9
[2]Humanities and social sciences electives	6
[3]English Composition (Wr 323)	3
Seminar (CE 407)	1

Senior Year

	Hours
Hydrology (CE 411)	3
Transportation Engineering (CE 421,422)	6
Sanitary Engineering (CE 451,452)	6
Foundations (CE 472)	3
Reinforced Concrete (CE 481)	3
Structural Engineering (CE 482,483)	6
Design of Steel Structures (CE 484)	3
[4] Approved electives	12
Unrestricted electives	3
[2] Humanities and social sciences electives	6
Field trip	0

[1] GE 101,102,103 is taught in each major department. Students register in sections corresponding to their major department.

[2] Twenty-seven credit hours of approved electives in humanities and social sciences are required in addition to English composition. Requirements include two nine-hour sequences and nine hours of approved electives. Check with department regarding approved courses and requirements.

[3] Technical Report Writing (Wr 327) may be substituted for English Composition (Wr 323).

[4] Approved elective subject matter upon advisement with departmental faculty.

Electrical and Electronics Engineering

COMMON LOWER DIVISION PROGRAM

Freshman Year

	Hours
[1]Engineering Orientation (GE 101,102,103)	6
Calculus (Mth 111,112,113)	12
General Physics (Ph 201,202,203) or General Physics I (Ph 211,212,213)	12
General Chemistry (Ch 201,202,203)	9
English Composition (Wr 121)	3
[2]Humanities or social science elective	6
Physical education and general hygiene	3

Sophomore Year

Calculus of several variables (Mth 211)	4
Applied Differential Equations (Mth 321, 322)	8
Linear and Discrete Mathematics (see adviser)	9
Electrical Fundamentals (GE 201,202,203)	9
[3]General Engineering elective	9
English Composition (Wr 222)	3
[2]Humanities or social science elective	6
Physical education	3

ELECTRICAL AND ELECTRONICS ENGINEERING PROGRAM

E.C.P.D. Accredited

Junior Year

Fields and Energy Conversion (EE 311, 312,313)	12
Circuits and Electronics (EE 321,322,323)	12
[3] General Engineering elective	9
English Composition (Wr 323)	3
[2] Humanities or social science elective	6
Restricted elective (see adviser)	11
Seminar (EE 407)	1

Senior Year

Transmission Systems (EE 421,422)	6
Electrical Engineering Economy (EE 411)	3
Seminar (EE 407)	3
Departmental electives (see adviser)	18
[3] General engineering electives	9
[2] Humanities or social science elective	9
Field trip	0

COMPUTER SCIENCE PROGRAM

(An option under electrical and electronics engineering)

Junior Year

Circuits and Electronics (EE 321,322,323)	12
Switching and Coding Systems (EE 351, 352,353)	9
Electromagnetic Fields (EE 331)	3
[3] General engineering elective	9
Restricted elective (see adviser)	12
English Composition (Wr 323)	3
[2] Humanities or social science elective	6

Senior Year

Logical Design and Digital System Engineering (EE 471,472,473)	9
Digital Circuits (EE 474,475,476)	9
Departmental elective (See adviser)	9
Seminar (EE 407)	3
Numerical Methods (Mth 487,488,489)	9
[2] Humanities or social science elective	9
Field trip	0

[1] Students will register in the section taught by the Electrical and Electronics Engineering Department.

[2] Selected from list on file in the office of the Dean of Engineering and in departmental offices.

[3] Elected upon advisement with departmental faculty from Mechanics of Solids, Mechanics of Fluids, Thermodynamics, Nature and Behavior of Materials, and Transfer and Rate Processes.

Engineering Physics

Students electing the curriculum in engineering physics register under the School of Engineering in the Department of Physics by cooperative arrangement.

Freshman Year

	Hours
Engineering Orientation (GE 101,102,103)	6
Calculus (Mth 111,112,113)	12
General Physics I (Ph 211,212,213)	12
General Chemistry (Ch 201,202,203)	9
English Composition (Wr 121)	3
Humanities and social science electives	6
Physical education and general hygiene	3
Officer education or other elective	3

Sophomore Year

Calculus of several variables (Mth 211)	4
Applied Differential Equations (Mth 321, 322)	8
General Physics II (Ph 311,312,313)	9
Engineering science elective	9
Approved courses in mathematics	9
English Composition (Wr 222)	3
Humanities and social science electives	6
Physical education	3
Officer education or other elective	3

Junior Year

Selected Topics in Classical Physics (Ph 471,472,473)	12
Physical Chemistry (Ch 440,441,442)	9
Approved sequences or courses in engineering science, analysis, synthesis, or design	9–18
English Composition (Wr 323)	3
Humanities and social science electives	6
Unrestricted electives	12–3

Senior Year

Atomic and Nuclear Physics (Ph 474, 475,476)	9
Approved sequence or courses in engineering science, analysis, synthesis, or design	18–27
Humanities or social science electives	9
Unrestricted electives	12–3

General Engineering

Freshman Year

	Hours
Engineering Orientation (GE 101,102,103)	6
Analytic Geometry (Mth 110)	4
Calculus (Mth 111,112)	8
General Physics (Ph 201,202 or Ph 211, 212)	8
Humanities or social sciences	9
English Composition (Wr 121)	3
Graphics (GE 115)	3
[1]Approved elective	3
Seminar or other elective	3
Physical education	3

Sophomore Year

Calculus (Mth 113,211)	8
Applied Differential Equations (Mth 321)..	4
General Physics (Ph 203 or Ph 213)	4
Mechanics of Solids (GE 211,212,213)	9
General Chemistry (Ch 201,202,203)	9
English Composition (Wr 222)	3
Elective	3
Seminar or other elective	6
Physical education	3

Junior Year

Electrical Fundamentals (GE 201,202,203)	9
English Composition (Wr 323)	3
[2]General engineering science	9
Humanities or social sciences	9
[3]Physical or biological science elective	6
[4]Restricted electives (option)	18

Senior Year

Analysis and Design (GE 411,412,413)	9
[2]General engineering science	9
Humanities or social sciences	9
[4]Restricted electives (option)	18
Seminar (GE 407)	1
Elective	2
Civil Engineering Economy (CE 490)	3

[1] Graphics GE 116 required if student has not had one year of senior high mechanical drawing or equivalent.

[2] Thermodynamics, *or* Mechanics of Fluids, *or* Nature and Behavior of Materials, *or* Transfer and Rate Processes.

[3] Biology, botany, chemistry, entomology, geography, geology, meteorology, microbiology, oceanography, physics, or zoology.

[4] Appropriate courses for engineering or nonengineering option. The option shall be a consistent program with a specific objective established at the sophomore level with advisement of departmental faculty.

Industrial Engineering

E.C.P.D. Accredited

Freshman Year

	Hours
Engineering Orientation (GE 101,102,103)	6
Calculus (Mth 111,112,113)	12
General Physics I (Ph 211,212)	8
General Chemistry (Ch 201, 202,203)	9
Principles of Economics (Ec 201,202,203)	9
English Composition (Wr 121)	3
Elective	3
Physical education and general hygiene	3

Sophomore Year

Calculus of Several Variables (Mth 211)	4
Applied Differential Equations (Mth 321)	4
Mathematical Models (IE 271,272,273)	9
Electrical Fundamentals (GE 201,202,203)	9
Mechanics of Solids (GE 211,212,213)	9
General Physics I (Ph 213)	4
English Composition (Wr 222)	3
Manufacturing Processes (TME 262)	3
Elective	3
Physical education	3

Junior Year

Nature and Behavior of Materials (GE 321,322,323)	9
Mechanics of Fluids (GE 301,302) *or* Transfer and Rate Processes (GE 331,332)	6
or Thermodynamics (GE 311,312)	6
Systems Analysis (IE 371,372,373)	9
Engineering Economy (IE 381)	3
Electronic Data Processing Systems (IE 311,312)	6
General Psychology (Psy 201,202)	6
English Composition (Wr 323)	3
Elective	3
[1]Approved humanities and social science electives	6

Senior Year

Management Models (IE 471,472)	6
Environmental Design (IE 441)	3
Quality and Reliability Control (IE 491)	4
Industrial Engineering Analysis and Design (IE 497,498)	6
Industrial Engineering Seminar (IE 407)	1
Industrial Supervision Principles (IE 451)	3
Machine Design (ME 410)	3
Basic Accounting and Financial Analysis (BA 217)	3
Restricted electives	14
[1]Approved humanities and social science electives	6

[1] Humanities, social science, and restricted electives are approved upon advisement with departmental faculty.

Mechanical and Nuclear Engineering

MECHANICAL ENGINEERING

E.C.P.D. Accredited

Freshman Year

	Hours
Engineering Orientation (ME 101,102)	6
Analytic Geometry (Mth 110)	4
Calculus (Mth 111,112,113)	12
General Physics I (Ph 211,212)	8
General Chemistry (Ch 201,202,203)	9
Mechanics of Solids (GE 211)	3
English Composition (Wr 121)	3
[1]Elective	6
Physical education and general hygiene	3

Sophomore Year

Calculus of Several Variables (Mth 211)	4
Applied Differential Equations (Mth 321)	4
Mechanics of Solids (GE 212,213)	6
Electrical Fundamentals (GE 201,202, 203)	9
General Physics I (Ph 213)	4
General Physics II (Ph 311)	3
Manufacturing Processes (TME 262)	3
English Composition (Wr 222)	3
Elective in science	3
Elective	3
[2]Approved humanities and social science electives	9
Physical education	3

Junior Year

Mechanical Laboratory (ME 351)	3
Engineering Analysis (ME 371)	3
Engineering Mechanics (ME 301,302)	6
Thermodynamics (GE 311,312,313)	9
Nature and Behavior of Materials (GE 321, 322,323)	9
Transfer and Rate Processes (GE 331,332)	6
[4]English Composition (Wr 323)	3
[2]Approved humanities and social science electives	9

Senior Year

Mechanical Analysis & Design (ME 411, 412,413)	9
Mechanical Laboratory (ME 437)	3
Mechanical Engineering Economy (ME 460)	3
Seminar (ME 407)	1
[3]Restricted electives	18
Electives	5
[2]Approved humanities and social science electives	9

[1] A minimum level of competence in reading and in making mechanical drawings, demonstrated by examination, is a departmental requirement. The examination will be given to all ME freshmen enrolled in ME 101. Those not demonstrating adequate proficiency will be required to take GE 215 in lieu of 3 hours of elective, and will then be reexamined.

[2] Subjects to be selected upon advisement and from an approved department listing. Nine hours of the total required 27 hours of humanities and social science must be in social science.

[3] Not less than 9 term hours to be in one of the following areas: general mechanical engineering, automotive, aeronautical, or nuclear engineering, or applied mechanics.

[4] Technical Report Writing (Wr 327) may be substituted for Wr 323.

AEROSPACE ENGINEERING

(An option in mechanical engineering)

Freshman Year

	Hours
Engineering Orientation (ME 101,102)	6
Analytic Geometry (Mth 110)	4
Calculus (Mth 111,112,113)	12
General Physics I (Ph 211,212)	8
General Chemistry (Ch 201,202,203)	9
Mechanics of Solids (GE 211)	3
English Composition (Wr 121)	3
Approved humanities and social science	6
Physical education and general hygiene	3

Sophomore Year

Calculus of Several Variables (Mth 211)	4
Applied Differential Equations (Mth 321, 322)	8
Mechanics of Solids (GE 212,213)	6
Electrical Fundamentals (GE 201,202, 203)	9
General Physics I (Ph 213)	4
General Physics II (Ph 311)	3
English Composition (Wr 222)	3
Introduction to Aerospace Engineering (ME 291)	3
Approved humanities and social science	9
Physical education	3

Junior Year

Mechanical Laboratory (ME 351)	3
Engineering Analysis (ME 371)	3
Engineering Mechanics (ME 301,302)	6
Thermodynamics (GE 311,312,313)	9
Nature and Behavior of Materials (GE 321,322)	6
Transfer and Rate Processes (GE 331,332)	6
English Composition (Wr 323)	3
Approved humanities and social science electives	6

Senior Year

Seminar (ME 407)	1
Aerospace Engineering Design (ME 451, 452)	6
Mechanical Laboratory (ME 437)	3
Mechanical Engineering Economy (ME 460)	3
Rocket and Space Propulsion (ME 441)	3
Aerodynamics (ME 454,455,456)	9
Aircraft Performance (ME 457)	3
Aircraft Stability and Control (ME 458)	3
Electives	19
Approved humanities and social sciences electives	3

NUCLEAR ENGINEERING

Freshman Year

	Hours
Engineering Orientation (GE 101,102,103)	6
Calculus (Mth 111,112,113)	12
General Physics I (Ph 211,212,213)	12
General Chemistry (Ch 201,202,203)	9
English Composition (Wr 121)	3
Elective	3
Physical education and general hygiene	3

Sophomore Year

Calculus of Several Variables (Mth 211)	4
Applied Differential Equations (Mth 321, 322)	8
Introduction to Nuclear Engineering (NE 211)	3
Mechanics of Solids (GE 211,212,213)	9
Electrical Fundamentals (GE 201,202,203)	9
English Composition (Wr 222)	3
Restricted elective	6
Elective	3
[1]Approved humanities and soc sci electives	6
Physical education	3

Junior Year

General Physics II (Ph 311,312,313)	9
Nuclear Instrumentation (NE 311,312)	4
Nuclear Reactor Thermohydraulics (NE 321)	3
Thermodynamics (GE 311,312,313)	9
Transfer and Rate Processes (GE 331,332)	6
English Composition (Wr 323)	3
Restricted elective	9
[1]Approved humanities and soc sci electives	9

Senior Year

Nuclear Reactor Analysis (NE 411,412, 413)	9
Computational Methods in Nuclear Engineering (NE 421,422,423)	9
Nuclear Safety (NE 451)	3
Nuclear Power Generation (NE 461)	3
Reactor Management and Economics (NE 471)	3
Nuclear Materials (NE 481)	3
Restricted elective	8
[1]Approved humanities and soc sci electives	12

[1] Subjects must be selected from department-approved list.

Metallurgical Engineering

Freshman Year

	Hours
Engineering Orientation (GE 101,102,103)	6
Analytical Geometry (Mth 110)	4
Calculus (Mth 111,112)	8
General Chemistry (Ch 201,202,203)	9
General Physics (Ph 211,212,213)	12
English Composition (Wr 121)	3
Humanities and social science	6
Physical education or general hygiene	3
Elective	3

Sophomore Year

Electrical Fundamentals (GE 201,202,203)	9
Mechanics of Solids (GE 211,212,213)	9
Calculus (Mth 113,211)	8
Differential Equations (Mth 321)	4
English Composition (Wr 222)	3
Introduction to Metallurgical Engineering (MetE 201)	3
Humanities and social science	6
Restricted elective	3
Physical education or general hygiene	3
Elective	3

Junior Year

Thermodynamics (GE 311,312,313)	9
Nature and Behavior of Materials (GE 321,322,323)	9
Transfer and Rate Processes (GE 331, 332, 333)	9
Physical Chemistry (Ch 440,441,442)	9
English Composition (Wr 323)	3
Humanities and social science	6
Electives	9

Senior Year

Met and Ceram Appli Engr (MetE 411, 412,413)	9
Transform, Struc, and Prop of Alloys (MetE 421,422)	6
Metallography (MetE 423,424)	2
Unit Operations in Metallurgical Engr (MetE 431)	3
Unit Processses in Metallurgical Engr (MetE 432)	3
Process Metallurgy (MetE 433)	3
Metallurgical Equipment and Meas (MetE 425)	3
Senior Project (MetE 426)	3
Seminar (MetE 407)	1
Engineering Economy (ME 460)	3
Humanities and social science	9

Agricultural Engineering Technology

See School of Agriculture

Freshman Year

	Hours
English Composition (Wr 121)	3
General Chemistry (Ch 201,202,203)	9
Mathematics (Mth 111 or 163)	4
Graphics (GE 115)	3
General Biology (GS 101,102,103)	12
A Concept of Agriculture (Ag 100)	2
Animal or Poultry Science (AnS 121 or P 121)	3
Mechanical Problems in Agriculture (AET 101,102)	4
Agricultural Mechanics (AET 221)	3
Physical education and hygiene	3

Sophomore Year

English Composition (Wr 222)	3
Fundamentals of Speech (Sp 111)	3
Outlines of Economics (Ec 212)	3
General Chemistry (Ch 207)	2
Organic Chemistry (Ch 226)	3
Abridged General Physics (Ph 111,112)	6
Soils (Sls 210)	5
Farm Management (AEc 211)	5
Motor Vehicles (AET 312)	3
Plane Surveying (CE 226)	3
Basic Accounting and Fin Anal (BA 217)	3
Agricultural economics elective	3
Humanities and social science elective	3
Physical education	3

Junior Year

English Composition (Wr 323)	3
Journalism or Tech Report Wr (J 111 or Wr 327)	3
Soil Water and Irrigation (Sls 311)	3
Crop Production (FC 211)	5
Farm Implements AET 391)	3
Motor Vehicles (AET 313)	3
Farm Buildings (AET 361)	3
Agricultural Processing (AET 371)	3
Farm Electricity (AET 331)	3
Land Drainage (AET 319)	3
Humanities and social science elective	3
Agriculture electives	9
Electives	9

Senior Year

	Hours
Statics and Strength of Materials (AET 421)	3
Dynamics of Solids and Fluids (AET 422)	3
Heat Energy Processes (AET 423)	3
Pumps and Irrigation (AET 321)	3
Seminar (AE 407)	2
Business Law (BA 411)	3
Humanities and social science electives	9
Agriculture electives	7
Electives	12

Civil Engineering Technology

Option, construction engineering technology

Elective courses in surveying and mapping are available for students wishing to prepare for a career in this field.

Freshman Year
(Common to all CET Curricula)

	Hours
Technical Problems (CET 111,112,113)	6
Drawing and Descriptive Geometry (CET 121)	3
General Physics (Ph 201,202,203)	12
English Composition (Wr 121)	3
Fundamentals of Speech (Sp 111)	3
Analytic Geometry (Mth 110)	4
Calculus (Mth 111,112)	8
Electives in social science	9
Officer training or other electives	3–9
Physical education and general hygiene	3

Sophomore Year
(Common to all CET Curricula)

Plane Surveying (CET 221,222,223)	9
Mechanics (Statics, Dynamics, Strength of Materials) (CET 252,253,254)	9
English Composition (Wr 222)	3
Civil Engineering Drawing (CET 232)	3
Quantitative Business Methods (BA 235)	4
Introduction to Management Science (BA 238)	4
Financial Accounting (BA 211)	4
Managerial Accounting (BA 212)	4
General Chemistry (Ch 201)	3
Officer training or other electives	3–9
Physical education and general hygiene	3

Junior Year

Production (BA 311)	4
Marketing (BA 312)	4
Finance (BA 313)	4
Technical Report Writing (Wr 327)	3
Project Scheduling (CET 381)	3
Hydraulics (CET 321)	3
Estimating and Cost Control (CET 362)	3
Construction Engineering Economy (CET 371)	3
Cost Accounting (BA 421)	3
[1] Approved electives	9
[1] Restricted electives	9

Senior Year

	Hours
Structural Problems (CET 451,452)	8
Contracts and Specifications (CET 461)	3
Labor Problems (Ec 425)	3
Human Relations in Business (BA 497)	3
Principles of Economics (Ec 201,202,203)	9
[1] Approved electives	9
[1] Restricted electives	12
Seminar (CET 407)	3

[1] Consult department regarding approved and restricted electives.

CONSTRUCTION ENGINEERING TECHNOLOGY OPTION
(Courses Required in Addition to Basic Curriculum)

Junior Year

Hydraulics (CET 322)	3
Construction Materials Laboratory (CET 341,342,343)	9

Senior Year

Business Law (BA 412)	3
Construction Methods and Control (CET 441,442,443)	9

Electric Power Technology

Freshman Year

	Hours
Electric Power Technology (EPT 101,102,103)	6
English Composition (Wr 121)	3
Algebra and Trigonometry (Mth 51, 60)	4
Analytic Geometry (Mth 110)	4
Intro to Business Data Processing (BA 131)	3
Humanities and social science electives	9
General Chemistry (Ch 104,105)	9
Physical education and general hygiene	3
Defense education or elective	7–13
	48

Sophomore Year

Electric Circuits and Components (EPT 201,202,203)	9
General Physics (Ph 201,202,203)	12
English Composition (Wr 222)	3
Quantitative Business Methods (BA 235)	4
Principles of Accounting (BA 211)	3
Calculus (Mth 111)	4
Physical education	3
Elective	3
Defense education or elective	3–9
	48

Junior Year

Electrical Equipment (EPT 301,302,303)	9
Electrical Instruments (EPT 311,312,313)	9
Production (BA 311)	4
Marketing (BA 312)	3
Finance (BA 313)	4
English Composition (Wr 323)	3
Principles of Economics (Ec 201, 202,203)	9
Principles of Accounting (BA 212,213)	6
Elective	1
	48

Senior Year

	Hours
Electr Codes, Regulations, and Economy (EPT 411,412,413)	9
Electr Power Gen Trans and Distr (EPT 421,422,423)	9
Fundamentals of Speech (Sp 111)	3
Business Law (BA 412)	3
Human Relations in Business (BA 497)	3
Humanities and social science elective	9
Elective	9
	48

Total hours 192

Manufacturing Engineering Technology

Freshman Year

	Hours
Woodworking Technology (TME 111)	4
Foundry Practices (TME 141)	4
Welding and Fabrication (TME 151)	4
Machine Tool Practices (TME 161)	4
Graphics (GE 115,116)	6
Engineering Fundamentals (GE 104)	3
General Chemistry (Ch 201)	3
Mathematics (Mth 51, 60)	4
Analytical Geometry (Mth 110)	4
English Composition (Wr 121)	3
Fundamentals of Speech (Sp 111)	3
Physical education and hygiene	3
Officer education or elective	3

Sophomore Year

Manufacturing Metrology Technology (TME 263)	3
Casting Processes (TME 344)	4
Production Welding (TME 354)	4
Mass Production Methods (TME 361)	4
Calculus (Mth 111)	4
General Abridged Physics (Ph 111,112)	6
General Psychology (Psy 201,202)	6
Outlines of Economics (Ec 115)	3
English Composition (Wr 222)	3
Physical education	3
[1] Officer education or elective	9

Junior Year

Casting Processes (TME 345)	4
Production Welding (TME 355)	4
Mass Production Methods (TME 362)	4
Materials Technology (TME 365)	4
Numerical Control (TME 366)	3
A.P.T. Programming (TME 367)	3
Statistical Quality Control Technology (TME 368)	3
Methods and Motion Study (IE 361)	3
Time Study (IE 362)	3
Production Planning and Control (IE 363)	3
Human Factors In Engineering (Psy 330)	3
Economic Development of U. S. (Ec 215)	3
[1] Fundamentals of Accounting (BA 211, 212)	8
Field trip	0

Senior Year

Non-metallic Materials Technology (TME 364)	3
Welding Design and Economy (TME 456)	3
Automated Manufacturing Technology (TME 463)	3
Tool Engineering (TME 464,465,466)	9
Mechanisms (GE 309)	3
Metallurgy (MetE 480)	3
English Composition (Wr 323)	3
Field trip	0
Social science electives	9
Electives	11

[1] If enrolled in officer education, omit 6 hours of technical electives and BA 212.

Mechanical Engineering Technology

Freshman Year

	Hours
English Composition (Wr 121)	3
Intermediate Algebra (Mth 51)	2
Trigonometry (Mth 60)	2
Analytic Geometry (Mth 110)	4
General Chemistry (Ch 104, 105)	9
Welding and Fabrication (TME 151)	4
Mechanical Technology Orientation (MT 101)	3
Graphics (GE 115,116,117)	9
Extempore Speaking (Sp 111)	3
[1] Approved humanities and social science	6
Physical education and general hygiene	3

Sophomore Year

Abridged General Physics (Ph 111,112)	6
Calculus (Mth 111)	4
Introduction to Mechanics (MT 211,212, 213)	9
Fundamentals of Accounting (BA 211,212)	6
Data Processing (St 331)	3
Machine Tool Practices (TME 161)	4
Mechanisms (MT 201)	3
English Composition (Wr 222)	3
Mechanical Technology Analysis (MT 220)	3
[1] Approved humanities and social science	3
Physical education	3

Junior Year

Electrical Circuits and Components (ET 201,202,203)	9
Preliminary Design Problems (MT 381)	1
Metallurgy and Materials (MT 301,302, 303)	9
Applied Heat Power (MT 321,322,323)	12
Elective	3
English Composition (Wr 323)	3
Descriptive Statistics (St 311)	3
[1] Approved humanities and social science	9

Senior Year

Unrestricted electives	12
[2] Electives in technology	18
Business Law (BA 411)	3
Human Relations in Business (BA 497)	3
Elective in Business Administration	3
[1] Approved humanities and social science electives	9

[1] Subjects to be selected upon advisement and from an approved department listing. Eighteen hours of the total required 27 hours of humanities or social science electives must be social science.

[2] Restricted electives subject matter upon advisement with departmental faculty.

Nuclear Technology

Freshman Year

	Hours
English Composition (Wr 121)	3
Nuclear Technology Orientation (NT 101)	3
Introduction to Nuclear Technology (NT 102,103)	6
Intermediate Algebra (Mth 51)	2
Trigonometry (Mth 60)	2
Analytic Geometry (Mth 110)	4
General Chemistry (Ch 104,105)	9
[1] Humanities and social science elective	9
Graphics (GE 115,116,117)	9
Physical education and general hygiene	3

Sophomore Year

Calculus (Mth 111)	4
[1] Humanities and social science electives	9
English Composition (Wr 222)	3
Electrical Circuits and Components (EPT 201,202)	6
Nuclear Instrumentation (NT 201)	5
Abridged General Physics (Ph 111,112, 113)	9
Quantitative Business Methods (BA 201, 202)	8
Physical Education	3

Junior Year

English Composition (Wr 323)	3
Elementary Reactor Engineering (NT 301, 302,303)	9
Radiation Safety (NT 311,312)	6
[1] Humanities and social science electives	9
[2] Restricted electives	8
Applied Heat Power (MT 321,322,323)	12

Summer Term

Field Practices (NT 410)	0

Senior Year

Nuclear Rules and Regulations (NT 401)	4
Nuclear Safety Analysis (NT 411)	4
Use of Computers in Nuclear Industry (NT 421)	4
Elementary Reactor Analysis (NT 441,442, 443)	9
Electrical Power Generation, Transmission, and Distribution (EPT 421,422,423)	9
[2] Restricted electives	9
Elective	9

[1] Subjects to be selected upon advisement from an approved departmental listing. Eighteen hours of the required 27 hours must be in social science.

[2] Restricted elective subject matter upon advisement with departmental faculty.

Courses in Engineering

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 materials 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.

Upper Division Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

AE 311. Engines and Tractors.
3 hours fall. 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. Prerequisite: GE 312.

AE 313. Motor Vehicles.
3 hours winter or spring. 1 ① 2 ③
Preventive maintenance procedures for automotive equipment. Maintenance schedules, lubrication, adjustments, engine tuneup, carburetion, brake service, chassis and accessory unit repairs. Prerequisite: AE 311 or AET 312.

AE 314. Motor Vehicles.
3 hours spring. 2 ① 1 ③
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 356. Computer Applications.
Terms and hours to be arranged.
Application of digital, analog, or hybrid computers to practical problems.

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 winter. 3 ①
Electrical codes, electric motors, and motor controls. Application of electricity to agricultural loads. Prerequisite: GE 203 or equivalent.

AE 461. Farm Structures. (g)
3 hours spring. 1 ① 2 ③
Materials and types of construction; services, uses, and economics of farm structures; structural, environmental, and system designing. Prerequisite: GE 213 and GE 312.

AE 465. Building Cost Estimating. (g)
3 hours spring. 2 ① 1 ②
Complete and approximate estimates; establishing unit prices; quantity surveying; overhead costs and profit estimates; specifications interpretations; estimates for separate contracts and subcontracts. Prerequisite: AA 179 or AET 361 or AE 461.

AE 466. Structural Reliability. (G)
3 hours winter. 3 ①
Probability review; load and strength probability distributions; reliability of simple and complex structures; reliability designing; student project. Prerequisite: GE 213; Mth 211.

AE 471. Soil and Water Conservation.
(g) 3 hours fall. 3 ①
Mechanics of erosion. Design of erosion control structures. Estimation of water supplies and crop water requirements. Prerequisite: GE 302.

AE 472. Drainage Engineering. (g)
3 hours winter. 2 ① 1 ③
Benefits of drainage, hydraulics of soil profiles, drainage investigations, design of agricultural drainage systems, interceptor drains, construction practices, drainage enterprises. Prerequisite: GE 302.

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: GE 302.

AE 491. Power Farming Machinery.
(g) 3 hours fall. 2 ① 1 ③
Power farming machinery; operation, calibration, selection, and systems of use. Prerequisite: AE 311; GE 213.

AE 492,493. Agricultural Machine Design. (g)
3 hours winter and spring. 1 ① 2 ②
Mechanics, mechanisms, and strength of materials applied to the design of agricultural machines with consideration given to motion, size, material, strength, durability, and manufacturing processes. Prerequisite: AE 491.

Graduate Courses

See also courses marked (*g*) and (*G*) above

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 511. Irrigation Science
3 hours spring. 3 ①
Hydraulics of surface irrigation, irrigation structures, estimation of evapotranspiration, and new developments in irrigation science and technology. Offered alternate years. Not offered 1970-71.

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. Offered 1970-71.

AE 525. Processing Equipment for Agricultural Products.
3 hours fall. 2 ① 1 ③
Fundamental theory and applications of various methods and equipment used in the processing of agricultural products. Offered alternate years. Not offered 1970-71.

AE 530. Agricultural Instrumentation and Application.
3 hours spring. 2 ① 1 ③
Pyrometry, air measurements, psychrometry, soil and field-crop moisture determinations, and water measurements. Offered alternate years. Offered 1970-71.

AE 540. Mechanics of Fluids in Porous Media.
3 hours fall. 3 ①
Fundamentals of the mechanics of two immiscible fluids in porous media and their application to drainage, irrigation engineering, and other soil-water problems. Soil physics and fluid mechanics background desirable.

CHEMICAL ENGINEERING

The chemical engineering curriculum provides to both the undergraduate and graduate student a background of fundamental, scientific knowledge which will prepare him for any job in his profession. These positions include research and development, design, technical service, plant operation, technical sales, or graduate work beyond the bachelor's degree. Petroleum and petrochemicals, plastics, heavy chemicals, aircraft, missiles, fuels, and many other industries require chemical engineers in laboratory research and administrative positions.

In the four-year curriculum, the important elective social and humanistic subjects are interspersed with science and engineering courses. Courses in English composition are required and other open electives are selected by the student according to his individual preferences. Mathematics, including use of computers, is an important part of engineering training and the student will be expected to complete the equivalent of one full year of mathematics beyond calculus during his four years.

It is becoming increasingly important that those students who plan to work in industrial research laboratories or to enter the teaching profession should continue with graduate work beyond the bachelor's degree. To this end the department has an active graduate program permitting outstanding students to continue work toward the M.S. and Ph.D. degrees. Thesis data are frequently correlated and analyzed using the Oregon State computers.

Lower Division Courses

ChE 211,212 Stoichiometry and Thermodynamics.
2 hours fall and winter. 1 ① 1 ②
Heat and material balances. Basic thermodynamic relationships; energy balances, and thermo-physical calculations. Prerequisite: General chemistry; Mth 113.

ChE 213. Measurements and Instrumentation.
2 hours spring. 1 ① 1 ②
Principles of industrial measurement and control. Application of analog computer in industrial control.

Upper Division Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

ChE 325,326,327. Chemical Engineering Problems.
1 hour each term. 1 ②
Advanced digital computer programing on industrial problems. Application of momentum, heat, and mass transfer phenomena. Prerequisite or parallel: GE 311,312,313 and GE 331,332,333; Mth 321.

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 Operations. (g)
3 hours fall and winter. 1 ① 2 ②
Mass, momentum, and heat transfer operations; basic transport equations. Prerequisite: GE 313; GE 333; Ch 442; Mth 321.

ChE 414,415. Chemical Engineering Laboratory. (g)
3 hours winter and spring. 1 ① 1 ④
Unit operations and transfer processes; preparation of technical reports. Prerequisite or parallel: ChE 411; Mth 321.

ChE 425,426,427. Chemical Engineering Calculations. (G)
3 hours each term. 3 ①
Mathematical analysis; setting up differential equations; special methods of solving problems. Prerequisite: ChE 327; Mth 321 and ChE 411 parallel.

ChE 431,432. Chemical Plant Design. (g) 3 hours winter and spring. 2 ① 1 ②
Design of plants and chemical engineering equipment. Reports required. Prerequisite: ChE 412,442,443; Mth 321.

ChE 442. Chemical Engineering Economics. (g) 2 hours. 1 ① 1 ②
Chemical processing; optimization of operations; depreciation and replacement policy; payout time on plant investment; operating costs and profit margins. Prerequisite: Mth 321.

ChE 443. Chemical Process Kinetics. (g) 2 hours. 1 ① 1 ②
Reaction rate; competing reactions; batch and continuous systems; reactor design; catalysis. Prerequisite: Mth 321.

ChE 461. Process Dynamics and Control. (g)
3 hours spring. 2 ① 1 ②
Fundamental principles of process dynamics and instrumentation used in control of process variables such as pressure, temperature, and flow rate. Prerequisite: ChE 412; Mth 321.

Graduate Courses

See also courses marked (*g*) and (*G*) above

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 512. Economic Balance.
3 hours. 3 ①
Typical chemical engineering and applied chemistry problems from the standpoint of economic considerations; design and operations.

ChE 514. Fluid Flow.
3 hours. 2 ① 1 ②
Momentum transfer and related theory; special attention to recent literature. Prerequisite or parallel. ChE 425.

ChE 520,521. Diffusional Operations.
3 hours winter and spring. 1 ① 1 ②
Diffusion in gases, liquids, and solids; interphase mass transfer; macroscopic mass balance. Prerequisite: ChE 425.

ChE 522. Heat Transmission.
3 hours. 2 ① 1 ②
Mechanisms of transference of heat energy; transport theory. Prerequisite: ChE 425.

ChE 531,532. Electrochemical Engineering.
3 hours each term. 2 ① 1 ②
Fuel cells; electro-organic reactions; electrodialysis and electro-winning; mass transfer and polarization; fused salt electrolysis; cell analogies; theory of electrolytic conduction; electrochemistry in nonaqueous solvents; current distribution.

ChE 535. Corrosion and Corrosion Control.
3 hours. 3 ①
Corrosion as an electrochemical reaction; metal activity; passivity; stress corrosion cracking; corrosion inhibitors; cathodic protection; corrosion control.

ChE 537,538. Chemical Engineering Thermodynamics.
3 hours each term. 2 ① 1 ②
Theory and laws governing energy transformations, phase equilibria, nonideal systems, and activities of electrolytes.

ChE 539. Thermodynamics of Irreversible Processes. 3 hours. 3 ①
Non-equilibrium systems with finite potential differences but restricted to time invariancy; entropy production in such systems.

ChE 540. Applied Reaction Kinetics.
3 hours. 2 ① 1 ②
Fundamental theories of reaction kinetics and catalysis; design of reaction vessels.

ChE 550. Process Systems Analysis.
3 hours. 2 ① 1 ②
Mathematical formulation and computer modeling of physical and chemical processes; process system simulation and optimization by analog, hybrid, and digital computer techniques; recent advances in computer-aided process design; on-line digital computer control. Prerequisite: ChE 425, 427.

ChE 551. Process Systems Optimization.
3 hours winter. 2 ① 1 ②
Optimization theory. Application to computer simulated mathematical models of chemical process systems. Prerequisite: ChE 427 or equivalent.

CIVIL ENGINEERING

The curriculum in Civil Engineering is designed to prepare students for a professional career of civil engineering and responsible positions in business, industry, private consulting, and government. The course of study includes basic sciences, social sciences, and engineering sciences fundamental to engineering practice. Courses in engineering analysis and design which cover the fields of structural engineering, highways and transportation systems, engineering surveying, hydraulics and water resources engineering, soil mechanics and foundation engineering, water supply, waste treatment, water pollution control, municipal engineering, and engineering planning and economy are included in the junior and senior years.

Graduate study leading to the M.S. and Ph.D. degrees is offered by the department. Graduate students can major in any of the above specialty areas. Ocean engineering is offered as a graduate major only since it requires undergraduate preparation. Due to the growing complexity of modern engineering practice, graduate study is becoming increasingly necessary and is recommended for students who wish to specialize.

The professional practice of engineering requires licensing in all states. Students are prepared to take the Engineer-in-Training examination of the State licensing board upon graduation and to take the professional licensing examination after four years of supervised experience.

Lower Division Courses

CE 226. Plane Surveying.
3 hours. 2 ① 2 ②
Use of engineer's transit, tape, and level; surveying methods applied to problems in construction and area survey. Prerequisite: Mth 60.

Upper Division Courses

Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

CE 312. 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: GE 302.

CE 361. Surveying Theory.
3 hours. 2 ① 2 ②
Use of surveying equipment, Gaussian error theory applied to measurements, calculations of position on spherical and plane surfaces, mapping techniques. Prerequisite: Mth 211.

CE 362. Photogrammetry.
3 hours. 2 ① 1 ③
Geometry of terrestrial and vertical photographs, radial line plotting, ground control, stereoscopy and parallax, stereoscopic plotting instruments, orientations, and aerial cameras. Prerequisite: CE 361.

CE 363. Engineering Surveys.
3 hours. 1 ① 2 ③
Design data and construction surveys, electronic distance measurements, precise leveling, field astronomy, property and U.S. Public Land surveys, highway earthwork and design applications. Prerequisite: CE 362.

CE 372,373. Soil Mechanics.
3 hours each term. 2 ① 1 ②
Origin, composition, and engineering properties of soils; settlement analysis, lateral earth pressures, slope stability, bearing capacity. Prerequisite: GE 213,301.

CE 381,382,383. Structural Theory.
3 hours each term. 2 ① 1 ②
CE 381, 382: Beam deflection, redundant structures, combined stress, columns, structural members and frames. *CE 383:* Analysis of statically indeterminate structures by moment distribution, slope deflection, strain-energy, elastic methods. Prerequisite: Mth 211, GE 213.

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 (g)
3 hours. 2 ① 1 ②
Fundamentals of hydrology; the several phases of the hydrologic cycle; special emphasis on precipitation, streamflow, hydrograph analyses, and hydrologic measurements. Prerequisite: senior standing.

CE 412. Hydraulic Engineering. (G)
3 hours. 1 ① 2 ②
Theory and design of hydraulic machinery and hydraulic structures. Analysis and synthesis of hydraulic systems and selected topics in Hydraulic Engineering. Prerequisite: CE 312.

CE 414,415. Environmental Engineering Fundamentals. (g)
3 hours each term. 1 ① 2 ②
Water quality analysis, water quantity measurements, hydraulic considerations, water supply and treatment, water pollution control, treatment of domestic and industrial wastes. Prerequisite: Ch 103.

CE 421,422. Transportation Engineering. (G)
3 hours each term. 2 ① 1 ②
Transportation planning, geometric design, traffiic characteristics, roadbed design, drainage, pavement design, traffic studies, traffic control.

CE 424. Highway Materials. (G)
3 hours. 2 ① 1 ③
Characteristics and behavior of highway materials, pavement mixtures, and control. Prerequisite: senior standing.

CE 425. Pavement Structures. (G)
3 hours. 2 ① 1 ②
Design for streets, highways, and airports. Prerequisite: CE 372.

CE 451,452,453. Sanitary Engineering.
(g) 3 hours each term. 2 ① 1 ②
Domestic and industrial water supply and waste disposal collection, storage, pumping, and treatment facilities. Prerequisite: CE 312.

CE 461. Oregon Land Survey Law.
(G) 3 hours. 3 ①
U. S. Public Land Survey System; history, development, Congressional legislation, restoration of corners, and rules of evidence; Oregon supreme court decisions; adverse possession, eminent domain and riparian rights, guarantees of title, descriptions, and plats. Prerequisite: senior standing.

CE 462. Photo Interpretation. (G)
3 hours. 2 ① 1 ③
Air photo interpretation and application to engineering problems; factors responsible for the formation and development of man-made features and geological landforms. Prerequisite: senior standing.

CE 463. Control Surveying. (G)
3 hours. 2 ① 1 ③
Theory, equipment, and data reduction of electro-optical and micro-wave electronic distance measurements; control specifications, methods, and problems in obtaining large area angular measurements; precise leveling; triangulation and trilateration figure adjustments with introduction of least square techniques. Prerequisite: senior standing.

CE 471. Soil Testing for Engineers. (G)
3 hours. 1 ① 2 ③
Soil sampling; organization of soils laboratory; identification, permeability, consolidation and strength tests. Prerequisite: CE 372.

CE 472. Foundations.
3 hours. 2 ① 1 ②
Foundations for engineering structures. Prerequisite: CE 373.

CE 481. Reinforced Concrete. (g)
3 hours. 2 ① 1 ②
Theory and design of reinforced concrete structural members. Strength properties and control of structural concrete. Design limitations and building codes. Prerequisite: CE 383.

CE 482,483. Structural Engineering.
(g) 3 hours each term. 2 ① 1 ②
Structural design in timber, reinforced and prestressed concrete, ultimate strength and limit design. Design criteria, limitations, and detail problems. Prerequisite: CE 383,481.

CE 484. Design of Steel Structures.
(g) 3 hours. 2 ① 1 ②
Elastic and plastic methods of structural steel analysis. Design of steel structures. Prerequisite: CE 383.

CE 485. Indeterminate Structures. (g)
3 hours. 1 ②
Elastic deflections and stress analysis. Prerequisite: CE 383.

CE 489. Building Design. (g)
3 hours. 2 ① 1 ③
Building elements constructed of steel, reinforced concrete, timber, and miscellaneous building materials; fabrication and construction. Prerequisite: CE 472,481.

CE 490. Civil Engineering Economy.
(g) 3 hours. 3 ①
Time value of money; economic study techniques of construction, retirement, and replacement of civil engineering structures. Prerequisite: senior standing.

CE 492. Estimating and Contracts.
(g) 3 hours. 2 ① 1 ②
Quantity surveying; unit prices, subcontracts, overhead costs, profits; principles and laws of contracts applied to engineering. Prerequisite: senior standing.

CE 494. Modern Construction Methods.
3 hours. 2 ① 1 ③
Equipment and performance factors, plant selection, productivity, and costs.

Graduate Courses
See also courses marked (g) and (G) above

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 511. Engineering Properties of Soils. 3 hours. 3 ①
Geochemistry of soil formation, clay mineralogy, physical chemistry of clay water systems, permeability, consolidation, shear strength, and soil stabilization.

CE 512. Theoretical Soil Mechanics.
3 hours. 3 ①
Stresses in earth masses, plastic equilibria, lateral earth pressures, slope stability, bearing capacity, conduits and shafts, and ground water flows. Prerequisite: CE 511.

CE 513. Foundations.
3 hours. 3 ①
Subsurface exploration, shallow foundation-footings, rafts and mats, deep foundation-piers and piles, retaining structures, and control of water in excavation. Prerequisite: CE 512.

CE 515. Advanced Soil Testing.
3 hours. 1 ① 2 ③
The direct shear test, the vacuum triaxial test, and triaxial testing of cohesive soils. Prerequisite: CE 511.

CE 516. Soil Engineering.
3 hours spring. 3 ①
Subsurface exploration, control of water in excavations, retaining structures, and conduits and shafts. Prerequisite: CE 512.

CE 517. Earth Structures.
3 hours. 3 ①
Compaction, properties of partially saturated soils, seepage through embankments, stability of slopes and embankment foundations, design of earth dams. Prerequisite: CE 512 (may be taken concurrently.)

CE 518. Theoretical Soil Mechanics II.
3 hours. 3 ①
Dimensional analysis and models, advanced statics of soils, soil dynamics. Prerequisite: CE 512.

CE 519. Applied Soil Mechanics.
3 hours spring. 3 ①
Actual problems presented as realistically as possible. Individual reports prepared. Student reports critically reviewed by other students and the instructor. Prerequisite: CE 513,517, 518.

CE 520. Fluid Measurement.
3 hours. 1 ① 2 ③
Dynamical measurement of fluid properties and fluid motion, error analysis, instrumental systems and methods, transfer functions, transient signal analysis.

CE 521. Hydraulic Transients.
3 hours. 3 ①
Problems of fluid flow in closed conduits and complex piping systems. Application of numerical methods to problems in water hammer, surge tank design, and pressures in pump discharge lines.

CE 522,523. Fluid Mechanics.
3 hours each. 3 ①
Dimensional analysis; principles of energy, continuity, and momentum; boundary layer theory; unsteady flow in pipes.

CE 524. Sediment Transport.
3 hours. 3 ①
Principles of transport in rivers and coastal waters; sediment problems associated with reservoirs. Prerequisite: CE 312.

CE 525. River Control and Utilization.
3 hours. 3 ①
Controlling flood flow in streams; design of dikes, shore protection facilities, retarding and impounding basins; laws of similitude; hydraulic models. Prerequisite: CE 312.

CE 526. Hydraulics of Open Channels.
3 hours. 3 ①
Steady, uniform, and nonuniform flow including transitions, delivery curves, side channel spillways, cavitation, and open channel surges.

CE 527,528. Hydrology.
3 hours each term. 3 ①
Advanced treatment of hydrology covering major components of hydrologic cycle. Hydrologic analysis and design of water resource systems. Flood prediction and control. Simulation of susrface water systems. Prerequisite: CE 411.

CE 529. Ground Water Hydraulics.
3 hours. 3 ①
Steady and unsteady flow in confined and unconfined aquifers and seepage through embankments, river depletion due to well pumping, bank storage, flow toward drains, method of images, and use of electrical and other analogs.

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. Analysis of Engineering Structures.
3 hours. 3 ①
Stress analysis of statically indeterminate structures. Energy and geometric methods.

CE 532. Matrix Methods of Structural Analysis.
3 hours. 3 ①
Applications of matrix algebra to problems of structural analysis; stiffness and flexibility matrices: computer applications.

CE 533. Structural Stability.
3 hours. 3 ①
Mathematical models of elastic and inelastic stability in structural frames; numerical methods of solution.

CE 534,535. Mechanics of Materials.
3 hours each term. 3 ①
Structural materials; theories of failure, multiaxial stress conditions, torsion, shear distortions, impact and vibrations, energy methods of analysis, stresses in plates and shells.

CE 536. Plastic Methods of Structural Analysis. 3 hours. 3 ①
Formation of yield hinges; upper and lower bound theorems; equilibrium and mechanism techniques applied to redundant frames.

CE 537,538. Reinforced Concrete.
3 hours each term. 3 ①
Winter: Prestressed concrete, analysis and design, systems of prestressing, material specification, economics. *Spring:* Ultimate strength, theory and design.

CE 539. Plate and Shell Structures.
3 hours. 3 ①
Deflection and stress analysis; analysis, design, and construction.

CE 540,541,542. Sanitary Engineering Processes.
3 hours each term. 2 ① 1 ③
Fall and winter: Unit physical operations and biological processes of water and waste treatment. *Spring:* advanced methods of water and waste treatment.

CE 543. Water Quality Studies.
3 hours. 1 ① 2 ③
Study of stream pollution, oxygen sag, reaeration, and their effects.

CE 544,545,546. Water Quality Analysis. 3 hours each term. 1 ① 2 ③
Chemical and physical principles of the measurement, analysis, and interpretation of the quality of water, sewage, and industrial wastes.

CE 547. Industrial Wastes.
3 hours. 2 ① 1 ③
Industrial processes; strength, quantity, and character of industrial wastes; methods of prevention, treatment, and disposal.

CE 548. Water Quality Dynamics.
3 hours. 3 ①
Mass balance, convection and diffusion in streams, lakes and estuaries, thermal pollution, heat balance, oxygen balance, and eutrophication. Prerequisite: CE 544.

CE 549. Sanitary Engineering Design.
3 hours. 2 ① 1 ③
Design of water and waste water collection and treatment facilities.

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
Engineering factors; the organization, administration, and finance of highway systems and control of traffic for ultimate efficiency.

CE 561. Photogrammetry.
3 hours. 2 ① 1 ③
Geometry of aerial and terrestrial photographs; design of cameras; rectification; design, construction, operation, and error theory of photogrammetric plotting instruments; analytical aerotriangulation. Prerequisite: graduate standing.

CE 562. Geodesy.
3 hours. 3 ①
History and properties of the spheroid; calculation of geodetic position; figure of the earth and isostasy; gravity measurement; geodetic astronomy.

CE 563. Space Surveying.
3 hours. 3 ①
Field astronomy; celestrial mechanics; dynamic and geometrical scientific observation and reduction of artificial satellite data; cislunar and lunar positions. Prerequisite: graduate standing.

CE 565. Analytical Photogrammetry.
3 hours. 3 ①
Photogrammetric coordinate systems, photograph orientation in space, condition equations, linearization of the condition equations, data analysis and normalizing of observation equations, analytical aerial triangulation, adjustment of strips and blocks. Prerequisite: CE 362.

CE 570. Coastal Hydraulics.
3 hours. 3 ①
Deep and shallow water waves; shoaling effects; tidal dynamics in bays, estuaries, and harbor entrances; wave and current forces; mixing processes; engineering considerations. Consent of instructor required.

CE 571. Forces on Marine Structures.
3 hours. 3 ①
Wave and current force interaction with marine structures, shoaling effects, sea ice forces, corrosion considerations. Prerequisite: CE 570.

CE 572. Marine Water Quality Dynamics. 3 hours. 3 ①
Water quality control and waste disposal in estuaries and near-shore areas; principles of diffusion and dispersion of dissolved and particulate matters in marine waters; fate of pollutants; interrelationships of physical, hydraulic, chemical, and biological factors. Consent of instructor required.

CE 574. Ocean Engineering Facilities Planning.
3 hours. 3 ①
Functional planning and design criteria of near-shore and harbor facilities including piers, platforms, jetties, sea walls, groins, moorings, locks, submerged pipelines, harbor design, and use of hydraulic models. Prerequisite: CE 570.

CE 578. Marine Geotechnique.
3 hours. 3 ①
Marine sediment processes, beach dunes, marine soil properties, sampling and testing; seismic surveys; foundations and anchorages; marine location surveys. Consent of instructor required.

CE 579. Special Topics in Ocean Engineering. 1 hour. 1 ②
Special topics on various phases of ocean engineering. Subject matter selected each term on basis of student interest and available speakers. May be repeated a maximum of four times for credit.

CE 590. Engineering Economic Planning. 3 hours. 3 ①
Planning of engineering facilities, economic analysis, selection of alternatives, benefit-cost analysis, rate structures, retirement, replacement, pricing decisions, capital budgeting for engineering objectives. Prerequisite: CE 490.

CE 593,594. Construction Engineering Management.
3 hours each term. 3 ①
Construction management and planning, project mobilization, contract documents, contracting procedures, legal considerations, insurance and safety requirements, project control and scheduling, selection of materials and methods, and project administration.

ELECTRICAL AND ELECTRONICS ENGINEERING

The curriculum is designed to provide a professional education in electrical and electronics engineering. An experienced professional staff and adequate facilities provide competent instruction in many important areas. Laboratories and equipment, including analog, digital, and hybrid computers, are available for undergraduate, graduate, and staff research.

The undergraduate may use electives in the sophomore, junior, and senior years for additional chemistry, physics, mathematics, or language—either as preparation for graduate work, or as part of a broader undergraduate program.

Graduate studies through the Ph.D. are provided in many areas of electrical and electronics engineering. All graduate students take a noncredit seminar with their major professors; this provides a meeting for all graduate students with a common major interest. Electives from other departments are used to strengthen the graduate students' program, as well as to provide programs of maximum benefit to the individual. Advanced seminars in specialized areas are offered when needed to complete specialized programs of study. The thesis is required in both M.S. and Ph.D. programs.

A program in computer science leading to the B.S. degree is offered. Graduate work in this area can be taken in the regular program of electrical and electronics engineering. Both the undergraduate and graduate programs have been established for engineers who are going to design computers, or who will use computers in advanced systems such as process control, power system area control, and electronic switching systems.

Upper Division Courses

Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

EE 311,312,313. Fields and Energy Conversion.
4 hours each term. 3 ① 2 ①; 3 ① 2 ①; 3 ① 1 ③
Electromagnetics through Maxwell's Equations, basic energy conversion principles, and energy converters, including treatment of steady state and transient conditions. Prerequisite: GE 203; Mth 211, 321.

EE 321,322,323. Circuits and Electronics. 4 hours each term. 3 ① 1 ③
Electronics, emission, conduction in solids, vacuum, and gases; vacuum, gas, and vapor tubes, solid state electronic devices and their associated circuits; circuit design and analysis using the Laplace transformation and the complex plane. Prerequisite: GE 203; Mth 321.

EE 331. Electromagnetic Fields.
3 hours. 3 ①
Basic laws of magnetic and electric fields. Electromagnetic fields and propagation. Prerequisite: GE 203; Mth 321.

EE 351,352,353. Switching and Coding Systems.
3 hours each term. 3 ①
EE 351: Combinational switching circuits.
EE 352: Sequential switching circuits.
EE 353: Coding systems.

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
Material pertinent to the professional aspects of electrical engineering and industry.

EE 411. Electrical Engineering Economy. (g) 3 hours. 3 ①
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. Systems Instrumentation. (G)
3 hours each term. 2 ① 1 ③
Instrumentation as a systems problem; control information and data acquisition; transducer as interface between physical system and control system. Prerequisite: EE 313,323.

EE 421,422. Transmission Systems. (g)
3 hours each term. 2 ① 1 ②
Transmission lines, networks, and waveguides. Prerequisite: EE 312 or 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.

EE 441,442,443. Solid-State Electronics. (g)
3 hours each term. 2 ① 1 ③
Semiconductor device fundamentals, models, and characteristics. Introduction to microelectronics. Prerequisite: EE 323.

EE 451,452,453. System Engineering.
(g) 3 hours each term. 2 ① 1 ③
Fall: Concepts of system engineering.
Winter: Modeling and simulating systems.
Spring: Optimization of system performance.
Prerequisite: EE 311 or 331, 323.

EE 461,462,463. Communication Engineering. (g)
3 hours each term. 2 ① 1 ③
Communication theory: Fourier analysis, modulation, detection of signals, noise. Applicable in telephony, radio, television, and digital communications. Prerequisite: EE 311 or 331, 323.

EE 471,472,473. Logical Design and Digital System Engineering. (g)
3 hours each term. 3 ①
EE 471: Logical design and logic circuit design; *EE 472:* Design of registers and arithmetic units. *EE 473:* Memories; input-output and system design. Prerequisite: EE 323,353.

EE 474,475,476. Digital Circuits. (G)
3 hours each term. 2 ① 1 ③
EE 474: Conventional switching circuits. *EE 475:* Special logic circuits. *EE 476:* High-current circuits and optical logic circuits. Prerequisite: senior standing in EE.

EE 491,492,493. Control Engineering.
(g) 3 hours each term. 2 ① 1 ③
Control systems analysis, synthesis, and simulation; linear, nonlinear, and sampled-data systems of electrical, electro-mechanical, electrohydraulic, etc. types with feedback. Prerequisite: senior standing in EE.

Graduate Courses

See also courses marked (g) and (G) above. 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 507. **Seminar.**
No credit. (Required of all graduate students.)

EE 511,512,513. **Solid-State Devices.**
3 hours each term. 2 ① 1 ③
Fall: Semiconductor device design. *Winter:* Integrated circuit design. *Spring:* Thin-film devices and circuits.

EE 514,515,516. **Advanced Solid State Electronics.**
3 hours each term. 3 ①
Properties of elemental and compound semiconductors; analytical techniques for understanding solid-state materials and devices. Prerequisite: EE 441,442.

EE 521,522,523. **Switching Theory and Automata.**
3 hours each term. 3 ①
Fall: Switching and combinational circuits.
Winter: Switching networks and sequential machines.
Spring: Coding theory and automata.

EE 525,526,527. **Computer Systems.**
3 hours each term. 3 ①
Fall: Arithmetic, data, and information processors.
Winter: Computer-man interface, input-output, etc.
Spring: Digital system organization for specific areas of utilization.

EE 531. **Materials.**
3 hours. 2 ① 1 ③
Electrical conductors and insulators and dielectric and magnetic materials.

EE 535,536,537. **Circuits and Fields.**
3 hours each term. 3 ①
Mathematical analysis. *Fall:* Wave propagation. *Winter:* Radiation and antennas. *Spring:* Graph theory and linear network transformations employing matrix methods.

EE 538,539,540. **Analytic Techniques in Waves and Fields.**
3 hours each term. 3 ①
Analytic techniques required for solving modern engineering problems in electromagnetics, EM wave propagation, optics, and antennas are developed and applied to illustrative problems.

EE 541,542,543. **Power Systems.**
3 hours each term. 2 ① 1 ③
Fall: Energy conversion devices in systems. *Winter:* Electrical energy transmission systems. *Spring:* Stability of systems.

EE 551,552,553. **Microwave Circuits.**
3 hours each term. 2 ① 1 ③
Fall: Analysis of waveguide systems of simple geometries. *Winter:* Cavities, waveguide junctions, and lossy systems. *Spring:* Propagation in inhomogeneous media, periodic structures, and non-bilateral elements.

EE 554,555. **Control Systems.**
3 hours each term. 2 ① 1 ③
Adaptive and sampled-data systems; nonlinear control systems. Prerequisite: EE 560.

EE 556,557,558. **Multivariable Systems.**
3 hours each term. 2 ① 1 ③
Multivariable system analysis, synthesis, and optimization using state concepts; stability criteria; simulation; optimal control; current topics.

EE 560. **Signals and Noise.**
3 hours fall. 3 ①
Stochastic processes, correlation functions, spectral analysis applicable to communication and control systems.

EE 561,562. **Communication Systems.**
3 hours each term. 3 ①
Winter: Factors affecting the design of communication systems. Information theory, coding, detection of signals in noise. *Spring:* Digital communications. Prerequisite: EE 560.

EE 581. **Advanced Network Analysis.**
3 hours fall. 3 ①
Advanced topics in network theory.

EE 582,583. **Network Synthesis.**
3 hours winter and spring. 3 ①
Synthesis of networks from prescribed driving-point and transfer characteristics. Prerequisite: EE 581.

EE 590,591,592. **Systems Simulation.**
3 hours each term. 2 ① 1 ③
Fall: Electronic analog computer uses in systems simulation.
Winter: Numerical methods and simulation models using digital computers.
Spring: Parameter optimization and simulation models using hybrid computers, processing of analog data. Permission of instructor required.

EE 593. **Simulation Fundamentals.**
3 hours. 2 ① 1 ③
Simulation of dynamical systems using analog, digital, and hybrid computers. Processing of analog data using hybrid computers. Prerequisite: graduate standing; differential equations.

ENGINEERING PHYSICS

The curriculum in Engineering Physics provides basic and advanced knowledge in physics and applied mathematics and the techniques for applying this knowledge to engineering problems. It seeks to prepare students for the continually widening engineering challenges that have deepening roots in fundamental knowledge produced by physical research.

The student is encouraged to develop insight into the application of concepts by taking a selected core of engineering science sequences. By selecting engineering electives in analysis, synthesis, and design, he opens for himself the way to several technological areas, such as recent advances in gas- and aerodynamics, magneto hydrodynamics and plasmas, masers and lasers, radar and radio-astronomy, earth and space sciences, nuclear science and engineering, material science and engineering, and in modern topics in solid state physics systems development.

The program provides a sound foundation for graduate study in all areas of physical and engineering research based on physics and applied mathematics, so that students who complete the curriculum with a B average or better should encounter no difficulties in pursuing graduate work toward an advanced degree in their field of interest in any of the major universities of this country. It has also proved to be an excellent foundation for employment in the newer technological industries that transcend the boundaries of the established engineering profession.

The graduation requirements in engineering physics are in addition to the institutional requirements:

42 hours of approved courses in physics
33 hours of approved courses in mathematics
18 hours of approved courses in chemistry
21 to 24 hours of approved courses in engineering orientation, or engineering science
21 to 24 hours of approved courses in engineering analysis, synthesis, or design
27 hours of approved courses in humanities or social science

GENERAL ENGINEERING

A freshman engineering curriculum applicable to most areas of engineering is offered by the Department of General Engineering to serve those students interested in obtaining a Bachelor of Science degree in General Engineering as well as those who have not yet chosen an engineering major.

The curriculum for a Bachelor of Science degree in General Engineering is designed to prepare young men and women for professional positions in engineering industry and to provide a firm background study in appropriate areas. This four-year degree program affords the participant a more diversified background than can be provided in the more specialized fields of engineering. It recognizes differences in student goals and provides a maximum of choices, subject to professional guidance, in arriving at a high-quality engineering degree.

The General Engineering degree program is based on an adequate background in mathematics, chemistry, and physics; a broad exposure to the humanities and social sciences; a thorough coverage of the engineering sciences and conceptual design; and a chosen engineering or non-engineering option. The option may be selected to provide a suitable background for graduate work in or associated with engineering. Suitable curriculum options place emphasis on management engineering, ocean engineering, architectural engineering, food science engineering, biological engineering, water resources engineering, urban planning engineering, human engineering, naval and marine engineering, engineering science, engineering meteorology, and others. With this arrangement the graduating student will offer his potential employer a second area of knowledge to supplement his engineering training, and he greatly expands his possibility for graduate school work.

The Department offers service courses for students in other fields such as forestry, business and technology, industrial education, and engineering technology.

Lower Division Courses

GE 101,102,103. **Engineering Orientation.** 2 hours each term. 1 ① 1 ②
Departmental engineering orientation.

GE 104. **Engineering Fundamentals.**
4 hours spring. 2 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 115,116,117. **Graphics.**
3 hours each term. 3 ②
Fundamental principles of the language.

GE 201,202,203. **Electrical Fundamentals.**
3 hours each term. 2 ① 1 ②
Vector, electric, and magnetic fields and response of electric circuits to generalized forcing functions of time. Corequisite: Mth 112.

GE 211,212,213. **Mechanics of Solids.**
3 hours each term. 2 ① 1 ②
Principles of mechanics: particles, systems of discrete particles, rigid bodies, and deformable bodies. Prerequisite: Ph 212 or 202; Mth 112.

GE 215. **Graphics.**
3 hours. 3 ②
Fundamental principles of graphic representation; their application to engineering design and processes.

Upper Division Courses

GE 301,302. **Mechanics of Fluids.**
3 hours each term. 2 ① 1 ②
Incompressible and compressible fluids; effects of fluid properties upon pressure distribution and flow patterns; similitude relationships. Prerequisite: Mth 321; GE 212.

GE 309. **Applied Mechanisms.**
3 hours spring. 2 ① 1 ②
Theory, application, and selection as applied to product design and production tooling.

GE 311,312,313. **Thermodynamics.**
3 hours each term. 2 ① 1 ②
Laws of thermodynamics, closed, and open (control volume) systems; thermodynamics properties; thermodynamic cycles, phase and chemical equilibria, and gas dynamics. Prerequisite: Mth 211; Ph 213 or 203; Ch 203.

GE 321,322,323. **Nature and Behavior of Materials.**
3 hours each term. 2 ① 1 ②
Solid state; materials response to external influences; physical and mechanical properties; control of properties. Prerequisite: junior standing in Engineering.

GE 331,332,333. **Transfer and Rate Processes.**
3 hours each term. 3 ①
Concepts, principles, and definitions involved; conductive and convective mechanisms; microscopic and macroscopic mass and energy balances; prediction of transport properties. Prerequisite: Mth 321; GE 212.

GE 407. **Seminar.**
Terms and hours to be arranged.
Material pertinent to senior student area of concentration.

GE 411,412,413. **Analysis and Design.**
3 hours each term. 1 ① 2 ②
Problems having no unique solutions. Student initiative and ingenuity in problem analysis and synthesis in more than one area. Prerequisite: senior standing in engineering.

INDUSTRIAL ENGINEERING

The Industrial Engineering Curriculum provides training for engineering, production, and technological-administrative departments of industry. Industrial Engineering, the youngest branch of the engineering profession, is represented on the Joint Engineering Council by the American Institute of Industrial Engineers, which body suggests that:

> Industrial Engineering is concerned with the design, improvement, and installation of integrated systems of men, materials, and equipment; drawing upon specialized knowledge and skill in the mathematical, physical, and social sciences together with the principles and methods of engineering analysis and design, to specify, predict, and evaluate the results to be obtained from such systems.

The curriculum at Oregon State University 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. The goal of the professional industrial engineer is to produce a superior product or service 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 271,272,273. **Mathematical Models.**
3 hours each term. 3 ①
Engineering and management systems analysis, design, and decision making. Includes linear models, programing models, competitive models, and stochastic models. Prerequisite: Mth 112.

Upper Division Courses
Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

IE 311,312. **Electronic Data Processing Systems.**
3 hours each term. 2 ① 1 ②
Computer hardware, software, and management. Application to ill-structured engineering and management problems, Monte Carlo simulation, sequencing problems, and forecasting techniques.

IE 361. **Methods and Motion Study.**
3 hours. 1 ① 2 ②
Theory and application; types of methods studies; operation and analysis sheets; principles of motion practice; micromotion studies; standardization and process charts. Prerequisite: junior standing.

IE 362. **Time Study**
3 hours. 1 ① 2 ②
Theory and application; job analysis and standardization; standard data and formula applications; time standards; wage payment systems and merit rating. Prerequisite: junior standing.

IE 363. **Production Planning and Control.**
3 hours. 2 ① 1 ②
Departmental organization and types of techniques; codification and symbolization; forecasting, materials control, routing, scheduling, dispatching, and inspecting. Prerequisite: junior standing.

IE 365. **Materials Handling.**
3 hours. 2 ① 1 ②
Selection of equipment, its application, coordination; effect on plant layout in industrial situations. Prerequisite: junior standing.

IE 371,372,373. **Systems Analysis.**
3 hours each term. 1 ① 2 ②; 1 ① 2 ②; 2 ① 1 ②
Appraisal and improvement of work systems for existing, modified, and newly designed operations; motion-economy principles, work count, schematic and mathematical models, cost-analysis charts, quality control, paperwork controls, production and project planning techniques. Prerequisite: IE 273.

IE 381. **Engineering Economy.**
3 hours. 3 ①
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: junior standing.

IE 390. **Safety in Industry.**
3 hours. 3 ①
History; legislation, organization, services, and training; accident costs and causes; safe practice, safety and health standards, and records. Prerequisite: junior standing.

IE 405. **Reading and Conference.**
Terms and hours to be arranged.
Prerequisite: senior standing.

IE 406. **Projects.**
Terms and hours to be arranged.
Prerequisite: junior standing.

IE 407. **Seminar.**
Terms and hours to be arranged.
Prerequisite: senior standing.

IE 441. **Environmental Design.** (G)
3 hours. 3 ①
Design factors for optimum man-machine operations; design features for improving man's data sensing and data transmission capabilities. Prerequisite: senior standing.

IE 451. **Industrial Supervision Principles.** (G)
3 hours. 3 ①
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: senior standing. Restricted to engineering students.

IE 455. **Critical Path and Related Scheduling Methods.**
2 hours. 1 ②
Construction of arrow networks and time charts; time/cost tradeoffs; resource leveling; line-of-balance technique; customized application to project planning and control.

IE 471,472. **Management Models.** (G)
3 hours each term. 3 ①
Analytical techniques for solution of management problems; schematic, statistical, and mathematical models; application to industrial decisions. Prerequisite: IE 273, 373.

IE 491. **Quality and Reliability Control.** (G)
4 hours. 4 ①
Control of quality through the use of statistical analysis; typical control techniques and underlying theory. Development of reliability models and procedures for product assurance. Prerequisite: IE 272.

IE 492. **Material Handling and Controls.**
3 hours. 3 ①
Selection of equipment, packaging, and plant layout; control considerations for automated processes. Prerequisite: IE 373.

IE 497,498,499. **Industrial Engineering Analysis and Design.**
3 hours each term. 3 ①
Selection, replacement, and training of people; product design; selection and replacement of major tools, processes, and equipment; paperwork controls; subsystem revision; system or plant revision; long-run policies and strategy. Prerequisite: senior standing.

Graduate Courses
See also courses marked (*g*) and (*G*) above

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 521,522,523. **Selected Topics in System Studies.**
3 hours each term. 3 ①
Recent advances in industrial engineering pertaining to the theory and application of system studies. Analysis and design of ocean resource evaluation, detection extraction, processing, and marketing systems; advanced design of production systems with reference to social, economic, and regional planning; human engineering studies of man-machine systems; applications of information theory to operations research and management science. Non-sequence course. Not all topics offered each year.

IE 561. **Operation Analysis.**
3 hours. 3 ①
Current techniques; application of work-study techniques to advanced problems.

IE 562. **Timing Techniques.**
3 hours. 3 ①
Modern time-study methods; allowances, skill levels, and other advanced problems.

IE 563. **Plant Layout.**
3 hours. 3 ①
Selection of site; plant layout; planning building for economic production.

IE 571,572,573. **Systems Theory and Cybernetics.**
3 hours each term. 3 ①
Systems theory and cybernetics as foundation for engineering analysis and synthesis of complex systems; applications to systems involving industrial and human engineering problems; model-building for systems analysis, conversion of descriptive models into normative models, model simulation and optimization techniques, and realization and control of designed systems.

MECHANICAL AND NUCLEAR 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. Opportunity is provided for specialization in applied mechanics, heating and air conditioning, power, nuclear engineering, automotive engineering, aeronautical engineering, or design.

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 Graf Hall, Rogers Hall, 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, 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 shaking table, are available for instruction and advanced studies in applied mechanics. An analog computer is available for instructional purposes. Analog computer equipment is contained within the department; a 1620 computer and an E.A.I. hybrid computer are available for instructional purposes and a CDC 3300 computer is available on a time-sharing basis.

The Nuclear Engineering Curriculum is designed to provide personnel for nuclear power plant operation, design of nuclear facilities, and research and development programs dealing with nuclear energy. Particular attention is directed toward application of scientific principle to both design and operation of nuclear installations. In addition, emphasis is provided in nuclear instrumentation, systems of control, materials of construction, economy of operation; and, particularly, safety and regulation in nuclear operations.

Excellent facilities are available for the instructional program at the Radiation Center, including TRIGA III, and AGN 201 nuclear reactors. Instruction is integrated with an extensive research program, with opportunity to participate at both the undergraduate and graduate levels.

Courses in Mechanical Engineering

Lower Division Courses

ME 101,102. **Mechanical Engineering Orientation.**
3 hours each term. 2 ① 1 ②
Departmental engineering orientation.

ME 271. **Numerical Methods in Mechanical Engineering.**
3 hours. 2 ① 1 ②
Numerical analysis applied to mechanical engineering problem areas: Function evaluation, roots of equations, interpolation techniques, integral evaluation, simultaneous linear algebraic equations, ordinary and partial differential equations. Emphasis on methods suitable for digital computers; computer programing adaptable to OSU time-sharing system included in each area. Prerequisite: GE 213; Mth 321.

ME 291. **Introduction to Aerospace Engineering.**
3 hours. 3 ①
Principles of aerodynamics; performance, propulsion, and control. Prerequisite: GE 212.

Upper Division Courses
Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

ME 301,302,303. **Engineering Mechanics.** 3 hours each term. 2 ① 1 ②
ME 301: Particle dynamics; vibration of single degree of freedom systems; dynamics of rigid bodies. *ME 302:* Determination of stresses, deflections, and stability of deformable bodies. *ME 303:* Fluids; stress and pressure distributions; flow analyses; fluids and fluid flows. Prerequisite: GE 213 for ME 301 and ME 303; GE 212 for ME 302.

ME 337. **Heat Engines.**
3 hours. 2 ① 1 ②
Construction, operation, and performance of internal combustion engines with emphasis on Diesel types; fuels and lubrication; fluid torque converters; tractive resistance. Service course for Forest Engineering students only.

ME 351. **Mechanical Laboratory.**
3 hours. 1 ① 2 ②
Selection, calibration, and application of instruments for testing machines and processes. Analysis of test results and preparation of engineering reports. Prerequisite: GE 312, 332.

ME 371. **Engineering Analysis.**
3 hours. 2 ① 1 ②
Use of previous course work in making judicious analyses leading to synthesis and design. Prerequisite: Mth 321; GE 203,213.

ME 381. **Preliminary Design Problems.** 1 hour. 1 ③
Widely varied projects emphasizing the determination and organization of design project requirements and criteria and their use in generating preliminary designs. Student is assigned one project at beginning of each three-hour period and submits proposed preliminary design at end of period. Prerequisite: junior standing.

ME 382. **Introduction to Design.**
3 hours. 2 ① 1 ②
Lectures on and direct involvement in mechanical design with emphasis on the importance of physical science fundamentals, flexibility of approach, and economic feasibility. Prerequisite: ME 301; GE 203; Mth 211; PT 262; GE 215.

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 410. **Machine Design.**
3 hours. 1 ① 2 ②
Practical aspects of industrial design. Introduces design process and phases, factors influencing design, and procedures for production design. Prerequisite: GE 213.

ME 411,412,413. **Mechanical Analysis and Design.** (g)
3 hours each term. 1 ① 2 ②
Systems involving mechanical, thermal, hydraulic, and electrical principles. Prerequisite: ME 301,302,371; Mth 321.

ME 416. **Applied Mechanics** (G)
3 hours. 3 ①
Load-deformation relationships in elastic structures. Energy theorems and applications to modern structural problems. Prerequisite: ME 301,302.

ME 417,418. **Statics of Deformable Structures.** (G)
3 hours each term. 3 ①
Combined stresses; analysis of composite structures; stresses beyond elastic range; instability problems. Prerequisite: ME 416.

ME 419,420. **Vibrations.** (g)
3 hours each term. 2 ① 1 ②; 2 ① 1 ③
Dynamics applied to vibrating systems; mechanical systems with one and several degrees of freedom; continuous systems; shaft "whirl," vibration isolation, and absorption; machine balancing. Prerequisite: ME 302; Mth 321 or ME 371.

ME 421,422. **Heating and Air Conditioning.** (g)
3 hours each term. 2 ① 1 ②
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, stream, hot water, and refrigeration systems; testing of air conditioning equipment and controls. Prerequisite: GE 313.

ME 423. **Refrigeration.** (g)
3 hours. 2 ① 1 ②
Thermodynamics; systems in use and principal characteristics of each; fundamentals of design; principal applications. Prerequisite: GE 313.

ME 424. **Heat Transfer.**
3 hours. 3 ①
Conduction problems, convection and comparison with nondimensional correlations of experimentally determined results, radiant exchange, heat exchanger design and analysis. Prerequisite: GE 332.

ME 425. **Fuels and Lubricants.** (g)
3 hours. 2 ① 1 ③
Heating value and calorimetry; solid, liquid, and gaseous fuels; rocket and nuclear fuels; theory and properties; laboratory tests and specifications.

ME 431,432. **Power Plant Engineering.** (g)
3 hours each term. 2 ① 1 ②
Fuels and combustion equipment, steam generators and auxiliaries, and power generation equipment including combustion engines, gas turbines, hydroelectric and nuclear power plants. Economics of design and operation. Prerequisite: GE 313.

ME 434. **Gas Turbines and Jet Engines.** (g)
3 hours. 2 ① 1 ③
Power generation, process industries, and aircraft; various cycles and component equipment including compressors, combustion chambers, gas turbines, heat exchangers; jets and ducts; gases, fuels, and high-temperature materials. Prerequisite: GE 313.

ME 437. **Mechanical Laboratory.** (g)
3 hours. 1 ① 2 ③
Testing basic types of equipment, including test procedures, test data, heat balances, and engineering reports. Prerequisite: GE 313; ME 351.

ME 441. **Rocket and Space Propulsion.**
3 hours. 2 ① 1 ②
Analysis of chemical, nuclear plasma and ion propulsion systems and components. Prerequisite: GE 313.

ME 451,452. **Aerospace Analysis and Design.**
3 hours each term. 1 ① 2 ②
Analysis and design of aerospace systems, vehicles, and components. Prerequisite: ME 441,454,457.

ME 454,455,456. **Aerodynamics.** (g)
3 hours each term. 2 ① 1 ②
Theories of flow of perfect, compressible, and viscous fluids; application of these theories to aerodynamic design. Prerequisite: GE 331.

ME 457. **Aircraft Performance.** (g)
3 hours. 2 ① 1 ②
Performance and flight environment of aircraft and space vehicles. Prerequisite: GE 213,311.

ME 458. **Aircraft Stability and Control.** (g)
3 hours. 2 ① 1 ②
Complete development of the theory of static aircraft stability and control and an introduction to dynamic stability and response to controls. Prerequisite: ME 457.

ME 460. **Mechanical Engineering Economy.** (g)
3 hours. 3 ①
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. 3 ①
Problems solved by use of advanced mathematical methods. Prerequisite: ME 371.

ME 474. **Analog Computers.** (g)
3 hours. 2 ① 1 ④
Electronic operational analog equipment used in the solution of mathematical equations common to engineering; network analyzers, digital computers, and membrane and conducting sheet analogies. Prerequisite: Mth 321;Ph 213.

ME 476. **Industrial Instrumentation.** (G)
3 hours. 2 ① 1 ③
Process instrumentation and system analysis in automatic process control; applications to the analysis and design of pneumatic, hydraulic, electric, and electronic control devices. Prerequisite: ME 371 or Mth 321.

ME 477. **Acoustical Measurement and Control.** (G)
3 hours. 2 ① 1 ②
Sound generation and propagation; measurements and analysis; acoustical characteristics of materials and configurations; design to reduce noise levels. Laboratory use of sound and vibration measuring equipment to obtain information for analysis of problem situations. Prerequisite: Ph 212.

ME 480,481,482. **Dynamics of Physical Systems.**
3 hours each term. 2 ① 1 ③
Analysis and synthesis of dynamic systems containing mechanical, electrical, thermal components. Modeling, mathematical analysis, and computer and laboratory simulation. Prerequisite: GE 203,332,312; ME 302.

ME 491,492,493. **Automotive Engineering.** (g)
3 hours each term. 2 ① 1 ③
Fuel-air cycle analysis of piston-type internal-combustion engines; combustion studies; correlation of design with performance; power plant testing; engineering analysis of automobile chassis components; road testing; tractive resistance; fleet operating cost analysis; preventive maintenance and economics. Prerequisite: GE 313,332.

Graduate Courses

See also courses marked (g) and (G) above

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 514,515. **Mechanical Design.**
3 hours each term. 3 ①
Systematic approach, from first suggestion of the need through preliminary steps leading to initial design; the design itself; cursory treatment of the development, redesign, testing, manufacturing, and servicing aspects.

ME 522. **Air Conditioning Design.**
3 hours. 3 ①
Commercial air conditioning systems including cost estimation, writing of specifications, and selection of controls; economics of fuels, equipment selection, and specialized systems; air purification and odor control and relation to public health.

ME 525,526. **Thermodynamics.**
3 hours each term. 3 ①
Concepts and postulates of thermodynamics and their consequences as applied to a wide variety of situations. Thermodynamic modeling of real situations.

ME 527,528. **Heat Transfer.**
3 hours each term. 3 ①
Conduction, radiation, and convection heat transfer; analytical, analogical, numerical, and computer solutions to both steady state and transient problems.

ME 529. **Selected Topics in Heat Transfer.**
3 hours. 3 ①
Conduction heat transfer; radiation heat transfer; convection heat transfer; boiling and condensation. Not all topics covered each year. Considerable use will be made of the current literature. Prerequisite: ME 528.

ME 530. **Heat Transfer Laboratory.**
3 hours. 1 ③
Problems in heat transmission; heat transfer systems. Prerequisite: ME 527.

ME 531. **Selected Topics in Thermodynamics.**
3 hours. 3 ①
Topics in thermodynamics selected from the following or related material: Application of thermodynamic concepts and postulates; thermodynamics of irreversible processes; coupling of thermodynamics with statistical mechanical property calculation methods; phenomenological statistical thermodynamics. Prerequisite: ME 525,526.

ME 532. Fuel Technology.
3 hours. 2 ① 1 ③
Production, manufacture, distribution, and application of fuels, including natural gas; liquefied petroleum gas; gasoline; jet; diesel; heavy burner fuels; and high energy rocket-engine fuels. Laboratory test methods for manufacturing control and prediction of performance.

ME 534. Gas Turbine Design.
3 hours. 2 ① 1 ③
Fields of application; design of compressors, combustion chambers, turbines, heat exchangers, ducts, and nozzles; design of gas turbine unit for a specific application, including auxiliary equipment; components tested in laboratory.

ME 545. Flight Mechanics.
3 hours. 3 ①
Equations of motion for flight over a flat earth; summary of aerodynamics and propulsion and their application to the performance of aircraft, rockets, and re-entry vehicles.

ME 546,547,548. Aerodynamics.
3 hours each term. 3 ①
Flow of perfect, viscous, and compressible fluids; wings of finite and infinite spans.

ME 549. Aircraft Stability and Control.
3 hours. 3 ①
Static stability and control; the general equations of unsteady motion and stability derivative terminology; dynamic, and automatic stability and control.

ME 550. Continuum Mechanics.
3 hours. 3 ①
Kinematics and governing field laws for continua. Applications to fluid dynamics, elastic and inelastic solids, and electromagnetic continua.

ME 551,552. Elasticity.
3 hours each term. 3 ①
Basic equations of linear elasticity with emphasis on physical interpretation; exact and approximate solutions with applications to engineering problems. Prerequisite: ME 550; concurrent registration in Mth 416 recommended.

ME 554. Plasticity.
3 hours. 3 ①
Stress-strain relations; perfectly plastic materials; strain hardening materials. Metal forming processes. Prerequisite: ME 550.

ME 555. Viscoelasticity
3 hours. 3 ①
Characteristics of various viscoelastic materials. Spring damper models, hereditary integrals. Simple stress problems. Extension to two and three dimensions, general deformation laws. Vibration. Impact. Buckling. Prerequisite: ME 550.

ME 557. 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 nonviscous fluids; Eulerian equation, potential motion, two-dimensional potential motion, vortex motion, energy and momentum theorems. Prerequisite: ME 550.

ME 558. Gas Dynamics.
3 hours. 3 ①
Dynamics and thermodynamics applied to the flow of gases; treatment of one- and two-dimensional reacting and nonreacting gas flows.

ME 560. Experimental Mechanics.
3 hours. 2 ① 1 ③
Stress analysis by strain measurement—mechanical, optical, and electrical strain gages; brittle coating techniques; strain gage instrumentation; piezoelectric, capacitive, and inductive transducers; stress analysis by x-ray diffraction.

ME 561,562. Optical Stress Analysis.
3 hours each term. 2 ① 1 ③
Photoelasticity; photoelastic coating technique; photoplasticity; three-dimensional photoelasticity; interferometric methods; Moiré techniques; grid methods.

ME 566,567,568. Advanced Dynamics.
3 hours each term. 3 ①
Fall: Dynamics of particles, rigid bodies, and systems. Generalized coordinates, Hamilton's principle, Lagrange's equations; applications to planetary motions; variational principles applied to performance optimization. *Winter:* Vibrations of discreet and continuous systems. Transfer functions, normal coordinates; response to impulsive loading; wave propagation. *Spring:* Motions of non-linear systems. Free, forced, and self-excited oscillations in mechanical and electrical systems with nonlinear characteristics; stability of dynamic systems.

ME 573. Numerical Methods for Engineering Analysis.
3 hours. 3 ①
Numerical solution of equations, matrix algebra, difference equations, interpolation, numerical integration, roots of equations, and Monte Carlo Methods. Emphasis on methods suitable for digital computers.

ME 574. Operational Analog Computer.
3 hours. 1 ① 2 ③
Solution of problems not readily solved by analytical methods. Emphasis on solution accuracy.

ME 578,579. Principles and Applications of Naval Architecture.
3 hours each term. 3 ①
Stability determination and considerations; oscillations-rolling, pitching, and heaving; resistance and propulsions; directional stability and steering; propeller design; model testing; strength requirements.

ME 590. Fundamentals of Air Sanitation.
3 hours. 2 ① 1 ③
The air pollution problem and factors affecting it; properties, sampling, and analysis of atmospheric pollutants.

ME 591,592. Measurement and Control of Air Pollutants.
3 hours each term. 2 ① 1 ③
Atmospheric chemistry; pollutants and control measures; winds, thermal effects, and atmospheric cleaning.

ME 593. Selected Topics in Air Sanitation. 3 hours each term. 3 ①
Aerosol technology; electrostatic cleaning processes; air quality studies; statistical analysis of atmospheric data. Not all topics covered each term.

ME 595. Industrial Hygiene.
3 hours winter. 2 ① 1 ③
Man and his health as a function of his work environment; evaluation and control of environmental hazards.

Courses in Nuclear Engineering

Lower Division Course

NE 211. Introduction to Nuclear Engineering.
3 hours. 3 ①
An introduction to the entire field of nuclear engineering: reactor concepts and types; reactor operation and analysis; radiation shielding; reactor materials and their properties; heat removal and power generation; radioisotope applications.

Upper Division Courses

Courses numbered 400-499 and designated (g) or (*G*) may be taken for graduate credit.

NE 311,312. Nuclear Instrumentation.
2 hours fall and winter. 1 ① 1 ③
The circuitry, design, performance, and application of all types of nuclear instrumentation. Theory explained in lecture and instruments analyzed in laboratory. Prerequisite: NE 211; GE 203.

NE 321. Nuclear Reactor Thermohydraulics.
3 hours. 3 ①
Heat transfer and fluid flow analysis of nuclear reactor cores. Heat transfer rate equations, power distribution, critical heat fluxes, single and two-phase flow, boiling heat transfer, and hydraulic instabilities. Prerequisite: GE 332.

NE 411,412,413. Nuclear Reactor Analysis. (g)
3 hours each term. 2 ① 1 ③
Steady state and transient reactor operation; reactor theory, shielding, heat transfer, and fluid flow problems.

NE 421,422,423. Computational Methods in Nuclear Engineering.
3 hours each term. 3 ①
The use of digital computers in solving problems in nuclear engineering. Subjects include computer systems, the FORTRAN language, numerical methods, nuclear reactor codes and on-line computers. Prerequisite: Mth 322.

NE 451. Nuclear Safety.
3 hours. 3 ①
Biological effects of radiation; radiation dosimetry; radioisotope handling; radioactive effluent control; pertinent AEC and state regulations regarding control of radioactive materials; criticality calculations. Prerequisite: NE 312.

NE 461. Nuclear Power Generation.
3 hours. 3 ①
Nuclear power systems and preliminary design considerations. Operating characteristics of boiling water, pressurized water, gas-cooled, and fast reactors. Power distribution systems and on-line power plant operations. Prerequisite: NE 321.

NE 471. Reactor Management and Economics.
3 hours. 3 ①
Problems unique to reactor management and economics; reactor personnel, records, public relations, safety, inspection program, radiation control, power generation costs, fuel costs, fuel cycling. Prerequisite: NE 451, 461.

NE 481. Nuclear Materials. (g)
3 hours. 3 ①
Role in a reactor; fuel, moderator, reflector, shielding, coolant, control, and structural; nuclear properties; radiation effects on metallic materials; metallurgy of uranium, thorium, and plutonium. Prerequisite: NE 211; Ph 313.

Graduate Courses
See also courses marked (g) and (G) above.

NE 501. **Research.**
Terms and hours to be arranged.

NE 503. **Thesis.**
Terms and hours to be arranged.

NE 505. **Reading and conference.**
Terms and hours to be arranged.

NE 507. **Seminar.**
Terms and hours to be arranged.

NE 511,512,513. **Advanced Nuclear Reactor Analysis.**
3 hours each term. 3 ①
Mathematical study of behavior based upon certain approximate physical models; steady state homogeneous and heterogeneous reactors, reactor kinetics, and control rod theory.

NE 531,532. **Nuclear Reactor Kinetics.**
3 hours each term. 3 ①
Time behavior of nuclear reactors; development of kinetics equations; application of these equations to different reactor types; reactor stability and control theory.

NE 541,542,543. **Nuclear Reactor Experiments.**
3 hours each term. 1 ① 1 ④
The steady state and transient behavior of TRIGA reactors and their use in reactor physics experiments; operation characteristics of the TRIGA, measurement of reactor parameters, and nuclear physics experiments.

NE 551. **Nuclear Reactor Shielding.**
3 hours. 3 ①
Fundamentals: sources, attenuation, interaction, and penetration of gamma rays and neutrons; shield design for core and cooling systems; geometrical effects and irregularities in shields.

NE 552,553. **Computational Methods for Nuclear Reactors.**
3 hours each term. 3 ①
The application of digital computers to problems in nuclear engineering. Numerical solution of nuclear reactor equations. Topics include multi-group diffusion theory, kinetic equations, Monte Carlo methods, S_n, P_1 methods; criteria for selecting methods, and computer programing.

NE 555. **Controlled Thermonuclear Reactions.**
3 hours. 3 ①
Theory of thermonuclear reactions and reactors; criteria for a sustained thermonuclear reaction; present experimental reactor designs.

METALLURGICAL ENGINEERING

Materials and energy are the two basic ingredients of engineering design, and the major objectives of design are maximum performance at minimum cost. Both the upper limits of performance and the lower limits of cost are determined by the materials available to the designer, and by his skill in using them.

We live in an age of tremendous growth in science and technology involving atomic power, space travel, world-wide and interplanetary communication, and computerization and automation. In all of these, and in such human-need fields as desalinization of sea water, economical housing and transportation, and artificial substitutes for damaged portions of the human body, progress is limited by the materials that are available. There is an enormous world-wide effort on the part of private organizations and governments to break the "materials barrier," and the continuing demands for higher performance, less expensive, more reliable, and more available materials indicate that the pace of change in the materials field will continue to accelerate. Therefore, an engineering career in the materials field has an exciting potential.

Undergraduate metallurgical engineering preparation at Oregon State is as fundamental and as broad as a four-year curriculum will permit.

After obtaining his bachelor's degree, the metallurgical engineer may choose either employment or graduate training in a wide variety of activities including planning and supervision of the production of materials; planning and supervision of the fabrication of materials into finished products; selection of materials and investigation of failures, either as a staff member of an engineering department or as an engineering consultant; applied research directed toward the development of better materials, better manufacturing processes, or better design procedures; and fundamental research on the structure and behavior of materials.

Lower Division Course

MetE 201. **Introduction to Metallurgical Engineering.**
3 hours. 3 ①
Sources of metals, chemical principles of metallurgical processes: pyrometallurgy, hydrometallurgy, electrometallurgy, structure of solids, alloys, physical properties of metals and alloys, methods for altering physical properties of metals and alloys.

Upper Division Courses

Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

MetE 401. **Research.**
Terms and hours to be arranged.

MetE 403. **Thesis.**
Terms and hours to be arranged.

MetE 405. **Reading and Conference.**
Terms and hours to be arranged.

MetE 406. **Projects**
Terms and hours to be arranged.

MetE 407. **Seminar.**
1 hour.

MetE 411,412,413. **Metals and Ceramics Applications Engineering.** (G)
3 hours each term. 3 ①
Recent developments and applications in engineering materials; materials selection, specifications, and design implications. *MetE 411:* Ferrous metals and alloys. *MetE 412:* Nonferrous metals and alloys. *MetE 413:* Nonmetallic materials. Prerequisite: GE 323.

MetE 421,422. **Transformation, Structure, and Properties of Alloys.** (G)
3 hours each term. 3 ①
Internal structure, constitution, heat treatment, physical and mechanical properties of ferrous and nonferrous metals and alloys. Prerequisite: GE 323.

MetE 423,424. **Metallography.** (G)
1 hour each term. 1 ③
Metallographic specimens; metallurgical microscope; photomicrography. Prerequisite: GE 323.

MetE 425. **Metallurgical Equipment and Measurements.**
3 hours. 2 ① 1 ③
Instrumentation and equipment used in the processing of refined metals, including: melting, casting, heat treating, and mechanical forming; laboratory equipment and techniques used in the study of metals. Prerequisite: GE 323.

MetE 431. **Unit Operations in Metallurgical Engineering.** (g)
3 hours. 2 ① 1 ②
Physical separation of metallic minerals from their ores. Crushing, grinding, heavy fluid separation, froth flotation, magnetic separation. Prerequisite: senior standing in engineering.

MetE 432. **Unit Processes in Metallurgical Engineering.** (g)
3 hours. 2 ① 1 ②
Applications of chemical and thermodynamic principles to the unit processes of extractive metallurgy. Heat, material and energy balances, slag chemistry, hydrometallurgy, electro-metallurgy, ingots, plastic deformation processes. Prerequisite: GE 313; Ch 441.

MetE 433. **Process Metallurgy.** (g)
3 hours. 2 ① 1 ②
Integration of unit operations and unit processes in the design of metallurgical plants. Raw material and energy supplies; transportation, storage, and handling of raw materials and products; waste disposal; instrumentation and control. Prerequisite: MetE 431,432.

MetE 480. **Metallurgy.**
3 hours. 2 ① 1 ②
Metallurgy and properties of ferrous products and nonferrous alloys: metallographic and other inspection techniques; heat treatment and machining and forming operations. Service course for production technology students onyl Prerequisite: Junior standing.

Graduate Courses
See also courses marked (g) and (G) above.

MetE 501. **Research.**
Terms and hours to be arranged.

MetE 503. **Thesis.**
Terms and hours to be arranged.

MetE 505. **Reading and Conference.**
Terms and hours to be arranged.

MetE 506. **Projects.**
Terms and hours to be arranged.

MetE 507. **Seminar.**
Terms and hours to be arranged.

MetE 511,512. 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 diffraction; effects of plastic deformation on diffraction patterns; radiographic inspection of metal castings and welds.

MetE 521. Theoretical Structural Metallurgy.
3 hours. 3 ①
Structure of the atom; structure of metal crystals; electron theory of metals; rate processes; kinetics of phase changes; shear processes.

MetE 531. Mechanical Metallurgy.
3 hours. 3 ①
Response of metals to applied forces; elements of elasticity, plasticity, advanced strength of materials, crystal deformation and dislocations; applications to testing and plastic working of metals.

MetE 545,546,547. Selected Topics in Materials Science.
3 hours each term. 3 ①
Theory of alloy phases, solid state reactions, liquid metals and solidification, strengthening mechanisms in solids, mechanisms of flow and fracture in metals, point and line defects, physical properties of metals. Not all topics covered each year. Prerequisite: GE 323 or equivalent.

MetE 552. Metallurgical Crystallography.
3 hours. 3 ①
Symmetry operations and repetition theory, algebra of operations, point groups and crystal classes, space groups, use of the International Tables for X-ray crystallography. Prerequisite: GE 322.

MetE 555. Electron Microscopy in Material Science.
3 hours. 2 ① 1 ③
Principles, methods, and applications of electron microscopy and electron diffraction to solids. Consent of instructor required.

Courses in Technology

Various departments of the School of Engineering offer *technology* as well as *professional* curricula. The technology courses of study are designed to provide support personnel for professional engineering activity. Each curriculum consists of a combination of technology, business, and general education courses. In each field, a student's adviser assists in planning a program that will be suited to the student's capabilities and objectives.

Technicians and technologists, who emphasize the art of engineering rather than the theory, are in great demand to support the professional engineer in many positions and to serve as important members of industrial teams. The technology curricula are oriented toward specialized areas but are less rigorous than professional curricula. They are "terminal," in that they lead to a B.S. degree but they do not prepare for the advanced study necessary in strictly professional practice. The "terminal" designation does not infer lack of opportunity or restriction, but students who contemplate any of the technologies should confer with an adviser prior to enrollment to make sure that the opportunities and limitations of technical preparation are thoroughly understood.

The Manufacturing Engineering Technology Department offers a four-year curriculum which prepares for responsible positions in the control, planning, and supervision of the manufacture of consumer products. Areas of special study include: metal industries, welding and fabrication, casting of metals, tool design and metal machining; wood industries with emphasis on wood products and furniture manufacturing. The program is designed to meet the demands in industry for individual enterprise and to include scientific management and business courses. Standard and specialized equipment in the laboratories permits the student to participate in manufacturing operations.

The Civil Engineering Department offers a four-year, terminal curriculum in Civil Engineering Technology. It is based on mathematics and physical sciences but not to the depth required in the professional curriculum in civil engineering. It includes drafting, surveying, construction field methods, materials of construction, and design. It provides opportunity to specialize in water supply, waste water control, photogrammetry, materials of construction, or construction methods. Through cooperation with the Associated General Contractors, students specializing in the construction option have an opportunity for practical field experience in summer months.

The Electrical and Electronics Engineering Department offers a curriculum in Electric Power Technology, primarily to prepare for employment with public and private utility operations. The generation, transmission, and use of electric power requires the services of people who understand the functioning of electrical equipment, who understand the economics of electric power production, generation, and distribution, who are aware of the administration problems of utilities, and who can supervise the personnel of a large power distribution complex. Specialized instruction in this curriculum includes circuits and components, instruments, protective equipment, codes, regulations and economy, power generation, power transmission and distribution, and use of electrical energy.

The Mechanical Technology curriculum in the Department of Mechanical and Nuclear Engineering focuses upon heating and air conditioning, refrigeration, power plant and power conversion, metallurgy and materials, internal combustion engines, mechanical design, and instrumentation and control systems. Instruction stresses application in laboratory courses. Students should confer with an adviser to determine an appropriate area of specialization within the technology.

Nuclear Technology provides preparation to enter the rapidly expanding field of nuclear power generation. Emphasis is upon safety, regulations, operational requirements, instrumentation, and control. Operational experience is available on a sub-critical pile, an AGN 201 reactor, and a TRIGA III reactor, all located at the Radiation Center where all instruction dealing with high level radiation is conducted. Since the state of the art in the nuclear industry changes rapidly, close liaison is maintained with industry in all aspects of nuclear development. Nuclear Technology bears the same relationship to Nuclear Engineering as do the other technologies to their corresponding professional fields.

Students who wish to receive particular information in regard to any of the technology curricula should direct inquiries to the departments concerned.

Civil Engineering Technology

Lower Division Courses

CET 111,112,113. Technical Problems.
2 hours each term. 1 ① 1 ②
Elementary technical problems related to civil engineering field, methods of work, use of slide rule, graphical representation.

CET 121. Drawing and Descriptive Geometry. 3 hours. 1 ① 2 ②
Fundamentals of engineering drawing, orthographic projection, study of lines, planes, and solids.

CET 221,222,223. Plane Surveying.
3 hours each term. 2 ① 2 ②
CET 221: Care and use of theodolite, transit, level, electronic distance measuring equipment, and tapes; effect of errors of observations; traverse and area surveys; machine computations. *CET 222:* U. S. public land survey system; metes and bounds descriptions; deeds as legal documents; use of state plane coordinate systems; theory of adjustment of survey equipment. *CET 223:* Stadia and other tachymetry methods; topographic mapping techniques; profile surveys; borrow pit and highway earthwork measurement and estimates. Prerequisite: Mth 60.

CET 232. Civil Engineering Drawing.
3 hours winter. 1 ① 2 ③
Drawing techniques applied to civil engineering projects. Prerequisite: CET 121.

CET 252,253,254. Mechanics: statics, dynamics, strength of materials.
3 hours each term. 2 ① 1 ②
Fundamental concepts of mechanics applied to elementary civil engineering problems. Prerequisite: CET 252 for *CET 254*.

CET 261. Fundamentals of Estimating.
3 hours spring. 2 ① 1 ②
Principles of estimating; classification of work; types of estimates; quantity take-off techniques. Prerequisite: CET 113.

Upper Division Courses

CET 321,322. Hydraulics.
3 hours. 2 ① 2 ②
CET 321: Pressure and energy concepts of fluids; fluid measurements; flow in pipes and open channels. *CET 322:* Pump characteristics and selection; elements of hydrology; storm runoff; drainage; culvert selection. Prerequisite: CET 253.

CET 334,335,336. Highway Location and Control Surveying.
3 hours each term. 2 ① 1 ③; 2 ① 1 ③; 1 ① 2 ③
CET 334: Geometry of highway location: circular, compound vertical, and spiral curves; field problems. *CET 335:* Curve problems in highway design; earth distribution analysis; preliminary office studies and paper location procedures; machine compilation of field data. *CET 336:* Second-order control surveys by traverse and triangulation; three-wire leveling astronomic determination of position. Prerequisite: CET 223.

CET 341,342,343. Construction Materials Laboratory.
3 hours each term. 2 ① 1 ③
CET 341: Origin of soils, standard soil tests for engineering projects. *CET 342:* Standard tests for structural elements, timber, steel, concrete. *CET 343:* Highway materials standard tests, asphalt, concrete, base and subbase materials.

CET 362. Estimating and Cost Control.
3 hours winter. 2 ① 1 ③
Quantity surveying, establishment of unit prices, overhead, profits; concrete, steel, and timber. Prerequisite: CET 261.

CET 371. Construction Engineering Economy. 3 hours fall. 3 ①
Engineering economy used as a decision-making tool to evaluate proposed investments in money terms; use of compound interest and depreciation calculations to compare the relative economy of alternatives in construction engineering.

CET 381. Project Scheduling.
3 hours fall. 2 ① 1 ③
Computer coding and computer applications to project scheduling and critical path methods.

CET 405. Reading and Conference.
Terms and hours to be arranged.

CET 406. Projects.
Terms and hours to be arranged.

CET 407. Seminar.
Terms and hours to be arranged.

CET 441,442,443. Construction Methods and Control.
3 hours each term. 2 ① 1 ③
CET 441: Earth moving, grading, classifications, methods, and equipment. *CET 442:* Construction of concrete, steel, and timber structures, specific construction projects and equipment; equipment maintenance.

CET 447,448,449. Photogrammetry and Construction Surveys.
3 hours each term. 1 ① 2 ③
CET 447: Terrestrial photogrammetry, aerial cameras, geometry of the aerial photograph, ground control requirements and principles of radial-line plotting and planimetric mapping, mosaics. *CET 448:* Orientation of a photograph, stereoscopy and parallax, geometry of overlapping vertical photographs, rectification of tilted photographs, stereoscopic plotting instruments, oblique photography, point identification. *CET 449:* Theory and practice in construction survey problems; highways, buildings, and special situations; evaluation of different methods and equipment used. Prerequisite: senior standing.

CET 451,452. Structural Problems.
4 hours winter, spring. 2 ① 2 ③
Study and design of building elements of concrete, steel, and timber; detailing and fabrication. Prerequisite: CET 254.

CET 461. Contracts and Specifications.
3 hours fall. 2 ① 1 ③
Laws of Contracts as applied to engineering work; correlation of blueprints and specifications.

Electric Power Technology

Lower Division Courses

EPT 101,102,103. Electric Power Technology. 2 hours each term. 1 ① 1 ②
Fundamentals of electric power technology.

EPT 201,202,203. Electrical Circuits and Components.
3 hours each term. 1 ① 2 ②
Electrical circuit fundamentals, characteristics of electrical components, economic and reliability evaluation of components. Prerequisite: EPT 103.

Upper Division Courses

EPT 301,302,303. Electrical Equipment. 3 hours each term. 1 ① 2 ②
Characteristics of various electrical equipment; evaluation of total cost of operation. Prerequisite: EPT 203.

EPT 311,312,313. Electrical Instruments and Protective Equipment.
3 hours each term. 1 ① 2 ②
Principles of electrical instruments, electrical measurements, and electrical circuit protection; characteristics of electrical circuit protective devices. Prerequisite: EPT 203.

EPT 406. Projects.
Terms and hours to be arranged.

EPT 411,412,413. Electrical Codes, Regulations, and Economy.
3 hours each term. 3 ①
National, state, and local electrical codes and regulations; power utility economy; plant investment, rates, and profit.

EPT 421,422,423. Electrical Power Generation, Transmission, and Distribution. 3 hours each term. 1 ① 2 ②
Principles and economic evaluation of various methods. Prerequisite: EPT 303, EPT 313.

Manufacturing Engineering Technology

Lower Division Courses

***TME 111. Woodworking Technology.**
4 hours. 2 ① 2 ②
Wood as a material; equipment and processes; use of nonwood materials in construction of wood furnishings.

TME 112,113. Methods in Woodworking. 3 hours each term. 3 ②
Tool techniques, applied design, and craftsmanship in group and individual projects. PT 112 prerequisite for PT 113.

TME 140. Foundry Practices.
3 hours. 3 ②
Constitution, properties and design limitations of casting in ferrous and nonferrous metals, methods in production of castings.

***TME 141. Foundry Practices.**
4 hours. 3 ① 1 ③
Properties and design limitations of casting in ferrous and nonferrous metals, the production of castings.

TME 150. Forging and Welding.
3 hours. 3 ②
Forging, forming, and heat-treating of steel, followed by gas and electric-arc welding, flame cutting, brazing, and resistance-welding operations.

***TME 151. Welding and Fabrication.**
4 hours. 3 ① 1 ③
Welding processes, including gas, arc, and resistance welding, brazing, and cutting as applied to ferrous and non-ferrous metals. The forming, forging, and heat treatment of steel.

TME 160. Machine Tool Practices.
3 hours 3 ②
Prescribed projects representative of industrial operations. Prerequisite: Mth 50.

***TME 161. Machine Tool Practices.**
4 hours. 3 ① 1 ③
Metalworking projects representative of industrial operations and methods. Prerequisite: Mth 50.

TME 211. Wood Industries Production Methods.
3 hours. 2 ① 1 ②
Analysis of production problems; solutions related to standard woodworking equipment through the design of jigs and fixtures; use of specialized production machines. Prerequisite: TME 111 or TME 112 and 113.

TME 220. Woodturning and Pattern-making. 3 hours. 1 ① 2 ③
Wood turning techniques and project development. Principles related to pattern design and materials. For industrial education. Prerequisite: TME 111 or TME 112 or TME 121.

TME 225. Machine and Tool Maintenance: Wood Shop.
3 hours. 3 ②
Maintaining woodworking tools, machines, and supplementary equipment. Prerequisite: TME 111 or TME 112 or TME 121.

†TME 262. Manufacturing Processes.
3 hours. 3 ①
Metal casting, welding and brazing, machining, and plastic flow of metals and nonmetals; quality control; production economy. Prerequisite: sophomore standing in engineering.

TME 263. Manufacturing Metrology Technology.
3 hours. 3 ①
Modern geometric and positional tolerancing in manufacturing practice, layout, and inspection techniques. The application and calibration of precision measuring instruments. Prerequisite: sophomore standing.

* In courses designated by asterisks, in addition to the regularly scheduled meetings, the student may be required to attend three general meetings during the term.

† Three facilities tours per term may be scheduled.

TME 265. Machine and Tool Maintenance: Metals. 3 hours. 2 ① 1 ③
Maintaining metalworking and mechanical equipment; tool and cutter sharpening; lubrication and power transmission. Prerequisite: TME 160 or TME 161.

TME 270. General Metals Laboratory. 3 hours. 1 ① 2 ③
Forging, heat-treating, welding, nonferrous metal casting, and machine tool work. For industrial education.

Upper Division Courses

TME 310. Production Millwork. 3 hours. 2 ① 1 ②
Production methods in contract millwork industries; special machines for multi-unit production; standard practices in the cabinet, furniture, and millwork industries. Laboratory work in design and construction of quantity, and quality-control devices for specific production problems. Prerequisite: PT 111 and/or PT 121, depending upon major.

TME 311. Millwork: Machine Woodwork. 3 hours. 3 ②
Design and construction of jigs and fixtures, and their use with common woodworking machines for mass production of a millwork project; organization of laboratory facilities and personnel for production; methods of quality control for items produced in limited quantities. Prerequisite: TME 112,113.

TME 312,313,314. Furniture Design and Construction. 3 hours each term. 1 ① 2 ③
Design, planning, and construction of furniture items with emphasis on original design, materials use, and construction of major furniture pieces and groupings. Prerequisite: TME 310 or 311.

TME 316. Wood and Metal Finishing. 3 hours. 3 ②
Application of modern finishes to old and new work on wood and metal surfaces; brush and spray application of finishing materials. Prerequisite: TME 111 or TME 112 or TME 121.

TME 332. Pattern Making. 2 hours. 2 ① 1 ③
Problems in production pattern, factors influencing production costs. Prerequisite: sophomore standing.

TME 340. Foundry Practices. 3 hours. 3 ②
Ferrous and nonferrous; equipment, materials, projects, and processes suitable for school or small shops. For industrial education. Prerequisite: sophomore standing.

TME 344,345. Casting Processes. 4 hours each term. 3 ① 1 ③
Techniques applied to ferrous, nonferrous, and reactive metals; foundry raw materials and controls, quality control as influenced by design; melting and sand practices; special molding methods; gating, risering, and solidification. Prerequisite: TME 140 or 141.

TME 350. Welding and Fabrication. 3 hours. 2 ① 1 ④
Techniques; heat treating, general fabrication, equipment selection, and maintenance problems oriented to instruction in school and small shops. For industrial education. Prerequisite: TME 150 or TME 151.

TME 354,355. Production Welding. 4 hours each term. 3 ① 1 ③
Techniques applied to ferrous and nonferrous metals; 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. Prerequisite: TME 150 or TME 151.

TME 360. Machine Shop Practices. 3 hours. 3 ②
Individual and group projects. For industrial education. Prerequisite: TME 160 or TME 161.

TME 361,362. Mass Production Methods. 4 hours each term. 3 ① 1 ③
Selection, setup, and operation of production machines; construction, use, and application of jigs and fixtures; job shop problems; group projects and quality control. Prerequisite: TME 160 or TME 161.

TME 364. Nonmetallic Materials Technology. 3 hours. 3 ①
Manufacturing, production methods, and processes applied to plastics, ceramics, and other nonmetallic engineering materials for consumer products; chemical composition of these materials.

TME 365. Materials Technology. 4 hours. 3 ① 1 ②
Elements of products design; determination of strength of tooling elements used in manufacturing processes. Prerequisite: Mth 60; junior standing in production technology.

TME 366. Numerical Control Technology. 3 hours. 3 ①
Application of numerical control to manufacturing processes and product design; control systems for machine tools; manual and computer-assisted programming techniques for point-to-point and continuous-path machining. Prerequisite: Mth 60; TME 262 or 361; junior standing.

TME 367. APT Numerical Control Programming. 3 hours. 2 ① 1 ②
APT systems applied to continuous path machining on milling, turning, and other operations; computer-aided design and manufacturing techniques with respect to APT systems; selected problems. Prerequisite: TME 366.

TME 368. Statistical Quality Control Technology. 3 hours. 3 ①
Manufacturing practices. The use of control charts, sampling, and reliability; application of data processing techniques using the digital computer to manufacturing and quality control. Prerequisite: TME 262 or TME 161.

TME 370. Electricity Technology. 3 hours. 1 ① 2 ③
Electricity technology, electrical circuits and controls, wiring for light and power circuits, communication and control systems. Prerequisite: junior standing.

TME 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 116.

TME 387. Metal Crafts. 3 hours. 1 ① 2 ③
Diversified metal crafts; metal spinning and craft work in iron, copper, and Britannia metal. For industrial education. Prerequisite: TME 350 or TME 380.

TME 405. Reading and Conference.
Terms and hours to be arranged.

TME 406. Projects.
Terms and hours to be arranged.

TME 407. Seminar.
Terms and hours to be arranged.

TME 456. Welding Design and Economy. 3 hours. 3 ①
Coordination of emphases on metals, weld-joint design, process selection, and inspection procedures required in manufacture of quality welded products and structures at least possible cost; relationship of welding to other methods and processes. Prerequisite: TME 355.

TME 463. Automated Manufacturing Technology. 3 hours. 3 ①
Principles, practices, and economics of the application of automated manufacturing techniques to the metalworking and other industries. Prerequisite: TME 262 or TME 361.

TME 464,465,466. Tool Engineering. 3 hours each term. 2 ① 1 ②
Tools, jigs, fixtures, and die design; operation sequences, dimensional and quality control. Power press applications on the plastic working of metals and nonmetals. Prerequisite: senior standing.

Mechanical Technology

Lower Division Courses

MT 101. Mechanical Engineering Technology Orientation. 3 hours. 2 ① 1 ②
Scope of technology and position of the technologist in relation to the scientist and the engineer; logical solution to problems; familiarization with equipment; use of common instruments and devices for problem solution.

MT 201. Mechanisms. 3 hours. 1 ① 2 ②
Analysis of mechanisms and linkages; kinematics of machines. Prerequisite: Mth 101, 102; MT 212.

MT 211,212,213. Introduction to Mechanics. 3 hours each term. 2 ① 1 ②
Applications of mechanics principles to prediction of effects of forces on mechanical systems. Prerequisite: Mth 111.

MT 220. Mechanical Analysis. 3 hours. 2 ① 1 ②
Application of differential and integral calculus to basic geometrical and physical problems. Determination of areas, volumes, centroids, mean values, moments of inertia. Prerequisite: Mth 111.

Upper Division Courses

MT 301,302,303. Metallurgy and Materials. 3 hours each term. 2 ① 1 ②
Structure and properties of engineering materials; modification of properties through changes in structures; effect of service environments on properties and stability of materials; metallic, organic, and ceramic materials and processes.

MT 321,322,323. Applied Heat Power. 4 hours each term. 2 ① 2 ②
Energy and power sources and methods of conversion; laws governing gases, vapors, processes, cycles, fuels, and combustion; operation, testing, and maintenance of mechanical equipment including fans, blowers, pumps, compressors, boilers and burners, engines and turbines, heat exchangers, refrigeration, and air conditioning systems; instrumentation, testing procedures, and evaluation of performance tests on heat power machinery. Prerequisite: Ph 112; Ch 105; Mth 111.

MT 381. Preliminary Design Problems. 1 hour. 1 ③
Projects emphasizing determination and organization of design project requirements and criteria and use in preliminary designs. Student is assigned project at beginning of each three-hour period and submits proposed preliminary design at end of period. Prerequisite: junior standing.

MT 406. Projects.
Terms and hours to be arranged.

MT 411. Mechanical Design.
3 hours. 1 ① 2 ②
Application of principles of mechanism, mechanics, and strength of materials to design of machine elements and mechanical systems. Prerequisite: MT 201,213,381.

MT 421,422. Air Conditioning and Ventilation.
3 hours each term. 2 ① 1 ③
Calculation of heating and cooling loads; air and temperature distribution; properties of dry and moist air; air washers and humidity control; heating and refrigerating requirements; matching components and systems characteristics. Prerequisite: MT 323.

MT 423. Refrigeration and Heat Pumps. 3 hours. 2 ① 1 ③
Vapor compression refrigeration cycles; direct expansion and brine-cooled cooling coils; condensing units and cooling towers; heat pumps and heat sources; controls and operation of vapor compression systems; adsorption refrigeration systems. Prerequisite: MT 421,424.

MT 424. Refrigeration.
3 hours. 1 ① 2 ③
Operation, maintenance, and trouble shooting of refrigeration systems. Prerequisite: MT 323.

MT 425. Mechanical and Electrical Equipment of Buildings.
3 hours. 2 ① 1 ③
Mechanical and electrical equipment of buildings, especially for those interested in their installation, adjusting, and maintenance; checking and maintaining typical equipment; field trips. Prerequisite: MT 323; EPT 203.

MT 426. Automatic Control Systems.
3 hours. 2 ① 1 ③
Process instrumentation and system analysis in automatic process control; operation of various types of control systems. Prerequisite: MT 323.

MT 428. Refrigeration for Food Processing and Preservation.
3 hours. 2 ① 1 ③
Refrigeration systems, cooling-load calculation, system controls, plant layout, and problems in plant construction and operation in food processing and preservation. Prerequisite: MT 424.

MT 429. Special-Purpose Refrigeration Systems.
3 hours. 2 ① 1 ③
Heat pumps, air cycle systems, absorption refrigeration cycle, low temperature systems, and systems used for solidification and liquification of gases. Prerequisite: MT 424.

MT 431,432,433. Power Plants.
3 hours each term. 2 ① 1 ③
Power plants and energy conversion systems; installation and operation of the equipment; steam, internal-combustion engine, gas turbine, hydroelectric, nuclear, solar, and others; fuels and combustion, heat transfer, fluid flow, and auxiliary equipment; field trips. Prerequisite: MT 323.

MT 435. Power Plant Economics.
3 hours. 2 ① 1 ③
Construction, operating, and maintenance costs of power plants; fuel, labor, maintenance, and overhead items; accounting systems. Prerequisite: MT 432.

MT 481,482,483. Metallography.
3 hours each term. 2 ① 1 ③
Metallographic laboratory technique; preparation of samples; the metallurgical microscope, photomicrography; macroscopic examination; pyrometric practice; thermal analysis; radiographic technique; special metallurgical tests. Prerequisite: MT 303.

MT 486,487,488. Materials Testing Laboratory.
3 hours each term. 2 ① 1 ③
Standard test procedures; importance of methods on accuracy and significance of results; metallic and nonmetallic materials, stress analysis and nondestructive testing. Prerequisite: MT 213; 303.

MT 491. Internal Combustion Engines.
3 hours. 2 ① 1 ③
Cycles, mechanical and thermodynamic; engine construction, operation and performance; fluid flow as applied to carburetion; fuel systems and combustion in spark-ignition and compression-ignition engines; electrical systems; lubrication fundamentals. Prerequisite: MT 323.

MT 492,493. Automotive Chassis.
3 hours each term. 2 ① 1 ③
Construction and design of automobile chassis and drive line components; purpose, function, operation, and performance. Prerequisite: MT 212,323.

MT 494. Fleet Operation.
3 hours. 2 ① 1 ③
Economics of motor fleet operation; cost analysis, vehicle taxation, preventive maintenance practices, laws governing size and weight restrictions, fuel economy, and tractive ability as applied to equipment selection.

MT 495. Fuel and Lubricant Technology. 3 hours. 2 ① 1 ③
Properties and application of fuels and lubricants to combustion devices and machines.

Nuclear Technology

Lower Division Courses

NT 101. Nuclear Technology Orientation. 3 hours. 2 ① 1 ②
Nuclear technology and relationship to engineering; methods of problem solving; computer languages and programming; equipment and instruments used in nuclear technology.

NT 102,103. Introduction to Nuclear Technology.
3 hours each term. 2 ① 1 ③
Measurements of radioactivity, analysis of radioactive measurements, interaction of neutrons and ionizing radiation with materials extending to the industrial use of devices employing penetrating and ionizing radiation. Tracers, gauges, and neutron activation analysis will be studied and demonstrated in the laboratory. Prerequisite: NT 101.

NT 201. Nuclear Instrumentation.
5 hours. 3 ① 1 ③
Circuitry designs and performance characteristics of instrumentation associated with radiation measurement, nuclear power production, and health physics. Emphasis on instrument system functions and calibrations. Prerequisite: NT 101,102,103; Ph 111,112.

NT 301,302,303. Elementary Reactor Engineering.
3 hours each term. 3 ①
Nuclear power systems with emphasis on the reactor and its associated control and instrumentation; properties of reactor materials including strength of materials and their relationship to design; corrosion of materials and its relationship to long-term operation. Includes identification of the nuclear steam generator components, the nuclear steam supply system, and the secondary power recovery system. Prerequisite: NT 101,102,103.

NT 311,312. Radiation Safety.
4 hours each term. 2 ① 1 ③
Effects of radiation on biological systems, basic principles in safeguard of personnel against ionizing radiation, radiation dosimetry, health physics instrumentation, shielding design and use, waste disposal, etc. Prerequisite: Ph 111,112,113.

NT 410. Field Practice. No credit
Between the junior and senior years, arrangements will be made for off-the-campus assignments of students in industrial nuclear plant locations. These assignments will be designed to give practical experience in a segment of the nuclear power industry and its associated equipment supply industries. Senior standing required.

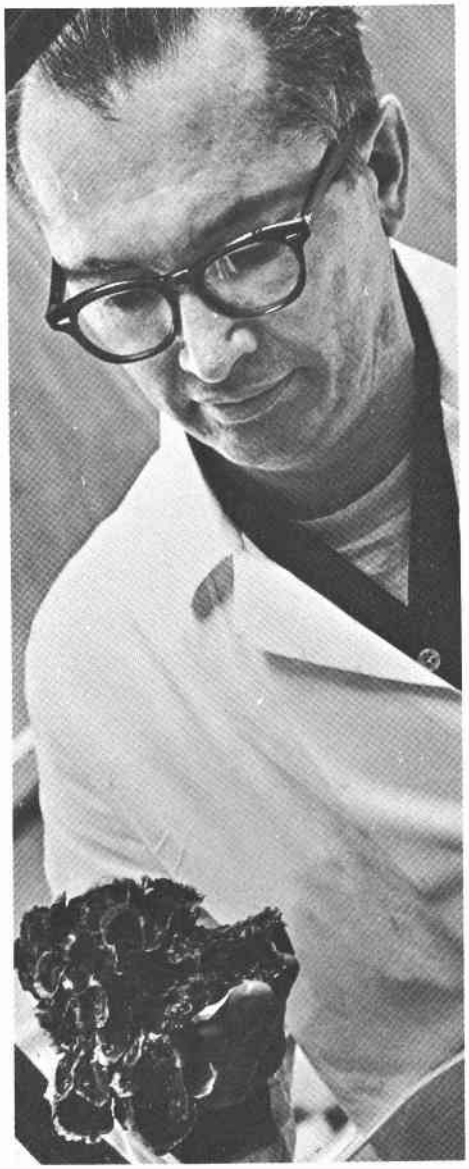
NT 411. Nuclear Safety Analysis.
4 hours. 4 ①
Safety analysis of operations involved in the use of ionizing radiation, neutrons, and radiation producing devices; safety analysis of nuclear reactor installation for either research purposes or power production; and safety analysis of novel uses of radioisotopes in industrial operations. Prerequisite: NT 311, 312.

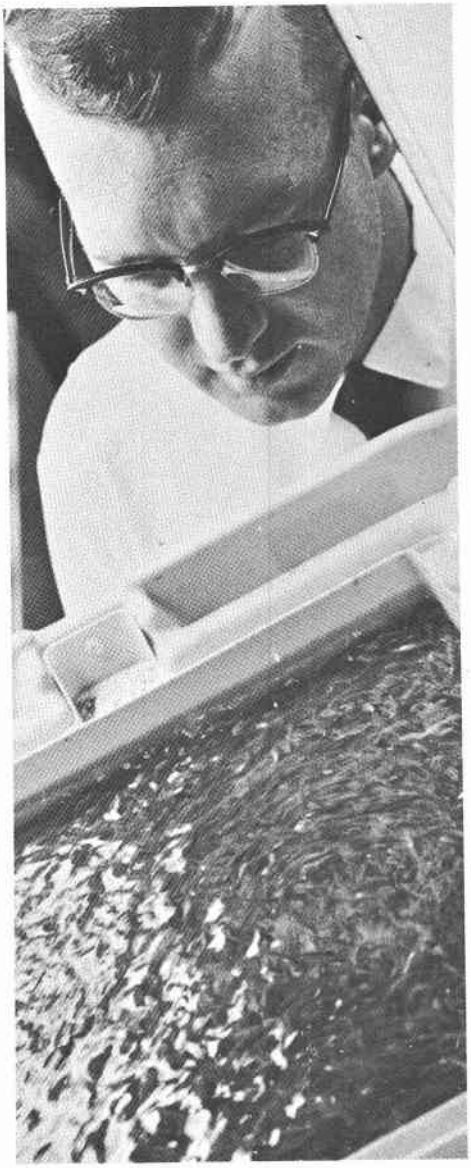
NT 412. Nuclear Rules and Regulations.
4 hours. 4 ①
The regulatory phase of the nuclear field, including the history of the regulatory programs, organization and responsibilities of regulatory agencies, pertinent rules and regulations and their application; early and current radiation protection standards and organizations responsible for their formulation will provide necessary background information.

NT 421. Use of Computers in Nuclear Industry.
4 hours. 4 ①
The use of digital computers in solving problems in nuclear technology. Subjects include program running, reactor problems, design optimization and the use of on-line computers for reactor operation. Prerequisite: NT 301,302,303.

NT 441,442,443. Elementary Reactor Analysis.
3 hours each term. 3 ①
The mathematical analysis and physical understanding of steady state and transient operation in reactors. Subjects will include neutron diffusion, slowing-down, criticality calculations, time dependent neutron effects, fission product poisoning, temperature coefficients, and the shielding of reactor systems. Prerequisite: NT 301,302,303.

For description of courses in Agricultural Engineering Technology, See SCHOOL OF AGRICULTURE.





Marine Science at OSU

TEACHING AND RESEARCH are two of the university's major functions in the marine field as in its other areas of concern. Teaching in marine sciences is conducted in four schools and a dozen departments, and cooperatively under the Sea Grant program, with the University of Oregon School of Law and Clatsop Community College technician-training courses. Graduate students in engineering and oceanography (above left) work with an acoustic imaging system, part of a student ocean engineering project. Marine research in a varied interdisciplinary range was stimulated when OSU pioneered as one of the nation's first Sea Grant centers. A fisheries scientist (right above) examines hybrid salmon that are being tested in the university's coastal laboratory at Port Orford. A specialist in shellfisheries (above) has developed a method for hatchery rearing of oyster seed, already aiding the state's oyster industry. Research and training are conducted jointly for oceanography students aboard OSU's 80-foot vessel, *Cayuse* (right). (*See also pages 32, 101, 161.*)

THE GENERAL AIM OF THE SCHOOL OF FORESTRY IS TO ASSURE ITS students quality education, both liberal and professional. A specific School aim is the best possible development of students as individuals, citizens, and professional men.

Forests constitute Oregon's most valuable natural resource—the forest industry is the backbone of Oregon's economy. Forestry is also important nationally and is of major significance in other western states. There is a strong, continuing demand for foresters in this region. Oregon State foresters are well equipped for future responsible positions in developing and managing the basic forest values, water, wood, wildlife, recreation, and forage. They are employed in developing and maintaining the forest environment; in harvesting forest crops; in wood product development, processing, and marketing; in teaching; and in research. Since the School stresses administrative management, graduates who prepare themselves adequately have excellent opportunities for advancement to administrative positions. The School arranges seasonal employment and operates a graduate placement service. Forestry is a highly satisfying occupation with expanding possibilities.

The School is accredited by the Society of American Foresters.

School of Forestry

FACULTY

As of January 1970

CARL HENRY STOLTENBERG, Ph.D., Dean of the School of Forestry.

DALE NESTRUD BEVER, M.F., Assistant Dean, Professor.

RUDOLPH MARTIN KALLANDER, M.F., Assistant Dean, Professor.

WILLIAM PERRY WHEELER, Ph.D., Head Adviser and Placement Officer, Professor.

JAMES LAFAYETTE OVERHOLSER, B.S., Publications, Assistant Professor.

Professors Emeritus of Forestry: BARNES, JAENICKE, JEFFERS, MCCULLOCH, PATTERSON.

Forest Engineering: Professors DAVIES (department head), O'LEARY.
Associate Professor WILSON.
Instructor MCLAREN.

Forest Management: Professors DILWORTH (department head), BERG, CHING, DUNN, FERRELL, JEMISON, KENISTON, OVERTON, ROBINSON, WHEELER, YODER.
Associate Professors BELL, BEUTER, BLACK, HERMANN, HOOVEN, IRGENS-MOLLER, KRYGIER, LAVENDER, NEWTON, PAINE, PARKE, SUTHERLAND.
Assistant Professors BROWN, GAY, KANGUR, STREEBY, WARING, ZAERR.
Instructors KLEMPERER, LEWIS, YORK.
Assistants in Forest Management CARMICHAEL, CLEARY, DOERKSEN, ELFERS.

Forest Products: Professors ELLIS (department head), ATHERTON, ESPENAS, WEST.
Associate Professors BUBLITZ, CORDER, CURRIER, GRAHAM, JOHNSON, KRAHMER, LAVER, MCMAHON, MCKIMMY, VAN VLIET, WELLONS.
Assistant Professors KOZLIK, LEHMANN, LIN, MILLER.
Instructors KUNESH, POLENSEK.
Assistants in Forest Products W. JOHNSON, LOVELAND, SIEBEN.

Forest Properties: Professor DAVIES, Forest Supervisor.

Improvement of Forestry Education Project: Professor Reichart (director).
Instructor CRAWFORD.

Forestry Extension: Associate Professors MCMAHON, VANVLIET.
Assistant Professor SANDER.

High School Preparation

In the forestry curricula listed in this catalog, it is assumed that the high school preparation of each student has included the following: English, four years; mathematics, four years—including trigonometry and advanced algebra; chemistry, one year; physics, one year; graphics or mechanical drawing, one year.

Entrance

All new students must complete Oregon State University and School of Forestry requirements for entrance, including the Scholastic Aptitude Test. All freshmen take placement tests in English and mathematics. Transfer students who do not have academic credit for college-level mathematics will also take the appropriate placement test. Deficiencies shown by this test should be corrected by the student before enrolling in regular courses in mathematics. Transfer students should normally plan to enter Oregon State at the end of the freshman year; otherwise, more than a total of four years may be required because of difficulties in scheduling sequence and prerequisite courses. Appropriate courses from accredited forestry schools will be accepted without examination to fulfill the School's curricular requirements. Courses in forestry subjects from institutions with unaccredited forestry programs may be accepted only after the student demonstrates an adequate grasp of the subject matter concerned by examination or other adequate evidence. Transfer credits in general education courses accepted by the University may be used to satisfy the School's general education requirements. The University does not grant credit for work done in vocational or technical training programs.

Graduation

Academic requirements: Minimum requirements for bachelor's degree include the University stipulations listed in the *General Catalog:* 204 term hours of university-level courses in an approved curriculum, of which 33 term hours must be in Humanities and Social Sciences, including 15 term hours in communications, and at least six months of forestry employment satisfactory to the employer and to the School.

Professional and personal requirements: The School's personnel program provides assistance and incentive, but success is dependent on the individual. The student is personally responsible for fulfilling all his curricular requirements in proper sequence. He must prove himself on the campus and during summer employment. Work performance and personal conduct both are thoroughly appraised by the School. Forestry is highly regarded for its ethical and its academic standards. Students are required to abide by the Code of Ethics of the Society of American Foresters, to conduct themselves as befits professional foresters, and to observe the Honor Code of the School in its entirety. Departure from these ethical requirements may be reason for terminating a student.

Advantages

The School of Forestry is recognized nationally for its strong undergraduate program, for its personal interest in students and their development, and for graduates who perform effectively and responsibly as professional foresters.

Corvallis is one of the largest forest research centers in America. An aggressive research program is conducted by the School through its Forest Research Laboratory and by the campus-based Forest Sciences Laboratory of the U. S. Forest Service. They offer splendid educational and employment opportunities for superior students.

The School is closely associated with industry and public forestry agencies and makes good use of their facilities for student benefit. During each school year, many trips are made to woods and plants to give classes a firsthand knowledge of engineering, management, and utilization processes.

No summer camp is required. A truck fleet takes students daily to nearby School forests for field instruction. There are more than 11,000 acres in the adjacent McDonald and Dunn Forests and Peavy Arboretum. The School owns other properties in Benton and Columbia counties. All are available for research and demonstration as well as instruction.

The School of Forestry seeks to help young men develop their personal and intellectual talents to enable them to serve society effectively as both citizens and resource managers.

University Honors Program

Students with exceptional scholastic abilities will be interested in the honors seminars of the School of Forestry. These are coordinated with the University Honors Program (see page 29). Information concerning the program may be obtained from the Director.

Curricula in Forestry

Degree Programs

The Bachelor of Science (B.S.) or Bachelor of Forestry (B.F.) degree is offered in FOREST ENGINEERING, FOREST MANAGEMENT, and FOREST PRODUCTS. General forestry concepts are strengthened by reference to western forestry practices, but the program is sufficiently broad to serve the needs of students from other areas. A student may combine engineering and management and earn degrees in both departments. See next page for options. Through the Graduate School the three departments offer the Master of Science (M.S.) and Master of Forestry (M.F.) degrees and the Doctor of Philosophy (Ph.D.) in Forest Management and Forest Products.

FRESHMAN YEAR ..... **Common to all programs**

	Term			Total hours
	Fall	Winter	Spring	
General Botany (Bot 201,202)	4	4	..	8
[1] Mathematics (Mth 110,111,112 or Mth 161, 162,163)	4	4	4	12
Chemistry (Ch 201,202,203)	3	3	3	9
English Composition (Wr 121)	(3)	3	(3)	3
Introduction to Forestry (F 111)	4	..	..	4
Dendrology (F 254)	..	..	4	4
Physical education	1	1	1	3
Defense education and/or approved electives	1	2	5	8
	17	17	17	51

[1] Mth 110,111,112 recommended for students in Forest Engineering and Wood Science.

Forest Engineering

Accredited by Society of American Foresters

FOUR-YEAR CURRICULUM

Sophomore Year

	Hours
Forest Engineering (FE 123)	3
Forest Engineering (FE 223)	4
Aerial Photointerpretation (F 220)	3
Mensuration (F 224)	5
Wood Technology and Utilization (FP 210)	4
General Physics (Ph 201,202)	8
Basic Geology (G 221)	3
English Composition (Wr 222)	3
Principles of Economics (Ec 201,202,203)	9
Physical education	3
Defense education or other electives	6
	51

Junior Year

Forest Engineering (FE 323)	4
Northwest Logging (FE 360)	4
Logging Roads (FE 361)	3
Forest Management Operations (F 432, 433)	9
Mechanical Properties (FP 321)	4
Principles of Accounting (BA 211,212)	6
English Composition (Wr 323)	3
Mathematical Models (IE 271,272)	6
Heat Engines (ME 337)	3
Electives	9
	51

Senior Year

Logging Plans (FE 461)	5
Logging Transportation (FE 462)	5
Logging Costs (FE 463)	5
Seminar (FE 407)	1
Production Planning and Control in Logging (FE 481)	4
Forest Economics and Regulation (F 434, 435)	9
Business Law (BA 412)	3
[1]Personnel Management (F 415 or BA 467 or BA 497)	3
Electives	16
	51

FIVE-YEAR CURRICULUM

Second Year

	Hours
Forest Engineering (FE 123)	3
Forest Engineering (FE 223)	4
Aerial Photointerpretation (F 220)	3
Mensuration (F 224)	5
Wood Technology and Utilization (FP 210)	4
General Physics (Ph 201,202,203)	12
Calculus (Math 113, 211)	8
English Composition (Wr 222)	3
Physical education	3
Defense education or other electives	3
	48

Third Year

Forest Engineering (FE 323)	4
Mechanics of Solids (GE 211,212,213)	9
Heat Engines (ME 337)	3
Basic Geology (G 221)	3
Applied Differential Equations (Mth 321)	3
Principles of Accounting (BA 211,212)	6
Principles of Economics (Ec 201,202,203)	9
English Composition (Wr 323)	3
Electives	9
	49

Fourth Year

Northwest Logging (FE 360)	4
Logging Roads (FE 361)	3
Forest Management Operations (F 432,433)	9
Mathematical Models (IE 271,272)	6
Mechanics of Fluids (GE 301,302)	6
Structural Theory (CE 381,382,383)	9
Reinforced Concrete (CE 481)	3
Electives	9
	49

Fifth Year

Logging Plans (FE 461)	5
Logging Transportation (FE 462)	5
Logging Costs (FE 463)	5
Seminar (FE 407)	1
Prod Plan and Cont in Logging (FE 481)	4
Forest Econ and Reg (F 434,435)	9
Hydrology (CE 411)	3
Structural Engineering (CE 482)	3
[1]Prsnnl Man (F 415 or BA 467 or BA 497)	3
Business Law (BA 412)	3
Electives	9
	50

[1]Not required of students completing 18 term hours of upper division military courses.

Forest Management

Accredited by Society of American Foresters

Sophomore Year

	Hours
English Composition (Wr 222)	3
General Physics (Ph 201,202, or 207,208)	8
Principles of Economics (Ec 201,202)	6
Plant Physiology (Bot 330)	4
Soils (Sls 210)	5
Aerial Photointerpretation (F 220)	3
Forest Engineering (FE 222)	5
Mensuration (F 224)	5
Wood Technology and Utilization (FP 210)	4
Physical education	3
Defense education or other electives	6
	52

Junior Year

English Composition (Wr 323)	3
Basic Meteorology (AtS 302)	3
Forest Pathology (Bot 415)	3
Forest Entomology (Ent 423)	3
Forest Ecology (F 341)	5
Forest Biometrics (F 327)	5
Forest Engineering (FE 423)	5
Forest Recreation (F 364)	3
Range Resources (Rng 341)	3
Business elective	3
Electives	15
	51

Senior Year

Watershed Management (F 424)	3
Forest Management Operations (F 432,433)	9
Forest Econ and Reg (F 434,435)	9
Multiple-Use Decisions (F 436)	3
Seminar (F 407)	1
Prsnnl Man (F 415 or BA 467 or BA 497)	3
Business elective	3
Electives	19
	50

FOREST SCIENCE OPTION

Sophomore Year

	Hours
English Composition (Wr 222)	3
Gen Phys (Ph 201,202,203 or 207,208,209)	12
Principles of Economics (Ec 201,202)	6
Plant Physiology (Bot 330)	4
Soils (Sls 210)	5
Forest Engineering (FE 222)	5
Mensuration (F 224)	5
Wood Tech and Utilization (FP 210)	4
Physical education	3
Defense education or other electives	4
	51

Junior Year

English Composition (Wr 323)	3
Basic Meteorology (AtS 302)	3
Forest Pathology (Bot 415)	3
Forest Entomology (Ent 423)	3
Forest Ecology (F 341)	5
Foreign language sequence	12
Approved science electives	9
Electives	13
	51

Senior Year

Forest Management Operations (F 432,433)	9
Forest Econ and Reg (F 434,435)	9
Seminar (F 407)	1
Prsnnl Man (F 415 or BA 467 or BA 497)	3
Statistics	3
Approved science electives	6
Electives	20
	51

FOREST RECREATION OPTION

Sophomore Year

	Hours
English Composition (Wr 222)	3
General Physics (Ph 201,202, or 207,208)	8
Principles of Economics (Ec 201,202)	6
Soils (Sls 210)	5
Landscape Design Theory (LA 280)	3
Applied Landscape Design (LA 290)	3
Aerial Photointerpretation (F 220)	3
Forest Engineering (FE 222)	5
Mensuration (F 224)	5
Wood Technology and Utilization (FP 210)	4
Physical education	3
Defense education or other electives	3
	51

Junior Year

English Composition (Wr 323)	3
Basic Meteorology (AtS 302)	3
Forest Pathology (Bot 415)	3
Forest Entomology (Ent 423)	3
Forest Ecology (F 341)	5
Forest Biometrics (F 327)	5
Forest Engineering (FE 423)	5
Forest Recreation (F 364)	3
Range Resources (Rng 341)	3
Plant Physiology (Bot 330)	3
Plant Materials (LA 326)	3
Forest Recreation Planning (F 365)	3
Electives	9
	51

Senior Year

Watershed Management (F 424)	3
Forest Management Operations (F 432, 433)	9
Forest Economics and Regulation (F 434, 435)	9
Multiple-Use Decisions (F 436)	3
Seminar (F 407)	1
Personnel Management (F 415 or BA 467 or BA 497)	3
Forest Recreation Management (F 464)	3
Business electives	6
Electives	14
	51

Forest Products

WOOD INDUSTRY MANAGEMENT OPTION

Sophomore Year

	Hours
English Composition (Wr 222)	3
General Physics (Ph 201,202)	8
Principles of Economics (Ec 201,202)	6
Principles of Accounting (BA 211,212)	6
Wood Technology and Utilization (FP 210)	4
Mensuration (F 224)	5
Physical education	3
[1]Defense education or approved electives	16
	51

Junior Year

English Composition (Wr 323)	3
Quantitative Methods (BA 201, 202, 203) or Mathematical Models (IE 271, 272)	9–6
Wood Structure (FP 311)	4
Introduction to Wood Chemistry (FP 370)	4
Wood and Cellulose Physics (FP 314)	4
Mechanical Properties (FP 321)	4
Wood Drying and Treating (FP 330)	4
Logging Methods (FE 392)	3
Approved electives	16–19
	51

Senior Year

Mechanical Properties (FP 422)	3
Wood Adhesives and Coatings (FP 425)	3
Plywood, Laminated and Composite Products (FP 464)	3
The Lumber Plant (FP 451)	3
Wood Industry Problems (FP 452)	3
Forest Products Merchandising (FP 453)	3
Forest Economics and Regulation (F 434, 435)	9
Seminar (FP 407)	1
Approved electives	23
	51

WOOD SCIENCE OPTION

Sophomore Year

	Hours
English Composition (Wr 222)	3
General Physics (Ph 201,202,203)	12
Principles of Economics (Ec 201,202)	6
Calculus (Mth 113,211)	8
Wood Technology and Utilization (FP 210)	4
Physical education	3
[1]Defense education or approved electives	15
	51

Junior Year

English Composition (Wr 323)	3
Statistics (St 311,312, or St 451,452)	6–8
Wood Structure (FP 311)	4
Wood and Cellulose Physics (FP 314)	4
Mechanical Properties (FP 321)	4
Wood Drying and Treating (FP 330)	4
Organic Chemistry (Ch 226-229 or Ch 334-339)	10–15
Approved electives	9–16
	51

Senior Year

Wood Chemistry (FP 470)	4
Mechanical Properties (FP 422)	3
Approved upper division courses in forest products	9
Seminar (FP 407)	1
Approved electives	34
	51

[1]Approximately 30 elective hours are required in courses related to biological, physical, chemical, and engineering sciences.

Courses in Forestry

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.

Because of the close proximity of the Peavy Arboretum, the McDonald Forest, the Dunn Forest, and other timber-growing tracts owned or administered by the School of Forestry, a good many of the laboratory periods for courses in Forest Engineering are conducted under field conditions.

Lower Division Courses

FE 123. Forest Engineering.
3 hours fall. 2 ① 1 ④
Measurement of distance, direction, and elevation. Prerequisite: trigonometry.

FE 222. Forest Engineering.
5 hours fall or spring. 3 ① 1 ⑥
Measurement of distance, direction, and elevation; topographic surveying; stadia; plane table; computation and plotting of field data. For forest management majors. Prerequisite: trigonometry and engineering drawing.

FE 223. Forest Engineering.
4 hours winter. 2 ① 1 ⑥
Topographic surveying; direct and indirect leveling; computing and plotting of field data; stadia and plane table. Prerequisite: FE 123; engineering drawing.

Upper Division Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

FE 323. Forest Engineering.
4 hours spring 3 ① 1 ④
Public land survey; polar and solar observation; triangulation; electronic surveying equipment; trilateration; Lambert grid system; theodolites. Prerequisite: FE 223.

FE 360. Northwest Logging.
4 hours winter. 2 ① 1 ⑥
A basic course in logging methods and equipment with particular application to the Pacific Northwest. Prerequisite: Mth 111; F 224; FE 223.

FE 361. Logging Roads.
3 hours winter 2 ① 1 ③
Design of logging roads. Prerequisite: F 220; G 221.

FE 392. Logging Methods.
3 hours winter 2 ① 1 ③
Relation between logging and forest production; felling and bucking; skidding, loading, hauling; relative merits of various methods.

FE 401. Research.
FE 403. Thesis.
FE 405. Reading and Conference.
FE 406. Projects.
FE 407. Seminar.
Terms and hours to be arranged.

FE 423. Forest Engineering. (g)
5 hours fall. 3 ① 1 ⑥
Public land survey; polar and solar observations; triangulation; Lambert grid system; logging road reconnaissance and surveys; horizontal and vertical curves; earthwork; road design. For forest management students only. Prerequisite: FE 222.

FE 461. Logging Plans. (g)
5 hours fall. 2 ① 1 ③ 1 ⑥
Basic logging plans; analysis of timbered areas for development of logging operations; preliminary transportation plans. Prerequisite: FE 323,360,361.

FE 462. Logging Transportation. (g)
5 hours winter. 2 ① 1 ③ 1 ⑥
Working plans from data obtained in FE 461; development of transportation systems. Prerequisite: FE 461.

FE 463. Logging Costs. (g)
5 hours spring. 2 ① 1 ③ 1 ⑥
Management control; economic theory of location and construction; costs of surveys, construction, operation, and maintenance. Prerequisite: FE 462; FP 321.

FE 481. Production Planning and Control in Logging. (G)
4 hours spring. 3 ① 1 ③
Collecting and analyzing field data. Mathematical models of cost and performance of principal phases of logging. Work scheduling procedures; inventory control; mechanics of yarding; new and experimental logging equipment; simulation; linear programing. Prerequisite: FE 360 or FE 392.

Graduate Courses

See also courses marked (g) or (G) above.

FE 501. Research.
FE 503. Thesis.
FE 505. Reading and Conference.
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 development in logging methods and equipment.

FE 561,562,563. Logging Engineering.
5 hours each term. 2 ① 1 ③ 1 ⑥
Logging plans and timber transportation systems.

FOREST MANAGEMENT

The forest management core curriculum includes basic courses in science and social science plus professional courses designed to prepare students to manage the forest resource on a multiple-use basis. Students have the opportunity to specialize through three options including forest administration, forest science, and forest recreation.

The administration option provides added background in such areas as engineering, economics, and business. The science option prepares the student for graduate work in areas of forest science such as pathology, entomology, ecology, physiology, and genetics. The recreation option fills a need for those students particularly interested in managing the forest environment for use by recreationists.

Forestry in the Pacific Northwest is emphasized, but the principles and concepts involved are universal.

Lower Division Courses

F 111. Introduction to Forestry.
4 hours fall. 3 ① 1 ③
Forest resource use alternatives; management problems and policies of forest industries and agencies; foresters' roles in increasing wood, water, recreation, and forage values; site visits to observe problems and operations. Restricted to forestry students.

F 153. Tree Identification.
3 hours fall and spring. 1 ① 2 ②
Principal Pacific Coast timber trees; range, occurrence, size, growth, form; climate, soil, moisture requirements, value; wildlife uses.

Sls 210. Soils.
See SCHOOL OF AGRICULTURE.

F 220. Aerial Photointerpretation.
3 hours any term. 2 ① 1 ③
Principles and techniques of forest photointerpretation, mapping, and remote sensing.

F 224. Mensuration.
5 hours any term. 3 ① 1 ⑥
Measurement of standing and felled timber and timber products. Prerequisite: FE 123 or FE 222; F 153 or F 254; F 220.

F 254. Dendrology.
4 hours fall or spring. 1 ① 3 ②
Principal timber trees of the United States with special emphasis on Western species; characteristics, classification, identification. Prerequisite: Bot 201.

F 260. Conservation of Natural Resources. 3 hours winter. 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

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

F 327. Forest Biometrics.
5 hours any term. 3 ① 2 ③
Application of mensurational and statistical principles and techniques in the determination of growth and yield of forest trees and stands.

F 341. Forest Ecology.
5 hours spring. 4 ① 1 ③
Influence of environmental factors on the development, distribution, and succession of forest vegetation. Prerequisite: Sls 210; Bot 330; Bot 415; Ent 423.

Rng 341. Range Resources.
See School of Agriculture.

F 344. Farm Forestry.
3 hours spring. 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 1970-71.

F 364. Forest Recreation.
3 hours winter. 2 ① 1 ③
Development of outdoor recreation in U. S.; recreation demands and resource needs; policies and practices of land management agencies; legislative proposals.

F 365. Forest Recreation Planning.
3 hours spring. 2 ① 1 ③
Inventory and evaluation of forests and other wild lands as bases for recreation policy, planning, and management decisions. Prerequisite: F 364.

F 401. Research.
F 403. Thesis.
F 405. Reading and Conference.
F 406. Projects.
F 407. Seminar.
Terms and hours to be arranged.

F 415. Forest Administration. (g)
3 hours any term. 3 ①
Administrative organization and personnel work of public and private forest agencies. Prerequisite: senior standing.

Bot 415. Forest Pathology.
See School of Science.

Ent 423. Forest Entomology.
See School of Science.

F 424. Watershed Management. (g)
3 hours winter. 2 ① 1 ③
Forest management applied to integrated use of all forest resources for the production of water. Prerequisite: senior standing.

F 427. Industrial Forestry. (G)
3 hours winter. 3 ①
Operation of industrial forest properties in the Northwest. Prerequisite: senior standing.

F 432,433. Forest Management Operations. (g) 5 hours fall, 4 hours winter. 4 ① 1 ③; 3 ① 1 ③
The cycle of forest development from establishment to harvest, including operations such as reforestation, silvicultural practices, fire control, and logging methods. Prerequisite: junior standing in forestry. For forest management majors, prerequisite F 327; F 341 or Bot 341; Ent 423.

F 434,435. Forest Economics and Regulation. (g) 4 hours fall, 5 hours winter. 3 ① 1 ③; 4 ① 1 ③
Valuation of forest assets including land, stumpage, capital, and equipment; economics of utilization, forest credit, taxation, marketing, and development of plans for achieving sustained-yield management. Prerequisite: senior standing in forestry; Ec 202; FP 210. For forest engineering and forest management majors, F 432, F 433 previously or parallel.

F 436. Multiple-Use Decisions. (g)
3 hours spring. 2 ① 1 ④
Integration of biological, economic, mathematical, and sociological characteristics of the forest system in making resource management decisions within the framework of multiple-use. Prerequisite: Rng 341; F 364,424,433, 435.

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 433; senior standing.

F 464. Forest Recreation Management. (g) 3 hours fall. 3 ①
Management of public and private outdoor recreation areas. Integration of recreation with other land management objectives. Prerequisite: F 365.

Graduate Courses

See also courses marked (*g*) or (*G*) above.

F 501. Research.
F 503. Thesis.
F 505. Reading and Conference.
F 506. Projects.
F 507. Seminar.
Terms and hours to be arranged.

F 511. Economics of Private Forestry.
3 hours spring. 3 ①
Economic and financial problems including insurance, forest credit, cost analysis, and practical problems in forest finance. Prerequisite: F 434. Offered alternate years. Offered 1970-71.

F 512. Economics of the Forest Resource. 3 hours fall. 3 ①
Place of forests in national and regional economy; forest industries; forest ownership, taxation, and public policy. Prerequisite: F 434.

F 513. Economics of Forest Utilization.
3 hours winter. 3 ①
Factors affecting costs and returns in forest industries. Prerequisite: F 434. Offered alternate years. Offered 1970-71.

F 514. Forest Land Use.
3 hours winter. 3 ①
Economic planning applied to problem of coordinating forest land uses with one another and with other forms of land use. Prerequisite: F 435. Offered alternate years. Not offered 1970-71.

F 515. Forest Administration.
3 hours spring. 3 ①
Organization, administration, operating problems of public and private forestry agencies.

F 519. Photogrammetry.
3 hours winter. 1 ② 2 ③
Use of multiplex and Balplex plotters in topographic mapping and road location. Prerequisite: F 220; FE 423. Offered alternate years. Offered 1970-71.

F 520. Aerial Photo Mensuration.
3 hours spring. 1 ① 2 ③
Use of aerial photographs in forest inventory; photomensurational techniques in preparation of stand and tree volume tables; planning large scale photomensurational projects. Offered alternate years. Not offered 1970-71.

F 521. Research Methods.
3 hours fall. 3 ①
Research project analyses and working plans, investigative procedures, principles and practices in scientific writing.

F 522. Multiple-Use Management.
3 hours spring. 2 ① 1 ③
Forest regulation, continuous forest inventory, and multiple-use management planning. Prerequisite: F 436.

F 524. Forest Mensuration.
3 hours spring. 2 ① 1 ③
Growth determination; mensurational aspects of level of growing stock; variable plot sampling; current forest inventories. Prerequisite: F 327; St 451.

F 531. Fire Control.
3 hours winter. 2 ① 1 ③
Forest-fire plans, their preparation and execution. Offered alternate years. Offered 1970-71.

F 534. Forest Hydrology.
3 hours fall. 2 ① 1 ③
Interception, transpiration, evaporation, and sedimentation with emphasis on aspects dealing with forest practice as related to stream flow. Prerequisite: F 424. Offered alternate years. Not offered 1970-71.

F 535. Water Quality and Forest Land Use.
3 hours winter. 3 ①
Water quality parameters; analytical methods; land use effects; municipal watershed management. Prerequisite: F 424. Offered alternate years. Not offered 1970-71.

F 536. Environmental Measurement Techniques.
3 hours spring. 2 ① 1 ③
Principles of design, evaluation, and operation of sensor-recorder systems suitable for measuring environmental parameters of temperature, humidity, wind, and radiation with particular reference to the forest environment. Prerequisite: AtS 482.

F 541,542,543. Silviculture.
3 hours each term. 3 ①; 3 ①; 2 ① 1 ③
Advanced forest ecology, silvicultural practices, and forest regeneration. Prerequisite: for *F 541*, Plant Pbysiology; Plant Ecology.

F 544. Forest Genetics
3 hours winter. 3 ①
Plant genetics principles applied to silvicultural practices. Prerequisite: F 341 or Bot 341; Z 341.

FOREST PRODUCTS

Two curricula are offered to prepare men for diversified careers in the forest products and allied industries. Both programs provide a broad education in wood science, a background in science, wood processing principles, wise use of wood and fiber products, and correlated general education including communications, social sciences, and humanities.

The curriculum in Wood Industries Management is equally adequate in preparation for production, sales, technical services, and utilization employment in the broad forest products field. The curriculum in wood science provides a base for advanced degree work in wood science and closely related fields for men interested primarily in research, product development, and academic careers. Employment opportunities are excellent in these broad areas.

Through careful choice of electives, the student, under staff guidance, has the opportunity to select a wide range of courses in many fields—wood chemistry, pulp and paper, wood technology and engineering, science, business, economics, social sciences and humanities, architecture, forest management, and forest engineering.

Advanced degrees are offered in wood science, forest products economics, wood industries management and processing, and allied subjects. A number of students have earned second bachelor's degrees in science or business and technology by meeting requirements for concurrent degrees. The Master of Science and Master of Business Administration degrees are also open to qualified candidates. Concurrent bachelor's degrees and master's degrees require approximately one additional full-time year of study and/or research; doctor's degrees generally require three years following completion of the bachelor's degree.

Lower Division Course

FP 210. Wood Technology and Utilization. 4 hours fall. 3 ① 1 ③
Characteristics of wood related to growth, manufacturing, treatment, grading, and use of products.

Upper Division Courses

Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

FP 311. Wood Structure.
4 hours fall. 2 ① 2 ③
Fine structure of wood and bark; variability of wood within and among species; identification of wood and fibers. Prerequisite: Bot 201.

FP 314. Wood and Cellulose Physics.
4 hours winter. 3 ① 1 ③
Density and specific gravity; hygroscopic nature of wood; wood-fluid relationships; electrical, thermal, and sonic properties of wood and fiber composites. Prerequisite: FP 311; Ph 202.

FP 321. Mechanical Properties.
4 hours spring. 3 ① 1 ③
Statics and strength of materials; anisotropic properties of wood and wood-base materials; variation in properties of wood products as functions of time, temperature, moisture content, and specific gravity; principles of determination of properties of wood products. Prerequisite: Ph 201; Mth 111 or 163.

FP 330. Wood Drying and Treating.
4 hours spring. 3 ① 1 ③
Wood-fluid relationships involved; principles and practices; equipment; performance of finished products in use; agencies of deterioration; specifications; plant visits. Prerequisite: FP 314.

FP 370. Introduction to Wood Chemistry. 4 hours fall. 4 ①
Lignin, polysaccharides, and extractives of wood and bark; distribution, isolation, structure, and relationships with anatomy, properties, and uses. Prerequisite: one year of college chemistry.

FP 401. Research.
FP 403. Thesis.
FP 405. Reading and Conference.
FP 406. Projects.
FP 407. Seminar.
Terms and hours to be arranged.

FP 422. Mechanical Properties. (g)
3 hours fall. 1 ① 2 ③
Standard tests and stress calculations; creep, strength, and strength distribution; codes; standards; trade associations; applications of forest products; design aids. Prerequisite: FP 321.

FP 425. Wood Adhesives and Coatings.
(g) 3 hours winter. 2 ① 1 ③
Fundamental properties; surface properties of wood; adhesion principles; coating techniques and commercial practices. Prerequisite: FP 311.

FP 451. The Lumber Plant. (g)
3 hours fall. 2 ① 1 ③
Grading principles; manufacturing plants, equipment selection, layout; production practices; plant visits. Prerequisite: FP 210; senior standing.

FP 452. Wood Industry Problems.
(g) 3 hours winter. 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 210; senior standing.

FP 453. Forest Products Merchandising. (g) 3 hours spring. 3 ①
Trade practices and customs pertaining to distribution of forest products, wholesale and retail. Prerequisite: FP 210; senior standing.

FP 464. Plywood, Laminated, and Composite Products. (g)
3 hours spring. 2 ① 1 ③
Production, properties, and uses of veneer, plywood, laminated products, hardboards, and particleboard; equipment used and commercial practices; plant visits. Prerequisite: FP 210; senior standing.

FP 470. Wood Chemistry. (G)
4 hours winter. 4 ①
Chemistry of wood polysaccharides, lignin, polyphenolics, and other extractives; present and potential utilization; analytical procedures specific to chemical constituents of wood and bark. Prerequisite: Ch 229 or 339.

FP 480,481. Pulp and Paper Processes.
(G) 3 hours winter and spring.
3 ①; 2 ① 1 ③
Chemistry and technology of fundamental processes of the pulp and paper industry including pulping, bleaching, beating, sheet forming, filling, sizing, coloring, and coating. Paper testing and relationship of fiber properties. Prerequisite: FP 470 previously or parallel.

Graduate Courses

See also courses marked (g) or (G) above.

FP 501. Research.
FP 503. Thesis.
FP 505. Reading and Conference.
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 510. Wood Microtechnique.
2 hours. 2 ③
Preparation, sectioning or maceration, staining, and mounting of slides of wood and wood-base materials for microscopic study. Prerequisite: FP 311.

FP 511. Forest Products Photographic Techniques. 2 hours. 2 ③
Application of macro and micro photography to wood technology problems. Prerequisite: FP 311.

FP 512 Wood Anatomy.
4 hours. 3 ① 1 ③
Development, structure, and function of cells and tissues in woody plants; cell types and distribution; interpretation of electron microscopy and other techniques used in the study of fine structure of wood. Prerequisite: FP 311.

FP 513. Wood Growth-Quality Relationships.
3 hours winter. 3 ①
Recent advances in relationship of conditions of growth with wood and fiber structure and properties, cell differentiation and development, and ultra-structure of plant cell walls. Prerequisite: FP 512. Offered alternate years. Offered 1970-71.

FP 514. Advanced Wood Physics.
4 hours. 3 ① 1 ③
Wood and fiber composites in terms of anisotropic elasticity; rheology; fracture; mass, heat, and charge transport; dielectric theories; thermodynamics; wood-fluid interaction; fiber optics; research techniques. Prerequisite: Mth 211; Ph 203; FP 314.

FP 515. Selected Topics in Wood Physics.
3 hours spring. 3 ①
Advanced course in wood physics and its application to special fields of study, according to student needs. Topics will include: (1) Advanced timber mechanics, (2) Surface properties of wood and composites, (3) Theories of dielectrics, (4) Thermodynamics of wood and cellulose, (5) Mass, heat, and charge transport, (6) Wood-fluid relationships. Prerequisite: FP 514. Offered alternate years. Offered 1970-71.

FP 531. Wood Industry Management.
3 hours winter. 3 ①
Application of communication theory, operations research, and modern management techniques to the unique problems and situations encountered in the forest products industry. The structure, analysis, and operation of wood using firms. Prerequisite: FP 210; BA 203; or IE 272. Offered alternate years. Not offered 1970-71.

FP 540. Wood Technology.
3 hours spring. 3 ①
Technological aspects of wood-fluid relationships involved in wood seasoning and preservation; applications and ramifications of recent developments in these areas; application of principles of adhesion and coating practices related to wood. Prerequisite: FP 330. Offered alternate years. Offered 1970-71.

FP 570. Selected Topics in Wood Chemistry.
3 hours 3 ①
Recent advances in wood chemistry including biogenesis of cell wall and extractive components, advanced carbohydrate chemistry, "aging" in wood, heartwood formation, chemistry of flavonoids, tannins, wood resins, and terpenes. Prerequisite: FP 470.

FP 580. Selected Topics in Pulp and Paper.
3 hours fall. 3 ①
Topics include unit process in pulp and paper; high polymer technology in pulp and paper; optical behavior of paper, colloidal properties of fibers and additives; paper machinery variables; paper specialties; printing and conversion; air and water pollution problems. Prerequisite: FP 470 or FP 481. Offered alternate years. Offered 1970-71.

THE SCHOOL OF HOME ECONOMICS AT OREGON STATE UNIVERSITY provides both a liberal and a professional education. The program of the School helps students prepare for their responsibilities as individuals, family members and citizens, as well as for gainful work.

The curricula include background in the arts and humanities, the physical and biological sciences, and the social sciences. These fundamental disciplines form the basis for professional work in home economics.

Home Economics represents a group of studies centered around the needs of the home, the family, and its individual members. The principles derived from the basic disciplines are applied to problems of food, shelter, clothing, management of resources, and interpersonal relations.

Professional fields for which students are prepared include teaching at various levels, e.g., nursery school, secondary school, and continuing education for adults; promotion, experimentation, writing, and advertising of foods, equipment, and textiles; merchandising and fashion; hospital dietetics and institutional food service; extension service at home or abroad; social work and public health. Students are also prepared for graduate study leading to research and college and university teaching.

School of Home Economics

FACULTY

As of January 1970

BETTY E. HAWTHORNE, Ph.D., Dean of the School of Home Economics.

AVA MILAM CLARK, M.A., Dean Emeritus.

WINNIFRED KEIL FULMER, M.S., Head Adviser.

CONSTANCE PLANTS, B.S., Coordinator, Learning Resource Center.

Emeritus Professors BAKER, BRANDON, CLARK, EDABURN, FINCKE, GARRISON, GATTON, MACK, PATTERSON, PRENTISS, TANK, VAN HORN, WARE, WILSON.

Clothing, Textiles, and Related Arts: Professor PETZEL (head).
Associate Professors DIEDESCH, GATES, LEDBETTER, MOSER.
Assistant Professors BUBL, GRANT, NIXON, WELLS.
Instructors SCORGIE, THIEL.

Family Life: Professor O'NEILL (head).
Associate Professor CARLIN.
Assistant Professors KING, MASSEY, POOLE.
Instructors ABRAHAM, MORRIS, NAKADA, SMITH.

Foods and Nutrition: Professors WOODBURN (head), CHARLEY, HAWTHORNE, MACKEY, STORVICK, YEARICK.
Associate Professor MILLER.
Assistant Professors BARTE, BUSSARD, EAST, JOHNSON, PETERS, WALLACE.
Instructor CALKINS.

Home Economics Education: Associate Professor LEE (head).
Professors DUBOIS, MCQUESTEN; Supervisor and Teacher Educator GOODWIN.
Assistant Professors ADIX, GRIEVE.

Home Management: Associate Professors MCHUGH (head), PLONK.
Assistant Professors SINNARD, VARS.
Instructor WOOD.

Institution Management: Professor HARGER (head).
Associate Professor CLEAVELAND.
Assistant Professors BOKORNEY, WIARD.
Instructor WICKMAN.

Home Economics Extension: Professors FRASIER, SCALES, STRAWN.
Associate Professors ABBOTT, BROWN, CARLSON, FUNK, JOHNSTON, REDMAN, SEAT.
Assistant Professor FOREST.
See FEDERAL COOPERATIVE EXTENSION SERVICE, page 200.

Home Economics Research: Professors STORVICK (chairman), CHARLEY, MACKEY, WOODBURN, YEARICK.
Associate Professor MILLER.
Assistant Professors BENSON, BUBL, PETERS.
Senior Instructor EDWARDS.
Instructor WOODRING.

Curricula in Home Economics

Degree Programs

The Bachelor of Science (B.S.) and Bachelor of Arts (B.A.) degrees are offered in all departments. Advanced degrees in home economics offered through the Graduate School are the Master of Arts (M.A.), Master of Science (M.S.), Master of Home Economics (M.H.Ec.), and Doctor of Philosophy (Ph.D.). Master's degrees are offered with a major in any of the departments. A student may work toward the M.H.Ec. degree in general home economics. The Ph.D. is offered in foods, nutrition, child development, family relations, and home management.

Graduate students in home economics have an opportunity to work with the faculty in research projects. The School cooperates with the Agricultural Experiment Station in research programs and undertakes studies supported by federal, state, private, and general research funds.

Transfer students and students whose education is interrupted—in addition to requirements outlined below:

(1) Must take at least one approved course in each of the basic subject matter departments in home economics in residence at OSU within five years of graduation.

(2) Must have one year of science and one year of social science (not necessarily in residence at OSU) within ten years of graduation.

Additional recency requirements for the several areas of concentration may be prescribed by the departments concerned.

The Honors Program in this School is coordinated with the programs in other Schools and administered by the Director of the University Honors Program (see page 28). Information concerning eligibility and application forms may be obtained from the Director.

Special Programs

One-year and two-year students.

Students who are interested in home economics but who are not candidates for degrees may plan, with the help of their advisers, combinations of courses to meet individual capabilities and interests. In such programs students may include a variety of courses in other schools and departments on the campus for which they have the necessary background.

Correspondence Study.

Some home economics courses are offered by correspondence through the Division of Continuing Education of the Oregon State System of Higher Education.

The Merrill-Palmer Institute

The School of Home Economics carries an affiliation with the Merrill-Palmer Institute in Detroit. Students interested in any phase of child development, family relations, or social service work may apply for study at the Merrill-Palmer Institute during one term of their junior or senior years. For information about applications, see the dean of the School of Home Economics.

Core Curriculum

All students fulfill requirements of one core curriculum for graduation from the School of Home Economics. The core includes courses in home economics, science, social science, and humanities.

Home Economics

- 12 hours in clothing, textiles, and home furnishings: CT 210,211,250, 331.
- 11-14 hours in foods and nutrition: FN 225; 215 or 220,221; 313.
- 9 hours in child development and family life: FL 225,311,322.
- 11–12 hours in household equipment, home management, and finance: HM 240,330,341, and 450 or approved alternate.
- 1 hour in home economics orientation: HEc 101.
- 9 hours of upper division electives in home economics subjects. See AREAS OF CONCENTRATION on next pages.

Humanities ..... 27 hours

- 9 hours of English Composition
- 3 hours of Speech
- At least 3 other areas, one in depth (i.e. 5 hours), to include:
  - 2 hours of Art: Basic Design
  - Others selected from art; architecture, including landscape architecture; communications (writing, speech and journalism); literature; modern languages; music; philosophy; religious studies.
  - (No more than 3 hours in the performing arts)

Social and Natural Sciences ..... 45 hours

- Sciences—one laboratory sequence* in physical or biological science area and at least one course in the other area, selected from:
  - Physical sciences—chemistry, physical science, physics
  - Biological sciences—general biology, botany, microbiology, physiology, zoology.
- Social Sciences—two sequences* selected from two of the following: psychology, sociology, economics, cultural anthropology.
- Additional social and/or natural sciences to fulfill 45 hour requirement:
  - Intermediate algebra (Mth 50) or demonstrated proficiency.
  - Others selected from: history, political science, anthropology, geography, biochemistry, entomology, general science, geology, mathematics, oceanography, statistics.

* Sequence: defined as course(s) that cover(s) the fundamentals of a subject (first level of knowledge) whether as one term, 5 credits, or year long, 15 credits.

Other requirements

- Physical Education: five terms in activity courses and one term in general hygiene required for senior standing.
- Additional courses chosen from AREAS OF CONCENTRATION listed on the following pages to meet graduation requirements.

Freshman Year

	Hours
Basic design (Art 195)	2
Additional art and/or other Humanities	5–9
Science sequence with laboratory	9–13
English Composition (Wr 121)	3
Social Science sequence	8–9
Speech	3
Intermediate Algebra, if not exempt (Mth 50)	(2)
Introduction to Home Economics (HEc 101)	1
Nutrition (FN 225)	3
Clothing and Textiles	6
Physical education	3–4
Electives	8–0

Sophomore Year

Foods (FN 215 or 220,221)	5–8
Child Development (FL 225)	3
Clothing and Textiles	3
Management in Family Living (HM 240)	2
Social Science sequence	5–9
English Composition (Wr 222)	3
Additional Science	3–4
Humanities	8–4
Physical education	3–4
Additional Science and/or Social Science	6–10

Junior Year

English Composition (Wr 323)	3
Meal Management (FN 313)	3
Personal and Family Finance (HM 341)	3
Child Development (FL 311)	3
Household Equipment (HM 330)	3
Home Furnishing (CT 331)	3
Humanities	6
Electives or courses in area of concentration	24

Senior Year

Family Relationships (FL 322)	3
Home Management House (HM 450) or alternate	3–4
Upper division electives in home economics	9
Electives	32

AREAS OF CONCENTRATION

Students elect an area of concentration to prepare for professional work. Nine hours of approved home economics courses in the core requirements (only three from any one department) may be replaced with courses that have been approved, except in Home Economics Education, Home Economics with Communications, and General Home Economics. Students should consult their advisers as soon as possible in their college careers to plan their total programs.

Child Development and Family Life

Hours

Core in home economics, exclusive of upper division electives ....43–44[1]

Family Life and Home Management.. 15
Development in Middle Childhood and Adolescence (FL 413); The Nursery School Child (FL 425); Selected Topics in Family Life (FL 481); Management Problems in Home-Community Relations (HM 445); choice of FL 430 or any FL seminar.

Social and natural sciences 54–61

Sciences in core 15–22
To include Physiology (Z 331, 332)

Social sciences 24
To include Cultural Anthropology (Anth 207,208,209); Psychology (Psy 201,202); Sociology (Soc 204,205,206).

Additional social and natural sciences 15
Nine upper division hours of psychology and/or sociology; Genetics (Bi 341); Introduction to Statistics (St 311).

Humanities in core 27

Physical education and hygiene in core 7

Electives 47–38

192

Clothing, Textiles, and Related Arts[2]

Hours

Core in home economics, exclusive of upper division electives .....45–46[1]

Clothing, textiles, and related arts 15
Consumer Buying (CT 350)
For Clothing or Interiors emphasis: Historic Costume (CT 309)
For Interiors or Textiles emphasis: Historic Textiles (CT 460)
Additional approved CT courses, at least 3 hours upper division.

Recommended additional approved courses 21

For Clothing emphasis:
General Anthropology (Anth 103)[3]; Introduction to Social Research (Soc 327).

For Interiors emphasis:
Graphics (AA 111); Design Studio I (AA 187); Elements of Interior Design (AA 223); Interior Design (AA 288); Organization and Use of House Space (HM 335); House Planning in Relation to Function (HM 435); Economics of the Family (HM 441); Environmental Housing (AE 451).

For either Clothing or Interiors emphasis:
Basic Design (Art 197); Basic Drawing (Art 105); Introduction to Art History (Art 261, 262,263).

For Textiles emphasis:
Organic Chemistry[3], Quantitative Analysis[3], Algebra, Trigonometry, Analytic Geometry, Calculus, Microbiology[3], Physics[3], Statistics.

For business combined with emphasis in Clothing, Interiors, or Textiles:
Accounting (BA 211 or 217); Marketing (BA 312); Selling and Promotion (BA 471); Advertising (BA 472); Retail Management (BA 474); Consumer and Buyer Behavior (BA 476); Human Relations in Business (BA 361); Group Dynamics (Psy 361).[3]
Other related courses approved by department head.

Social and natural sciences 45
Sciences in the core—general chemistry required for Textile emphasis.

Social science in core—two sequences to be chosen from Cultural Anthropology (Anth 207, 208,209); Economics (Ec 201, 202,203), or (Ec 213,214). Ec 115 if no sequence in economics; Sociology (Soc 204,205, 206); psychology recommended.

Additional social sciences
History sequence required. History of Western Civilization preferred.

Humanities in core 27
To include Fundamentals of Speech (Sp 111); Basic Design (Art 196); Housing and Architectural Philosophy (AA 178).

Physical education and hygiene in core 7

Electives 32–28

192

Foods and Nutrition

Hours

Core in home economics, exclusive of foods and nutrition courses and upper division electives ..32–33[1]

Foods and nutrition 30
Nutrition (FN 225,381); Foods (FN 220,221); Meal Management (FN 313)..... (18)

Foods and nutrition electives .....(12)
Food Demonstrations (FN 410); Family Food Buying (FN 411), Home Food Preservation (FN 414); Cultural Aspect of Foods (FN 416), Nutrition in Disease (FN 420); Child Nutrition (FN 421), Recent Advances in Foods (FN 425), Experimental Food Studies (FN 435), Research (FN 401), Reading and Conference (FN 405), Seminar (FN 407), Quantity Food Production (IM 311).

Science 42–52
General Chemistry (Ch 201,202, 203,207), *or* (Ch 204,205,206), *or* (Ch 104,105,106,107); Organic Chemistry (Ch 226,227, 228,229); Quantitative Analysis (Ch 234); Introduction to Biochemistry (BB 350); Intermediate Algebra (Mth 51), Trigonometry (Mth 60); Microbiology (Mb 130 or 304,305), Physiology (Z 331,332).

Social science in core 13–18

Humanities in core 27

Physical education and hygiene in core 7

Electives 41–25

192

Home Economics Education

Hours

Core in home economics exclusive of upper division electives 43–46

Clothing Construction (CT 212) 3–0

Upper division home economics 10
Development in Middle Childhood and Adolescence (FL 413)[4]; Nursery School Child (FL 425)[4]; Home Management House (HM 450 or HM 460).

Social and natural sciences 45
Sciences in core
To include Physiology (Z 331, 332).

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[1] Nine hours of core courses may be replaced by approved electives.

[2] Emphasis may be placed on clothing, textiles, or interiors.

[3] May be counted as part of science or social science electives of core.

[4] Other home economics courses may be substituted if student has over 192 hours and wishes to reserve these for graduate credit or teaching certification.

Social sciences in core
To include Psychology (Psy 200); at least one course in economics and sociology with a sequence in one.

Additional social science and/or science

Humanities in core 27
To include Basic Design (Art 196); Housing and Architectural Philosophy (AA 178).

Physical education and hygiene 7

Education for:

Senior high school certification 21–35
School in American Life (Ed 310), Educational Psychology (Ed 312)[5], Methods in Reading (Ed 350), Special Secondary Methods (Ed 408d)[5], Student Teaching (Ed 416)[5] Seminar: Student Teaching (Ed 407), Seminar: Problems of Beginning Teachers (HEd 407), Organization and Administration of Homemaking Education (HEd 422), Psychology of Adolescence (Ed 461)[5], Homemaking Education in the Community High School (HEd 440) optional.

Junior high school certification.....6–3
Psychology of Childhood, (Ed 460) or FL 413, Junior High School (Ed 430 or Ed 484).

Electives 30–16

192

Home Economics with Communications

Hours

Core in Home Economics, exclusive of upper division electives 43–46

Home Economics Upper Division Electives 14–18

For Clothing and Textiles emphasis: Consumer Buying in Clothing and Textiles (CT 350); Historic Costume (CT 309) or Historic Textiles (CT 460); Approved electives in clothing and textiles, 12 hours.

For Foods and Nutrition emphasis: Nutrition (FN 325 or 381); Food Demonstrations (FN 410); Family Food Buying (FN 411); Approved upper division electives from Foods and Nutrition and/or Institution Management, 4-6 hours.

For General Home Economics emphasis: upper division electives to include at least one course from Clothing and Textiles, Family Life, Foods and Nutrition and/or Institution Management, and Home Management, 18 hours.

Communications courses 27
Fund of Speech (Sp 111); Radio, TV, Film Speaking (Sp 262); Journalism (J 111,112); Journalism Laboratory (J 121); Broadcast Journalism (J431) or 3 hours upper division speech or journalism. Approved electives from J 214,317,318,319,334; Sp 113, 121, 241, 267, 322, 363, 366, 367; BA 312, 361, 471, 472; Art 245; Wr 316.

Social and natural sciences 45
Sciences in core—For foods and nutrition emphasis; general chemistry, Physiology (Z 331, 332); Introductory Microbiology (Mb 130).

Social sciences in core
To include psychology sequence, at least one course in economics and sociology. (Economics sequence recommended.)

Additional social science and/or science

Humanities in core 27
To include Basic Design (Art 196); House Planning and Architectural Philosophy (AA 178).

Physical education and hygiene in core 7

Electives 32–22

192

Institution Management and Dietetics

Hours

Core in home economics, exclusive of foods and nutrition courses and upper division electives .....33–34[1]

Foods and nutrition 18
Nutrition (FN 225,381); Foods (FN 220,221); Meal Management (FN 313).

Institution management 14
Quantity Food Production (IM 311); Institution Organization and Administration (IM 430); Purchasing for Institutions (IM 440); Institution Experience (IM 450).

Business administration 6
Personnel Management (BA 467); Accounting (BA 217).

Approved electives 6
Reading and Conference (FN 405); Nutrition in Disease (FN 420); Child Nutrition (FN 421); Recent Advances in Foods (FN 425); Experimental Food Studies (FN 435); Personnel Management (BA 468); Human Relations in Business (BA 497); Institution Management (IM 405,406,407).

Educational Psychology (Ed 312) .. 3

Sciences 34–38
General Chemistry (Ch 201,202, 203,207) or (Ch 104,105,106, 107); Organic Chemistry (Ch 226,227,228,229); Introduction to Biochemistry (BB 350); Physiology (Z 331,332); Microbiology (Mb 130).

Social Sciences in core 13–14
To include general psychology and choice of economics or sociology sequence.

Humanities in core 27

Physical education and hygiene in core 7

Electives 31–25

192

Management, Family Economics, and Housing

Hours

Core in Home Economics, exclusive of upper division electives ....43–46[1]

Home Management 13
Management in Family Living (HM 440); Economics of the Family (HM 441); Organization and Use of House Space (HM 335)[2]; Home Management House (HM 450) or Management in the Home (HM 460).

Additional hours of HM courses approved by adviser 6
House Planning in Relation to Function (HM 435); Consumer Economics (HM 412); Family Housing (HM 439); Management Problems in Home-Community Relations (HM 445); HM 407 Seminars:
The Family and Economic Change, Work Simplification, Case Studies in Family Decision Making, Consumer Buying Decisions.

Social and natural sciences 45
Sciences in core
Social sciences in core
To include sequence in economics, psychology, and sociology.
Additional science
Introduction to Statistics (St 311)

Humanities in core 27
To include House Planning and Architectural Philosophy (AA 178).

Physical Education and Hygiene 7

Electives 51–48

192

[5] These 21 hours in education are the minimum required to have Home Economics-Education on diploma. The student must take all others except HEd 440 to complete vocational home economics and junior and senior high school teaching norms.

[1] Nine hours of core courses may be replaced by approved electives.

[2] Persons emphasizing Family Economics may substitute HM 439 for HM 335.

Nursery School Teaching

	Hours
Core in home economics, exclusive of upper division electives	43–46[1]
Family Nutrition (FN 325)	2
Family Life Parent Education (FL 423); Nursery School Child (FL 425); Educational Programs for Preschool Children (FL 427); Supervised Nursery School Experience (FL 429); choice of FL 428,413,430, or 481.	21–24
Social and natural sciences	45
Sciences in core To include Physiology (Z 331, 332).	
Social sciences in core To include General Psychology (Psy 200); Sociology (Soc 204, 205,206), Cultural Anthropology (Anth 207,208,209), or one course in sociology if not taken as a sequence.	
Humanities in core To include art (3 additional hours); Children's Literature (Eng 487); music 3 hours).	27
Physical education and hygiene in core	7
Electives	45–41
	192

[1] Nine hours of core courses may be replaced by approved electives.

General Home Economics

General Home Economics allows students to develop individual programs for specialized interests. Students interested in extension work may take General Home Economics or elect an area of concentration.

Home Economics and Social Welfare

Students interested in preparing for professional opportunities in social welfare as caseworkers, as home economics consultants to social agencies, or as professionals in social welfare programs may elect to concentrate in the areas of Management, Family Economics, and Housing, or Child Development and Family Life, or in General Home Economics. Emphasis on courses in sociology, psychology, economics, and government also prepares the student for graduate work in the related areas of home economics or in Social Work.

Courses in Home Economics

CLOTHING, TEXTILES, AND RELATED ARTS

The Department of Clothing, Textiles, and Related Arts offers instruction in the areas of clothing, textiles, and home furnishings.

Advanced courses are offered for students preparing for positions in retailing, interiors, promotional work for manufacturers of clothing, textiles, and home furnishings, and for graduate work leading to research and college teaching.

Graduate work is offered in the three areas leading to the Master of Arts and Master of Science.

Lower Division Courses

CT 210. Clothing Construction.
3 hours. 1 ① 2 ②
Principles of selection, construction, and fitting; management problems.

CT 211. Clothing Selection.
3 hours. 3 ①
Artistic, economic, and psychological factors affecting the selection of adult clothing.

CT 212. Clothing Construction.
3 hours. 3 ②
Principles of pattern alteration and fitting. Organization and creativity in construction techniques and design. Prerequisite: CT 210, 211.

CT 231. Home Furnishing.
3 hours. 2 ① 1 ②
Selection of a plan for a home and its furnishings in relation to function, beauty, and cost.

CT 235. Textile Design: Weaving.
3 hours. 3 ②
Decorative art involving line, texture, and color as applied to problems in weaving.

CT 250. Textiles. 3 hours. 2 ① 1 ②
Properties, identification, selection, use, and care of textile fibers and fabrics.

Upper Division Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

CT 309. Historic Costume.
3 hours. 3 ①
Relation of historic costume to the social and cultural environment and to modern dress. Prerequisite: CT 250; one year of history.

CT 310. Flat Pattern and Draping.
3 hours. 3 ②
Flat pattern study; draping on half-size dress forms; principles of fitting and construction of afternoon and evening garments. Prerequisite: CT 212,250.

CT 311. Costume Design.
2 hours. 1 ① 1 ②
Designing fashionable and appropriate ensembles for various occasions and figure types. Prerequisite: CT 210,211,250; Art 196.

CT 312. Tailoring. 4 hours. 2 ① 2 ③
Principles of tailoring applied to the construction of a coat or suit. Prerequisite: CT 212, 250.

CT 320. Clothing for Children.
3 hours. 1 ① 1 ② 1 ③
Selection and construction of garments related to child development, good design, and the saving of time, money, and energy. Prerequisite: CT 212,250.

CT 331. Home Furnishing.
3 hours. 1 ① 2 ②
Furnishing a home for comfort, beauty, convenience, and economy; influence of historic design. Prerequisite: CT 250; AA 178; Art 196; one year of history.

CT 332. Home Furnishing.
3 hours. 1 ① 1 ② 1 ③
Design and techniques applied to home furnishing articles. Prerequisite: CT 210; CT 231 or 331. CT 212 recommended.

CT 335. Textile Design.
3 hours. 3 ②
Line, texture, and color; contemporary weaving techniques. Prerequisite: Art 196; CT 250.

CT 350. Consumer Buying in Clothing and Textiles. 3 hours. 3 ①
Problems and aids in purchasing clothing and textiles from consumer's point of view. Prerequisite: CT 210,211,250; Ec 115 or 201.

CT 351. Quantity Textile Purchasing.
3 hours. 3 ①
Selection, purchase, and care of textiles by manufacturers, wholesalers, retailers, and institutions; use of specifications. Prerequisite or parallel: CT 350.

CT 352. Textiles for Interiors.
2 hours. 2 ①
Types, qualities, and maintenance of functional and decorative fabrics for homes and public buildings. Use of specifications, standards, and legislation. Prerequisite: CT 250. CT 350 recommended.

CT 353. Textile Yarns and Fabrics.
3 hours fall. 1 ① 2 ②
Measurement of physical properties of yarns and fabrics. Evaluation of data in relation to serviceability. Prerequisite: CT 250; one year of chemistry or physics.

CT 355. Textile Processing.
3 hours. 3 ①
Processing and manufacturing of fibers, yarns, and fabrics. Prerequisite: CT 250.

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 406. Projects.
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. 1 ① 1 ② 1 ③
Fitting experiences with varied designs and figures. Creative use of fabrics. Prerequisite: CT 310 (CT 309 and 311 recommended). LEDBETTER.

CT 411. Costume Design. (G)
3 hours. 1 ① 2 ②
Creative designing of clothing and accessories for women. Prerequisite: CT 212,309,311. DIEDESCH.

CT 413. Recent Advances in Textiles. (g) 3 hours winter. 3 ①
Review of recent literature on textile fibers, yarns, fabric construction, color, finishes, maintenance, and labeling. Prerequisite: CT 250 and 12 hours in clothing, textiles, and related arts, including 3 upper division hours. Chemistry recommended.

CT 431. Home Furnishing. (G) 3 hours. 3 ②
Contemporary designers, materials, prices, and manufacturers of fabrics, furniture, rugs, and accessories. Prerequisite: CT 331; senior standing.

CT 432. History of Furniture. (G) 3 hours. 3 ①
Historic furnishings in relation to architectural styles and interiors. Prerequisite: CT 331; Hst 101,102,103. CT 460,461 recommended.

CT 435. Textile Design. (G) 3 hours. 3 ②
Advanced textile design as applied to rugs, upholstery, drapery, and suiting fabrics. Prerequisite: CT 335; senior standing.

CT 450. Textiles. (G) 3 hours. 2 ① 1 ②
Investigations of physical properties of yarns and fabrics; evaluation of data in relation to serviceability. Prerequisite: CT 353. GRANT.

CT 451. Textile Fibers. (G) 3 hours. 2 ① 1 ②
Composition and chemical properties; relation to certain structural and physical characteristics. Prerequisite: CT 250; Ch 228,229; senior standing. BUBL.

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; tapestries, rugs, laces, embroideries, painted and printed fabrics. Prerequisite for both courses: CT 250; 3 hours of upper division clothing, textiles, and related arts; one year of history. Art 261, 262,263 recommended. PETZEL.

CT 470. The Clothing Buyer. 3 hours. 1 ① 1 ②
Selection, buying, promotion, and selling of ready-to-wear clothing. Management and personnel responsibilities of buyers. Prerequisite: CT 350; senior standing. DIEDESCH.

Graduate Courses

See also courses marked (g) and (G) above.

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 506. Projects.
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 512. Comparative Tailoring. 4 hours. 2 ① 2 ③
A comparison of tailoring methods used in the production of commercial and custom-made garments; application of selected methods in construction of a tailored garment. Prerequisite: CT 312. LEDBETTER.

CT 513. Readings in Clothing, Textiles, and Related Arts. 3 hours fall. 3 ①
Review, interpretation, and significance of research studies.

CT 514. Research Methods in Clothing, Textiles, and Related Arts. 3 hours winter. 3 ①
Philosophy and methodology for research. Statistics recommended.

CT 515. Socio-psychological Aspects of Clothing. 3 hours. 3 ①
Application of theories in the social sciences to clothing selection and use. Prerequisite: 12 hours of psychology, sociology, and/or cultural anthropology.

CT 552. Textile Analysis. 4 hours. 1 ① 2 ③
Identification of textile fibers by chemical methods and quantitative analysis for moisture content, total nonfibrous materials, fiber content. Prerequisite: CT 451. BUBL.

FAMILY LIFE

The Department of Family Life offers courses in the areas of marriage, family relationships, and child development. Advanced courses prepare students for nursery school teaching, work in social service agencies and youth agencies, and graduate work leading to research and college teaching. Two nursery schools on campus are used as laboratories for instruction. Men and women in any school are welcome in courses for which they have the prerequisites.

Lower Division Courses

FL 222. Marriage Preparation. 2 hours. 2 ①
Open to men and women. Courtship period, factors in mate selection.

FL 223. Family Living. 2 hours. 2 ①
Open to men and women. Marriage and relationships in the beginning family.

FL 225. Child Development. 3 hours. 3 ① 1 ①
The infant and young child; observations in nursery school.

Upper Division Courses

Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

FL 311. Child Development. 3 hours. 3 ① 1 ①
Behavior and development of preschool children. Observation in nursery school. Prerequisite: Psy 202; FL 225.

FL 312. Studies in Child Development. 3 hours. 3 ①
Theory and basic research in the area of child development. Prerequisite: FL 311.

FL 322. Family Relationships. 3 hours. 3 ①
Stages and adjustments in the family cycle; the family and the community. Prerequisite: FL 225; Soc 204; or consent of instructor.

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.
WOMAN'S ROLE TODAY. 1 ②
One-half term. Field experiences.

FL 408. Workshop.
Terms and hours to be arranged.

FL 413. Development in Middle Childhood and Adolescence. (G) 3 hours. 3 ①
Growth and development in middle and late childhood and early adolescence. Prerequisite: FL 311.

FL 421. Behavior of Young Children. 2 hours. 2 ①
For men. Understanding development problems of young children; observations in nursery school. Prerequisite: senior standing or consent of instructor.

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.

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
May only be taken parallel to FL 425 or FL 427. It may parallel both.

FL 427. Educational Programs for Preschool Children. (G) 3 hours. 2 ① 1 ④
Program planning for preschool children, home-school relations, studies of individual children. Prerequisite: FL 425.

FL 428. Curriculum Enrichment for Young Children. (g) 2 hours spring. 2 ①
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) 9-12 hours.
Full participation in a nursery school program and its administration; field experiences arranged. Consent of instructor required. Prerequisite: FL 425.

FL 430. Understanding Child Behavior. (G) 3 hours. 3 ①
Observation of young children as a basis for developing insight into human behavior. Prerequisite: FL 425.

FL 435. Organization and Administration in Preschools. (G) 3 hours. 1 ② 1 ①
Organization and administration of school for young children with special emphasis upon the application of research findings to details of good preschool programs. Prerequisite: FL 425 or equivalent and consent of instructor. Offered alternate years. Offered 1969-70.

FL 481. Selected Topics in Family Life. (G) 3 hours. 3 ①
Current literature on child development and family relations. Prerequisite: FL 311,322.

Graduate Courses

See also courses marked (g) and (G) above.

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. Field experiences.
PSYCHO-SEXUAL DEVELOPMENT IN FAMILY LIFE CYCLE.
CURRENT TRENDS IN CHILD DEVELOPMENT.
INTERPERSONAL RELATIONS.

FL 508. **Workshop.**
Terms and hours to be arranged.

FL 511,512. **Methods of Behavioral Research.**
3 hours fall, winter. 3 ①
Philosophy and methods of behavioral research with emphasis on application of concepts to problems in Child Development and Family Relations.

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.

FL 523. **Topics in Preschool Education.**
3 hours fall. 3 ①
Review of research studies with emphasis on significance and interpretation.

FL 530,531,532. **Behavior in Infancy and Early Childhood.**
3 hours each term. 3 ①
FL 530: Significance of prenatal and perinatal factors in development of behavior; interrelationships of various developmental sequences throughout infancy. *FL 531:* Socialization process, child behavior, and learning during the early childhood years. *FL 532:* Measurement and evaluation of social, emotional, intellectual, and physical development through the preschool years.

FL 533. **Topics in Child Development.**
3 hours spring. 3 ①
Research studies reviewed; focus on interpretation. Significance and integration with theory.

FL 543. **Topics in Family Relations.**
3 hours winter. 3 ①
Research studies reviewed; focus on interpretation. Significance and integration with theory.

FOODS AND NUTRITION

The Foods and Nutrition Department offers basic work in nutrition, in the application of scientific principles to the preparation of foods, and in meal management for all majors in home economics. Advanced and specialized upper division courses are offered for students with professional interests in areas such as food service and hospital dietetics, product testing and promotion, high school teaching, and in graduate work and research. Students in any school may take any courses in foods and nutrition for which they have the prerequisites.

Graduate courses are available for programs leading to the Master of Science, Master of Arts, or the Doctor of Philosophy degrees for those students interested in high school teaching, research, college teaching, or public health nutrition.

Lower Division Courses

FN 215. **Foods.**
5 hours. 3 ① 2 ③
Components: their functional properties and interactions in food preparation. Prerequisite: FN 225. Prerequisite or parallel: one year of physical or biological science.

FN 218. **Food Preparation.**
3 hours. 1 ① 2 ②
For men and women not majoring in home economics. Basic principles of food preparation, meal planning and service.

FN 220,221. **Foods.**
4 hours each term. 2 ① 2 ②
Chemical and physical principles applied to the study of foods. Prerequisite: FN 225. Prerequisite or parallel: Ch 226,227.

FN 225. **Nutrition.** 3 hours. 3 ①
Newer scientific investigations; optimal diet for health; present day problems.

Upper Division Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

FN 313. **Meal Management.**
3 hours. 1 ① 1 ② 1 ③
Principles of foods and nutrition applied to meal planning, preparation, and service; economic, aesthetic, nutritional, and managerial aspects. Prerequisite: FN 215 or 221.

FN 325. **Family Nutrition.**
2 hours. 2 ①
Principles; maternal nutrition, nutrition of the infant and child through growth period; geriatric nutrition. Prerequisite: FN 225; FN 313 prerequisite or parallel.

FN 335. **Science of Foods.**
3 hours spring. 3 ①
Scientific study emphasizing common basic principles. Readings from a selective bibliography. Prerequisite: Ch 107 or 207; FN 215.

FN 381. **Nutrition.**
4 hours winter. 3 ① 1 ②
Fundamentals; application of biochemistry and physiology to nutrition of the individual and family. Prerequisite: FN 225; Ch 228; BB 350. Prerequisite or parallel: Ch 229; Z 332.

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.

FN 410. **Food Demonstrations.**
3 hours. 1 ① 1 ② 1 ③
Principles and techniques of classroom, extension, and commercial demonstrations. Experience before audiences. Prerequisite: FN 313; Sp 111 or Ed 416, or equivalent. FN 411 is recommended but not required.

FN 411. **Family Food Buying.** (g)
3 hours. 1 ① 1 ② 1 ③
Principles of economics applied to buying food for the home; laws protecting the consumer, criteria for selection of food at different income levels. Prerequisite: FN 313; Ec 115 or 215.

FN 412. **Food Management.**
3 hours. 1 ① 1 ② 1 ③
Special problems in foods with emphasis on time, energy, and money management. Prerequisite: FN 313.

FN 414. **Home Food Preservation.**
(g) 3 hours spring. 1 ① 1 ② 1 ③
Principles and methods, including freezing, canning, curing, pickling, and preserving with sugar. Prerequisite: FN 215 or 221; Mb 130 or 304. Offered alternate years. Offered 1970-71.

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 381.

FN 421. **Child Nutrition.** (G)
3 hours winter. 3 ①
Nutritional needs from prenatal life through childhood; maternal dietary requirements. Prerequisite: FN 381.

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 or 335; Ch 228,229.

FN 435. **Experimental Food Studies.**
(G) 3 hours winter. 1 ① 1 ② 1 ③
Semi-independent studies using the experimental approach; literature in the field. Prerequisite: FN 221 or 335; Ch 228,229.

Graduate Courses

See also courses marked (*g*) and (*G*) above.

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 521. **Readings in Nutrition.**
3 hours fall. 3 ①
Research studies reviewed; interpretations and significance. Prerequisite: FN 381.

FN 522,523. **Techniques 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 381; Ch 234. Students may register for one or two terms.

FN 531,532. **Food Preparation Investigation.** 3 or 5 hours each term. 2 ③
Independent investigations. Prerequisite: FN 435. Offered alternate years. Not offered 1970-71.

FN 535. **Selected Topics in Foods.**
3 hours. 3 ①
Prerequisite: FN 221; Ch 228,229; FN 425 or FN 435. Offered alternate years. Offered 1970-71.

FN 551. **Selected Topics in Nutrition.**
3 hours. 3 ①
Prerequisite: FN 521. Offered alternate years. Not offered 1970-71.

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 and FL 311 may take FL 413 to substitute for Ed 460. (For requirements for the State Teachers' Certificates and listing of courses see SCHOOL OF EDUCATION.)

HOME ECONOMICS EXTENSION

Professional preparation for the position of extension agent in home economics is offered by the School of Home Economics. Courses taught by staff members of the Cooperative Extension Service include classroom work in methods used by Extension to disseminate information, as well as practical experience with a county extension staff. Majors in home economics interested in extension as a career are urged to include electives in humanities and social sciences as well as the courses in extension methods. For full description of courses see EXTENSION METHODS, School of Agriculture.

Upper Division Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

EM 405. **Reading and Conference.**
Terms and hours to be arranged.

EM 411,412. **Extension Methods.** (G)
3 hours each, winter and spring 3 ①

EM 453. **Field Work in Extension.**
(g) Terms and hours to be arranged.

Graduate Course

EM 505. **Reading and Conference.**
Terms and hours to be arranged.

EM 508. **Workshop.**
Terms and hours to be arranged.

HOME ECONOMICS (GENERAL)

Lower Division Course

HEc 101. **Introduction to Home Economics.** 1 hour fall. 2 ①
Orientation of beginning students in home economics.

Upper Division Courses

HEc 407. **Seminar.**
Terms and hours to be arranged.
HOME ECONOMISTS IN SOCIETY.

HEc 408. **Workshop.**
Terms and hours to be arranged.

Graduate Course

HEc 508. **Workshop.**
Terms and hours to be arranged.

HOME MANAGEMENT

The Department of Home Management offers instruction in general areas of family living—home management, housing, family economics, and household equipment. Advanced courses are offered in the first three of these areas, leading to advanced degrees and positions in industry, social work, research, and college teaching. Laboratories for instruction include a home management house on campus and a housing and equipment laboratory in the Home Economics Building.

Courses are open to students in other schools.

Lower Division Course

HM 240. **Management in Family Living.** 2 hours. 2 ①
Management as decision making. Emphasis on time problems.

Upper Division Courses

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

HM 330. **Household Equipment.**
3 hours. 2 ②
Selection, placement, use, and care.

HM 335. **Organization and Use of House Space.** 3 hours. 2 ① 1 ②
Housing needs of families; optimum dimensions of activity areas; patterns for space units of family dwelling; house plans and family needs. Prerequisite: AA 178.

HM 341. **Personal and Family Finance.**
3 hours. 3 ①
Open to men and women. Management of income, expenditures, credit, savings, insurance, Social Security, taxes, etc.

HM 401. **Research.**
Terms and hours to be arranged.

HM 403. **Thesis.**
Terms and hours to be arranged.

HM 405. **Reading and Conference.**
Terms and hours to be arranged.

HM 407. **Seminar.**
Terms and hours to be arranged. (See titles listed under HM 507.)

HM 408. **Workshop.**
Terms and hours to be arranged.

HM 412. **Consumer Economics.** (g)
3 hours. 3 ①
The consumer in society; basis for choice-making; consumption patterns and trends in U. S.; marketing system; consumer information and protection. Prerequisite: HM 341; economics.

HM 435. **House Planning in Relation to Function.** (G) 3 hours. 2 ① 1 ②
Functional design applied to various types of family dwellings and their surroundings. Prerequisite: HM 335.

HM 436. **Functional Design of Dwellings.** (G)
Terms and hours to be arranged.
Storage space; arrangement of equipment; floor plans for small dwellings. Prerequisite: HM 435.

HM 439. **Family Housing.** (G)
3 hours. 3 ①
Socio-economic aspects in relation to family living. Prerequisite: economics; Soc 204; senior or graduate standing.

HM 440. **Management in Family Living.** (G) 3 hours. 3 ①
Theories and principles of home management. Prerequisite: HM 240,341; Psy 202; sociology.

HM 441. **Economics of the Family.**
(G) 3 hours. 3 ①
The family and roles of its members in American economy; problems of setting, improving, and maintaining standards of living. Prerequisite: HM 240,341; economics.

HM 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: HM 240; Soc 204. PLONK.

HM 450. **Home Management House.**
4 hours. 3 ① and residence
Applying principles of home economics courses in a family-size group and in a family-type house. One-half term residence. Prerequisite: FN 313; FL 311; HM 240.

HM 460. **Management in the Home.**
4 hours. 2 ① 1 ②
Supervised experience with student's home used as laboratory. Open to married students only. Students who are married and living at home may substitute HM 460 for HM 450. Prerequisite: FL 311; HM 240.

Graduate Courses

See also courses marked (*g*) and (*G*) above.

HM 501. **Research.**
Terms and hours to be arranged.

HM 503. **Thesis.**
Terms and hours to be arranged.

HM 505. **Reading and Conference.**
Terms and hours to be arranged.

HM 507. **Seminar.**
Terms and hours to be arranged.
THE FAMILY AND ECONOMIC CHANGE.
HOME MANAGEMENT HOUSE SUPERVISION.
WORK SIMPLIFICATION.
CASE STUDIES IN FAMILY DECISION MAKING.
CONSUMER BUYING DECISIONS.
READING IN HOME MANAGEMENT, HOUSING, or FAMILY ECONOMICS.

HM 508. **Workshop.**
Terms and hours to be arranged.

HM 510. **Philosophy and Application of Home Management.**
3 hours. 3 ①
Current home management philosophy and its use in analyzing managerial problems facing homemakers today. Prerequisite: HM 440.

HM 540,541,542. **Selected Topics in Home Management.**
3 hours each term. 3 ①
Consent of instructor required.

INSTITUTION MANAGEMENT

The curriculum in institution management and dietetics provides professional preparation for management positions in school, college, hospital, commercial and other types of food services. The Institution Management Department utilizes large group feeding and housing facilities on campus for laboratory experience.

Business majors interested in food service management may take a minor in this department. *Men and women students in this area of specialization are encouraged to qualify for a post-graduate dietetic internship to fufill membership requirements in the American Dietetic Association.*

Graduate courses and programs are available to those seeking a Master of Science degree in administrative dietetics or institution management.

Upper Division Courses

IM 311. Quantity Food Production.
4 hours. 2 ① 2 ③
Quantity food production methods; standardized formulae and costing; equipment; menu planning; safety and sanitation. Prerequisite: FN 313.

IM 401. Research.
Terms and hours to be arranged.

IM 403. Thesis.
Terms and hours to be arranged.

IM 405. Reading and Conference.
Terms and hours to be arranged.

IM 406. Projects.
Terms and hours to be arranged.

IM 407. Seminar.
Terms and hours to be arranged.

IM 408 Workshop.
Terms and hours to be arranged.

IM 430. Institution Organization and Administration. (g) 3 hours. 3 ①
Management principles applied to various food service systems; personnel training and management, labor laws, cost control including computerized methods. Prerequisite: IM 311. HARGER.

IM 440. Purchasing for Institutions.
(g) 5 hours winter. 5 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. CLEAVELAND, HARGER.

IM 450. Institution Experience.
(G) 4 hours. 1 ① 3 ②
Experience in campus food units includes daily food production and service, business office procedure, catering, and banquet service. Prerequisite: IM 311,430,440. HARGER, BOKORNEY.

Graduate Courses

See also courses marked (g) and (G) above.

IM 501. Research.
IM 503. Thesis.
IM 505. Reading and Conference.
IM 507. Seminar.
IM 508. Workshop.
Terms and hours to be arranged.

IM 520. Advanced Food Service Management.
3 hours winter. 3 ①
Interpretation of management principles and current research in relation to administration of food service organizations at the policy-making level. Prerequisite: IM 430,440. HARGER.

Marine Science at OSU

STUDENTS in the marine sciences often are attracted by the romance of the sea, but they soon find that along with the ocean's romantic elements is a far larger helping of just plain hard work. They go about their work at sea, in Oregon's estuaries, in the laboratory, and in tidal flats. Oceanography students (above left) pay out heavy steel cable with flotation material attached to ease handling in the water. A student in zoology (above) carries on laboratory studies of body fluid balance in the Dungeness crab. A student in fisheries (below) examines oyster bed in a tidal mud flat. Oysters are a $500,000 a year business in Oregon. (*See also pages 32, 101, 145.*)

THE SCHOOL OF PHARMACY AT OREGON STATE UNIVERSITY 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 the improvement of public health and welfare through dissemination, expansion, and application of knowledge. In so doing the School provides an instructional program assuring academic and technical proficiency in the basic sciences and their pharmaceutical application.

A petition from the pharmacists of the State of Oregon led to the first establishment of a Department of Pharmacy at Oregon State College in 1898. From its inception, the department grew steadily and in 1917 became the School of Pharmacy. Since 1925, it has occupied the Pharmacy Building, which was designed and constructed specifically for pharmaceutical education. During 1965-1966 an extensive remodeling and building program was completed.

Holders of the Bachelor of Science in Pharmacy degree can qualify for a wide variety of professional positions. By far the greatest proportion of graduates engage in the community practice of pharmacy with approximately half being owners or part-owners of pharmacies. Opportunities also exist for pharmacists in hospital and clinic pharmacies; as medical representatives for pharmaceutical manufacturers; as production, control, and research pharmacists in the manufacture of medicinal and pharmaceutical products; as personnel in wholesale drug distribution; as food and drug control chemists or inspectors for local, state, and federal health agencies; as pharmacists in the United States Public Health Service, the Veterans Administration, the Armed Forces, and other government departments; and in pharmaceutical journalism.

Graduates of this School are privileged to become licensed either by examination or reciprocity in all states. California, Florida, and Hawaii permit licensure by examination only.

School of Pharmacy

FACULTY

As of January 1970

CHARLES O. WILSON, Ph.D., Dean of the School of Pharmacy; Professor of Pharmaceutical Chemistry.

HERMAN C. FORSLUND, M.S., Assistant Dean, Head Counselor, Professor of Pharmacy Law.

HARRIET E. SISSON, M.S., Alumni Director and News Correspondent of the School of Pharmacy, Associate Professor of Pharmaceutical Science.

Pharmaceutical Science: Professor SAGER (department head).
Associate Professors SISSON, MACHAFFIE.
Assistant Professors HERMANN, KULA, MUHLHAUSER.

Pharmaceutical Chemistry: Professors DOERGE (department head), WILSON.
Associate Professor SCHULTZ.
Assistant Professor BLOCK.
Instructors LO, SPENCER.

Pharmacology: Professors FINK (department head), KRUEGER.
Associate Professors LARSON, WEBER.
Assistant Professor WINTERS.

Pharmacognosy: Associate Professor CATALFOMO (department head).
Assistant Professor CONSTANTINE.
Instructor LEE.

Pharmacy Administration: Professor FORSLUND (department head).
Associate Professor JOHNSON.
Instructor SHARP.

Visiting Lecturers

The Department of Pharmaceutical Science utilizes practicing pharmacists and physicians as lecturers in the clinical teaching program, the hospital pharmacy program, and in graduate education. Current lecturers include: J. R. ORENDURFF, M.D., Acting Chief, Laboratory Service, Portland V. A. Hospital; MARVIN PRINCE, M.S., Clinical Pharmacy Teaching Coordinator, Portland V. A. Hospital; and ERNEST M. WILSON, B.S., Chief, Pharmacy Service, Portland V. A. Hospital.

Preparation

The School of Pharmacy has no special admission requirements. Any student accepted for admission to Oregon State University may register in the School of Pharmacy.

High school preparation should include courses in mathematics, chemistry, physics, biology, as well as English and speech. However, there are no specific course requirements. Students not having high school chemistry, physics, or mathematics are accepted and can do well.

A pharmacist assumes a position of considerable responsibility in the health professions. He needs to be of high moral character as well as neat, orderly, accurate, and careful with details. Carelessness can endanger lives.

The pharmacy curriculum provides a broad scientific base with room for a wide variety of electives. There is opportunity to take additional business and economics courses, professional pharmacy courses, and advanced mathematics and chemistry courses for the student interested in retail, industrial, institutional (hospital, Public Health Service), or research pharmacy.

Transfer Students

Transfer students who do not have academic credit for college level English and/or mathematics will take the appropriate placement tests. Deficiencies shown by these tests should be corrected by the student before enrolling in regular courses in the subjects concerned. Transfer students should plan to enter Oregon State as soon as possible, preferably not later than the end of the freshman year; otherwise, more than a total of four years may be required because of difficulties in scheduling sequence and prerequisite courses. Transfer credits in most courses accepted by the University may be used to satisfy the School's elective requirements.

Summer Term

The 11-week Summer Term provides opportunities for transfer students and regular students (including those with a college degree) who meet the other requirements of the first professional year of the curriculum to take Inorganic Pharmaceutical Chemistry (PCh 313) and Pharmaceutical Science (PSc 317). By following this procedure, these students can have a more flexible program.

Licensure

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, of good moral character, and a graduate of an accredited school or college of pharmacy that is recognized by the Board of Pharmacy. He must also complete internship requirements and successfully pass an examination given by the Board of Pharmacy.

One calendar year of internship in the various areas of pharmacy under the supervision of a registered pharmacist is a basic requirement. A student who interns in a pharmacy concurrently with school attendance can not have the time count. No internship may count until after the student has finished the freshman year in pharmacy at OSU. At least one-fourth of the internship must be obtained after graduation; all of it may be gained after graduation if desired.

The examination consists of two parts: a theoretical part, which may be taken upon completion of the educational requirement, and a practical part, which may be taken only after completion of the internship requirement.

Course of Study

The curriculum for the School of Pharmacy is a five-year program 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 another accredited college or university.

Undergraduates who have decided to pursue graduate work may expedite their programs by selection of pertinent electives. Although the choice of electives will vary with the student's selected field in the pharmaceutical sciences, it should be emphasized that studies in the School of Pharmacy require adequate preparation in the physical and biological sciences, mathematics, and foreign language. Physical chemistry (calculus is a prerequisite), qualitative organic chemistry, biochemistry, and courses in the pharmaceutical sciences are basic. Students who have not completed certain undergraduate courses may do so during their graduate programs.

A curriculum combining pharmacy with premedical, predental, or preveterinary studies may be arranged for a student planning to enter a professional school of medicine, dentistry, or veterinary medicine.

Students should register for a regular sequence of work as outlined in the five-year curriculum on the next page. The proper sequence of both the professional and nonprofessional required courses in the curriculum must be maintained. A student may register for only those courses for which he has the stated prerequisites. Each student is assigned a faculty adviser according to his class standing. Together with his adviser, he reviews his career objectives and programs the courses to be taken. The student must have his proposed schedule approved by the adviser each term before proceeding with final registration. When planning a schedule he should keep his future plans in mind. The student who plans to enter Graduate School should select his electives accordingly. Too frequently the graduate student spends his first year in Graduate School taking courses he could have taken as an undergraduate.

Each year upperclassmen make several field trips. Annually the fifth-year students tour several pharmaceutical plants in the Midwest with transportation their only expense. As guests of the pharmaceutical houses, they are provided with lodging and meals. Visits to hospitals, wholesale houses, manufacturers in Oregon, and visiting lecturers help to acquaint them with the scope of pharmacy.

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.

University Honors Program

The Honors Program in this School is co-ordinated with the programs in other Schools and administered by the Director of the University Honors Program (see page 28). Information concerning eligibility and application forms may be obtained from the Director.

Curriculum in Pharmacy

Baccalaureate Degree Programs

The Bachelor of Arts (B.A.) and the Bachelor of Science (B.S.) degrees are offered in the five-year undergraduate program in Pharmacy.

A candidate for a degree must satisfy the University requirements (see page 14). He must have a minimum of 240 term hours of university-level courses in the approved pharmacy curriculum, which includes two preprofessional years and three years of professional study. He must have a grade-point average of 2.00 (C) or higher in all professional pharmacy course work to register as a fourth-year student in pharmacy and must have a 2.00 average in these courses to graduate.

Graduate Study

A need exists for persons with education beyond the B.S. degree to fill positions in industrial research and development, college teaching, government service, hospital pharmacy, and pharmaceutical distribution. The School of Pharmacy offers advanced degrees of Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) in pharmaceutical chemistry, pharmaceutical science, pharmacology, and pharmacognosy. The M.S. is offered in pharmacy administration and hospital pharmacy. The Master of Pharmacy (M. Pharm.) degree is offered with a major either in pharmacy administration or in hospital pharmacy.

In all cases, advanced degree programs are developed with faculty advisement to meet the interests and objectives of the individual candidate. General regulations and requirements for all advanced degrees are printed under the GRADUATE SCHOOL.

Candidates for admission to graduate study must hold a bachelor's degree in pharmacy from OSU or its equivalent, except that for advanced study in pharmacology, acceptance is determined by the Graduate Studies Committee. Candidates must have attained a creditable scholastic average in undergraduate work and have determined a definite objective to be attained through advanced study. All advanced degrees are granted through the Graduate School.

Professional Associations

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.
Open to all students in 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.

For financial aids, see the last page of this section.

Preprofessional Years

First Year
(May be taken at any accredited college or university)

	F		W		S	
	Lecture	*Lab*	*Lecture*	*Lab*	*Lecture*	*Lab*
General Chemistry (Ch 204,205,206)	3	2(3)	3	2(3)	3	2(3)
[1]English Composition (Eng 121)	3	.....	..	.....	..	.....
History and Ethics of Pharmacy (PAd 201)	..	.....	..	.....	2	.....
Calculus (Mth 163)	..	.....	..	.....	4	.....
Physical education	1	.....	1	.....	1	.....
Sociology (Soc 204,205)	3	.....	3	.....	..	.....
Economics (Ec 201,202)	3	.....	3	.....	..	.....
[2]Elective	..	.....	3	.....	3	.....
	15		15		15	

Second Year
(To be taken at Oregon State University)

[3]Organic Chemistry (Ch 226,227,228,229)	3	.....	3	.....	2	2(2)
Physics (Ph 201,202)	3	1(3)	3	1(3)	..	.....
Biological Science (Bi 211,212)	3	2(2)	3	2(2)	..	.....
Microbiology (Mb 304)	..	.....	..	.....	3	2(2)
English (Eng 222)	..	.....	..	.....	3	.....
Pharmaceutical Science (PSc 317)	..	.....	..	.....	4	1(3)
Physical education	1	.....	1	.....	1	.....
Psychology (Psy 201,202)	3	.....	3	.....	..	.....
	16		16		18	

PROFESSIONAL CURRICULUM

First Professional Year

	F		W		S	
	Lecture	*Lab*	*Lecture*	*Lab*	*Lecture*	*Lab*
Pharmacognosy (Pcg 330,331,332)	2	1(3)	2	1(3)	2	1(3)
Inorganic Pharm Chem (PCh 313)	3	1(3)	..	.....	..	.....
Organic Pharm Chem (PCh 323)	..	.....	3	1(3)	..	.....
Pharmaceutical Analytical Chem (PCh 331)	..	.....	..	.....	3	1(3)
Physiology (Z 431,432)	..	.....	3	1(3)	3	1(3)
Pharmaceutical Science (PSc 317)	4	1(3)	..	.....	..	.....
Pharmacy Admin (PAd 345,347)	..	.....	3	.....	3	.....
Biological Prod (Pcg 395)	3	.....	..	.....	..	.....
[4]Electives	..	.....	3	.....	3	.....
	15		17		17	

Second Professional Year

Pharmaceutical Science (PSc 319,320)	2	1(3)	2	1(3)	..	.....
Pharmacology (Phc 410,411,412)	4	1(3)	4	.....	4	.....
Biopharm Chem (PCh 450,451,452)	3	.....	3	.....	3	.....
Organic Pharm Chem (PCh 324,325)	3	.....	3	.....	..	.....
Drug Marketing (PAd 447)	..	.....	..	.....	3	.....
[5]Electives	3	.....	3	.....	3	.....
[6]Professional elective	..	.....	..	.....	3	.....
	17		16		16	

Third Professional Year

Prescriptions (PSc 454,455,456)	2	1(4)	2	1(4)	2	1(4)
Seminar (PAd 407)	1	.....	1	.....	1	.....
Biological Products (Pcg 495)	..	.....	3	.....	..	.....
Pharmacognosy (Pcg 433)	3	.....	..	.....	..	.....
Pharmacy Law (PAd 450,451)	..	.....	3	.....	3	.....
Organizational Medical Care (PAd 452)	..	.....	..	.....	3	.....
Pharmacy Management (PAd 448,449)	2	1(3)	2	1(3)	..	.....
[5]Electives	3	.....	3	.....	3	.....
[6]Professional elective	3	.....	..	.....	3	.....
	16		16		16	

[1] Students not attending Oregon State should take English requirements.
[2] Elective: recommended: speech, history (U.S. or Western), or computer science.
[3] Students may substitute Ch 334,335,336, and 337.
[4] Transfer students must take PAd 201.
[5] All electives must be approved by the adviser. Electives must include 9 term hours of foreign language or 9 term hours of social science or 9 term hours of literature.
[6] A course offered by the School of Pharmacy.

PHARMACEUTICAL CHEMISTRY

The Department of Pharmaceutical Chemistry offers undergraduate and graduate courses concerning the chemistry of inorganic and organic therapeutic and pharmaceutical agents used in current medical practice. It also provides courses in qualitative and quantitative drug analysis.

PCh 313. **Inorganic Pharmaceutical Chemistry.**
4 hours fall or spring. 3 ① 1 ③
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 or equivalent; PSc 317 prerequisite or concurrent.

PCh 323. **Organic Pharmaceutical Chemistry.**
4 hours winter. 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 313; Ch 229.

PCh 324,325. **Organic Pharmaceutical Chemistry.**
3 hours fall and winter. 3 ①
Organic chemicals and their preparations used in pharmacy and medicine; correlation between chemical and physical properties and physiological action. Prerequisite: PCh 323.

PCh 331. **Pharmaceutical Analytical Chemistry.**
4 hours spring. 3 ① 1 ③
Emphasis on U.S.P. and N.F. methods as applied to raw materials and dosage forms. Introduction to instrumental methods. Prerequisite: PCh 323 prerequisite or concurrent.

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

PCh 401. **Research.**
PCh 403. **Thesis.**
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.

PCh 440,441,442. **Selected Topics.**
(g) 3 hours each term. 3 ①
Recent developments in pharmaceutical chemistry and their application to pharmaceutical practice. Topics include: hormones, vitamins, chemotherapeutic agents, CNS depressants and stimulants, cardiovascular drugs, etc. Not all topics covered each year. May be taken in any order. Prerequisite: PCh 325. BLOCK, DOERGE.

PCh 443. **Toxicology.**
3 hours winter. 2 ① 1 ③
Detection of common inorganic and organic poisons; emphasis on alkaloids and synthetics. Prerequisite: Phc 412.

PCh 450,451,452. **Biopharmaceutical Chemistry.**
3 hours each term. 3 ①
Biochemical applications of pharmaceutical chemistry. Prerequisite: fourth-year standing.

PCh 461,462,463. **Special Analytical Methods.** (g)
3 hours each term. 1 ① 2 ③
Advanced quantitative methods, both chemical and physical, as applied to drugs and their dosage forms. Prerequisite: PCh 331.

Graduate Courses
See also courses marked (*g*) or (*G*) above.

PCh 501. **Research.**
PCh 503. **Thesis.**
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.

PCh 527,528,529. **Pharmaceutical Chemistry.** 3 hours each term. 3 ①
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; Phc 412. BLOCK, DOERGE.

PCh 530,531,532. **Pharmaceutical Chemistry Laboratory.**
2 hours each term. 2 ③
To be taken in conjunction with PCh 527, 528,529.

PCh 540,541,542. **Phytopharmaceutical Chemistry.** 3 hours each term. 3 ①
Nomenclature, chemistry, stability, and relationship of structures to pharmacological and toxicological activity of steroids, alkaloids, glycosides, terpenes, and other related compounds of medicinal and pharmaceutical interest. Prerequisite: PCh 325; Phc 412.

PCh 543,544,545. **Phytopharmaceutical Chemistry Laboratory.**
2 hours each term. 2 ③
To be taken in conjunction with PCh 540, 541,542.

PHARMACEUTICAL SCIENCE

The Department of Pharmaceutical Science offers undergraduate and graduate courses in the various areas related to professional practice and dosage formulation of therapeutic agents.

PSc 310. **History of Pharmacy.**
2 hours any term. 2 ①
A study of early pharmacy in the Pacific Northwest. Prerequisite: PSc 317.

PSc 317. **Pharmaceutical Science.**
5 hours fall or spring. 4 ① 1 ③
Introduction to the practice of pharmacy. Prerequisite or concurrent Ph 202.

PSc 319,320. **Pharmaceutical Science.**
3 hours fall and winter. 2 ① 1 ③
Physico-chemical principles and laws applied to pharmaceutical systems. Prerequisite: PSc 318; Ph 202; ability to type 35 words per minute.

PSc 321. **Pharmaceutical Science.**
3 hours spring. 2 ① 1 ③
Special projects concerning pharmaceutical systems. Prerequisite: PSc 320.

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

PSc 401. **Research.**
PSc 403. **Thesis.**
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.

PSc 420. **Clinical Pharmacy.**
1 hour any term. 1 ③
Supervised experience in the Student Health Center pharmacy. Prerequisite: fifth-year standing.

PSc 454,455,456. **Prescriptions.**
3 hours each term. 2 ① 1 ④
PSc 454: Extemporaneous compounding of dosage forms. *PSc 455:* Procedures in the prescription department. *PSc 456:* Clinical use of drugs. Prerequisite: Phc 412; PSc 320.

PSc 460. **Hospital Pharmacy.**
3 hours any term. 3 ①
The specialized area of hospital pharmacy. Prerequisite: fourth-year standing, permission of instructor.

PSc 464,465. **Manufacturing Pharmacy.** (G)
3 hours winter and spring. 1 ① 2 ③
Development and production of drug products. Prerequisite: fifth-year standing.

PSc 470. **Biopharmaceutics.**
3 hours. 3 ①
Influence of pharmaceutical formulations on biological activity of drugs. Prerequisite: fifth-year standing.

Graduate Courses
See also courses marked (*g*) or (*G*) above.

PSc 501. **Research.**
PSc 503. **Thesis.**
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.

PSc 510. **Physical Pharmacy.**
3 hours fall. 2 ① 1 ③
Physico-chemical properties of pharmaceutical systems.

PSc 512,513. **Manufacturing Pharmacy.**
3 hours winter and spring. 1 ① 2 ③
Unit operations in manufacture of pharmaceuticals. Fifth-year standing required.

PSc 520,521,522. **Hospital Pharmacy.**
3 hours each term. 3 ①
The organization and operation of a hospital pharmacy. SAGER, and Clinical Instructors.

PSc 554,555,556. **Product Development.** 3 hours each term. 1 ① 2 ③
Current and novel dosage forms; product stability; therapeutic designs. MUHLHAUSER.

PHARMACOGNOSY

The Department of Pharmacognosy offers undergraduate and graduate courses that deal with drugs of biological origin.

Pcg 330,331,332. **Pharmacognosy.**
3 hours each term. 2 ① 1 ③
Official and important nonofficial drugs of biological origin; macroscopic, microscopic, and micro-chemical identification. Prerequisite: Ch 229; Bi 212; PSc 317.

Pcg 395. **Biological Products.**
3 hours. 3 ①
Biological products used in the treatment of infectious diseases caused by bacteria. Prerequisite: Mb 304.

Pcg 433. **Antibiotics and Hormones.**
3 hours fall. 3 ①
Development, dosage forms, use, and stability. Prerequisite: Pcg 332.

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

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.

Pcg 454,455. **Pharmacognosy.** (G)
3 hours winter and spring. 1 ① 2 ③
Extraction, isolation, and identification of active components from drug plants. Prerequisite: Pcg 332.

Pcg 471,472. **Pharmacognostical Techniques.** (G)
3 hours fall and winter. 1 ① 2 ③
Pcg 471: Microscopic techniques. *Pcg 472:* Research Methods. Prerequisite: Pcg 332.

Pcg 480,481. **Effects of Growth Regulators on Drug Plants.** (G)
3 hours each term. 1 ① 2 ③
Effects of auxins, gibberellins, kinins, and growth retardants on production of active constituents of medicinal plants. Prerequisite: Pcg 332.

Pcg 495. **Biological Products.**
3 hours winter. 3 ①
Vaccines, serums, antitoxins, and related products. Prerequisite: Pcg 332. CATALFOMO.

Graduate Courses
See also courses marked (*g*) or (*G*) above.

Pcg 501. **Research.**
Pcg 503. **Thesis.**
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.

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 332.

Pcg 544. **Biological Products.**
3 hours. 1 ① 2 ③
Problems involved in preparation and standardization. Prerequisite: Pcg 495.

Pcg 545. **Phytochemistry of Drug Plants.**
3 hours. 3 ①
The distribution of certain secondary plant constituents. Prerequisite: Pcg 455 or equivalent.

Pcg 550,551,552. **Biogenesis of Medicinal Plant Constituents.**
3 hours each term. 3 ①
Pcg 550: Glycosides. Possible metabolic pathways. *Pcg 551: Alkaloids.* Nitrogen metabolism within plants and formation of alkaloids. *Pcg 552: Lipids, Resins, and related compounds.* Formation within living plant. Prerequisite: BB 450,451,452, or equivalent.

PHARMACOLOGY

The Department of Pharmacology offers undergraduate and graduate courses that deal with the action of drugs and other chemicals on living things. The physiological responses, mode of action, toxic properties, therapeutic uses, standardization, and other phenomena are considered.

Phc 315. **Safety in Use of Drugs.**
2 hours any term. 2 ①
Origin and development of drugs, their purpose, uses and shortcomings, dangers, and misuse. Prerequisite: sophomore standing, nonpharmacy major.

Phc 380. **Drug Education.**
3 hours. 3 ①
Pharmacologic principles, drug use, abuse, dependence, and laws. Prerequisite: one year of a basic science; registration in a teaching program.

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

Phc 401. **Research.**
Phc 403. **Thesis.**
Phc 405. **Reading and Conference.**
Terms and hours to be arranged.

Phc 407. **Seminar.**
Conducted jointly with 407 in PSc, PAd, PCh, and Pcg.

Phc 410. **Pharmacology.** (g)
5 hours fall. 4 ① 1 ③
Pharmacodynamics. Prerequisite: Z 432; PCh 323.

Phc 411,412. **Pharmacology.** (g)
4 hours winter and spring. 4 ①
Therapeutic uses of drugs and toxicity. Prerequisite: Phc 410.

Phc 414,415. **Pharmacology Laboratory.** (g)
1 hour winter and spring 1 ③
To be taken in conjunction with Phc 411,412.

Phc 454. **Commercial Poisons.** (G)
3 hours fall. 3 ①
Toxicology of common household, medicinal, industrial, and economic poisons. Prerequisite: Phc 412.

Phc 455,456,457. **Pharmacotherapeutics.** (G)
3 hours each term. 3 ①
Discussion of disease states: pathogenesis, symptoms, pharmacological basis of therapy. Prerequisite: Phc 412.

Graduate Courses
See also courses marked (*g*) or (*G*) above.

Phc 501. **Research.**
Phc 503. **Thesis.**
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.

Phc 515. **Environmental Toxicology.**
2 hours. 2 ①
Nature and public health aspects of environmental contaminants. Prerequisite: two years of chemistry; two years of biology.

Phc 520,521,522. **Advanced Pharmacology.** 2 hours each term. 2 ①
Lectures and conferences on advanced concepts and applications of pharmacologic actions of drugs. Prerequisite: Phc 412; BB 352, or equivalent.

Phc 523,524,525. **Advanced Pharmacology Laboratory.**
1 hour each term. 1 ③
To be taken in conjunction with Phc 520,521, 522.

Phc 530,531. **Advanced Toxicology.**
3 hours winter and spring. 2 ① 1 ③
Lectures, conferences, and laboratories on advanced concepts and mechanisms of toxicity of drugs and other chemicals. Prerequisite: Phc 412; BB 352, or equivalent.

Phc 535. **Pharmacometrics.**
3 hours fall. 2 ① 1 ③
Evaluation of drug activity by various pharmacologic techniques, screening methods, official and other bioassays. Prerequisite: St 452; Phc 412.

PHARMACY ADMINISTRATION

The Department of Pharmacy Administration offers undergraduate and graduate courses concerned with the economic, social, business, and legal aspects pertaining to and associated with the practice of pharmacy.

PAd 201. **History and Ethics of Pharmacy.**
2 hours fall or spring. 2 ①

PAd 345. **Medical Care.**
3 hours winter. 3 ①
Organization and financing of public and personal health services. Prerequisite: Psy 202.

PAd 347. **Drug Marketing.**
3 hours spring. 3 ①
Marketing organization and market environment of drug manufacturing, distribution, and use. Prerequisite: PAd 345.

Courses numbered 400-499 and designated (*g*) or (*G*) may be taken for graduate credit.

PAd 401. **Research.**
PAd 403. **Thesis.**
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.

PAd 447. **Drug Marketing.**
3 hours spring. 3 ①
Understanding marketing functions, marketing institutions, marketing policies and practices, consumer behavior, as related to drug and pharmaceutical products. Prerequisite: fourth-year standing.

PAd 448,449. **Pharmacy Management.**
3 hours fall and winter. 2 ① 1 ③
Activities involved in planning, organizing, financing and controlling a pharmacy practice. Prerequisite: PAd 447.

PAd 450,451. **Pharmacy Law.**
3 hours winter and spring. 3 ①
Federal, state, and local laws applicable to pharmacy. Prerequisite: fifth-year senior standing.

PAd 452. **Organizational Medical Care.**
3 hours. 3 ①
Organization, structure, function and purpose of health agencies of city, county, state, and federal governments. Prerequisites: fifth-year standing.

PAd 453. **Pharmacy Socio-Economics.**
3 hours fall. 3 ①
Contemporary social and economic forces which affect the practice of pharmacy. Prerequisite: fifth-year senior standing.

PAd 454. **Pharmacy Planning.**
3 hours winter. 2 ① 1 ③
Activities associated with location and layout of a pharmacy. Prerequisite: fifth-year senior standing.

PAd 460. **Pharmacy Marketing Management.** (G)
3 hours spring. 3 ①
Practices and policies in marketing and management of a pharmacy practice. Prerequisite: PAd 449.

Graduate Courses
See also courses marked (*g*) or (*G*) above.

PAd 501. **Research.**
PAd 503. **Thesis.**
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.

PAd 540,541. **Drug Distribution.**
3 hours. 3 ①
Changing patterns, changing market structures and behavior of institutions distributing drugs and pharmaceuticals for ultimate consumption. Prerequisite: PAd 449,451.

PAd 587. **Pharmaceutical Marketing: Analysis and Techniques.**
3 hours spring. 3 ①
Marketing policies and practices of manufacturers in distribution of drug products restricted by law to prescription use only. Prerequisite: BA 478.

PAd 588. **Pharmaceutical Economics.**
3 hours. 3 ①
Demand analysis and production functions, organization, conduct, performance, and implications of policy among firms in the pharmaceutical industry. Prerequisite: Ec 458.

PAd 589. **Pharmaceutical Economics.**
3 hours. 3 ①
Aggregative pharmaceutical services, interrelationships with other medical services; personnel, facilities, financing, prices, costs, supply, organization and coordination. Prerequisite: Ec 477.

PAd 599. **Drug Trade Regulations.**
3 hours winter. 3 ①
Anti-trust laws and methods of resale price maintenance, regulatory agencies, related to distribution of drug products. Prerequisite: PAd 449; PAd 451; BA 411.

FINANCIAL AIDS

Students of ability and promise may have part of their college expenses paid through one of the scholarship funds. In addition to general scholarships awarded to OSU students, the ones listed below are available to pharmacy students. Special loan funds are also available.

Scholarships and Loans

Health Professions Scholarships: Varying amounts annually to full-time pharmacy juniors and seniors who are citizens or are lawfully admitted for permanent U. S. residence, have financial need, and maintain a 2.50 GPA. Application through Financial Aid Office, Plageman Hall, Room 108.

Lane County Scholarship. $150 annually to a deserving student in pharmacy from Lane County or surrounding area provided by the registered pharmacists of that county.

Dargavel Scholarship and Loan Fund. $200 annually for an Oregon senior in pharmacy who has stimulated professionalism among his fellow students. Loans are also available for pharmacy students from the John B. Dargavel Foundation. They are administered by the National Association of Retail Druggists and may be repaid after graduation.

Women's Auxiliary, OSPA Fund. The Women's Auxiliary of the Oregon State Pharmaceutical Association provides loans for senior women in pharmacy, the amount varying according to need with repayment after graduation.

Golden Fund. The Frank and Esther Golden Student Aid Fund, established by the will of Esther L. Golden, provides several modest grants for pharmacy students who have demonstrated superior scholastic ability and financial need.

Oregon State Pharmaceutical Association Loan Fund. Loans available to pharmacy students through the Financial Aids office.

Payless Drug Stores Educational Fund. Selected Oregon students in their last three years of pharmacy may borrow from this fund. Preference is given to students who show promise of professional service and financial need.

Corbett Fund. Selected Oregon students, preferably from Harney County, who are in their last three years of pharmacy may borrow from a fund established in memory of Orville Corbett.

Honors and awards

Several national undergraduate awards are given to students in pharmacy schools for the best essays in various fields of pharmacy. Outstanding scholarship or notable achievement in the School of Pharmacy at Oregon State University is recognized by the awards listed:

Bristol Laboratories Award. A personalized medical dictionary awarded annually to a senior who has combined scholarly achievement with professional service.

Johnson and Johnson Award. To the senior who exhibits interest and excellence in pharmacy administration.

Kappa Psi Award. A reference book given each year to the senior who, in the opinion of his classmates, has most outstandingly displayed qualities of character, leadership, and service. The recipient's name is engraved on a plaque in the School of Pharmacy.

Kappa Psi Grand Council Gold Key and Certificate. Awarded to the graduating senior member of Kappa Psi having the highest scholastic standing.

Kappa Psi Gavel from Portland Graduate Chapter. Awarded to the regent of Kappa Psi.

Lambda Kappa Sigma Award. Awarded to a graduating senior selected on the basis of high academic achievement, leadership, and professional interest.

Lilly Achievement Award: A gold medal awarded to a senior student for superior scholastic and professional achievement.

Oregon Society of Hospital Pharmacists Award. A copy of Facts and Comparisons presented to two graduating seniors who have shown aptitude and distinct interest in hospital pharmacy.

Linn-Benton Pharmaceutical Association Award. A monetary award for library improvement to the senior who shows the greatest scholastic improvement during the last three years.

McKesson and Robbins Presidential Plaque. Awarded to the president of the Student Branch of Oregon—American Pharmaceutical Association.

McKesson and Robbins Award. $50 awarded annually by the Portland Branch of the company to the senior scoring highest in a comprehensive examination in pharmacy. The recipient's name is engraved on a plaque in the School of Pharmacy.

Merck Awards. Two sets of reference books awarded annually to seniors having highest scholastic averages in pharmacy and in pharmaceutical chemistry.

Portland Retail Druggists Association Plaque. Awarded annually to the graduating senior who attains the highest scholastic rank in his class.

Rexall Trophy. Awarded annually to the senior who presents the most outstanding record of service to the School of Pharmacy while maintaining a high scholastic average.

Rho Chi Award. An advanced reference work in pharmacy or related field awarded each year to a junior having the highest scholastic rating in professional studies.

Senior Class Service Award. Awarded annually to the senior who has best served the school and his class by his activities while at OSU.

THE DIVISION OF HEALTH AND PHYSICAL EDUCATION IS RESPONSIBLE FOR: (1) professional study programs leading to baccalaureate degrees in health and physical education; (2) basic instruction in health and physical education for all OSU students; (3) professional service courses in health, physical education, and recreation for students in other schools; (4) basic four-year and standard five-year teacher education programs leading to certification in health, physical education, and health and physical education; (5) professional courses in health, physical education, and recreation which may be included in graduate programs; and (6) extramural sports for women and intramural sports and recreational activity programs for all students and staff members.

Basic Instruction

Basic instruction in health and physical education is offered for all students. General hygiene courses are designed to give each student the necessary educational foundation to promote his own health and that of his dependents and to make health decisions in behalf of himself, his family, and his community. Basic physical education instruction is designed to assist each student to develop skills for leisure time and to make intelligent decisions concerning the physical activity needs and programs for himself and his community.

The university graduation requirements for all students include one term of general hygiene and five terms of physical education performance courses which are expected to be completed during the first six terms on campus. For complete information on health and physical education requirements see page 169.

Based on the medical examination required of all entering students, the Student Health Service advises the Division of Health and Physical Education in the assignment of students to activities in accord with their physical needs. Students are classified for (1) unlimited activity, (2) unlimited activity with observation, (3) restricted activity, (4) adaptives, or (5) no activity.

Division of Health and Physical Education

FACULTY

As of January 1970

JAMES WALDO LONG, Ph.D., Director of Division of Physical Education, Professor of Physical Education.

ROBERT W. BERGSTROM, Ed.D., Head Adviser, Professor.

Emeritus Professors ADRION, ALLMAN, COLEMAN, LANGTON, SEEN. Associate Professors COX, HUPPRICH, SWAN. Assistant Professor MCALLESTER. Senior Instructor POLING.

Physical Education for Women: Professors LAMBERT (department head), WEIR. Associate Professors DIXON, MASILIONIS, PETERSON, THOMPSON. Assistant Professors BRUST, HANCOCK, PYE, SCHAEFER, SUTTIE. Instructors CHAMBERS, GUGGENHEIM, HEATH, HUNTER, IRWIN, MOORE, O'SHEA, WILLIAMS.

Physical Education for Men: Professors FLATH (department head), ANDROS, BERGSTROM, DAILEY, VALENTI, Associate Professors CAMPBELL, DRLICA, FLOOD, MCKALIP, MARTINSON, MOE, TANSELLI, THOMAS, WAGNER, WINKLER. Assistant Professors CRAMER, DICKINSON, HARPER, IRVIN, MCNEIL, MARTIN, MEGALE, O'SHEA, POLING, ROBERTSON, TILLMAN. Instructors FERRIS, JOHNSON, MICHAEL.

Health Education: Professors FOSTER (department head), C. L. ANDERSON, KOSKI. Associate Professors G. W. ANDERSON, ELLIS, MARKHAM. Assistant Professors GAWER, GIBSON, HOUSTON, LAWSON, PHELPS.

Recreation: Professors HEATH (department head), SLEZAK. Associate Professors MILLIKEN, OWEN. Assistant Professor FILIPPONI. Instructor GORSUCH.

Physical Education Requirements

Courses which satisfy the physical education requirement for graduation are designated at MPE, WPE, and CPE 101 to 199. No more than one performance course may be taken during one term. Professional activity courses (PE 194, 294, 394, 494) taken by students enrolled in teaching norm or area of concentration programs in physical education satisfy university physical education requirements. Elective physical education performance courses (MPE, WPE, CPE 301-399) are offered for those students who have completed university requirements. A total of six term hours of performance courses may be elected above the regular requirement.

Hygiene Requirements

Courses which satisfy the general hygiene requirement are H 150, 160, or 170 for men and H 160 or 170 for women. Students are expected to complete the hygiene requirement during the freshman year. General hygiene and physical education activity courses usually are taken in different terms, but it is permissible for these courses to be taken concurrently if there is sufficient reason for the normal pattern not being followed.

Fees

Regular registration fees entitle every student to use of gymnasium, pool, showers, gymnasium suits, swimming suits, 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.

Extramural Sports

The Department of Physical Education for Women organizes and administers an extramural program for women students consisting of various teams and individual sports.

Intramural and Recreational Activities

A comprehensive intramural sports program offers sports for all students. Living organizations, clubs, individuals, classes, and departments compete with friendly rivalry in many sports. This program is separate from intercollegiate athletics. Recreational activities in swimming, volleyball, fitness programs, and other activities are available to both students and staff members.

Professional Service Courses

Many opportunities exist for combining professional courses in health, physical education, and recreation with courses in the schools of Science, Agriculture, Business and Technology, Engineering, Forestry, and Home Economics. Students majoring in other teaching fields or other schools may elect work in physical education, health education, and recreation by completing professional courses in these fields. An area of concentration in health and physical education may be elected by elementary teacher candidates. Qualified students in other teaching fields may complete professional courses to prepare for athletic coaching assignments. For information concerning professional service courses and programs, consult with advisers in the Division.

Teacher Education

Students desiring to become teachers of health, physical education, or health and physical education in schools must be admitted to the teacher education program. Formal application for admission to the teacher credential program is made following completion of 75 term hours of academic work. Permission to take professional courses leading to a credential is based on academic, professional, personal, and social qualifications. Consult with advisers in the Division for further information and application forms.

Requirements for Oregon teachers' certificates may be obtained from the School of Education.

HEALTH

The Department of Health offers professional study programs leading to baccalaureate and advanced degrees for nonmedical professional personnel seeking health careers. Health is a collective, applied body of knowledge based on the life sciences and social sciences concerned with the effect of man's activities and the environment on his personal and community well-being. The Department promotes research and expansion of knowledge in the areas of personal, community, and environmental health and in disease control, aging, safety, and other fields of specialization.

Undergraduate Programs

The basic health curriculum meets university requirements for the Bachelor of Science degree and includes basic science, social science, and humanities courses which are fundamental to preparation for professional health careers. In addition to general education and specific health courses, each undergraduate student will complete an area of emphasis selected from (1) school health education, (2) community health, or (3) environmental health. The basic program outlined below will be required of all baccalaureate degree candidates.

Lower Division

	Hours
English Composition (WR 121,222)	6
Fundamentals of Speech (Sp 111)	3
Biological science sequence	9–12
Cultural Anthropology (Anth 207,208)	6
General Psychology (Psy 200)	5
General Chemistry (Ch 201,202,203,207)	11
Nutrition (FN 225)	3
Introduction to Health Education (H 123)	3
General Hygiene (H 170)	3
Physical education	5
Area of emphasis or electives	39–42

Upper Division

	Hours
Physiology (Z 331,332)	6
General Microbiology (Mb 304)	5
Family Relationships (FL 322)	3
English Composition (WR 323)	3
School Health Education (H 321)	3
School Health Services (H 322)	3
Sanitation (H 331)	3
Communicable and Noncommunicable Diseases (H 332)	3
First Aid (H 358)	3
Safety Education (H 360)	3
Special Secondary Methods: Health (Ed 408i)	3
Community Health Promotion (H 424)	3
Area of emphasis or electives	55

Areas of Emphasis

Depending on his specific professional goal, the student will select one area of emphasis to prepare him for professional health careers in that area. Substitutions or changes in the courses listed in each area of emphasis require approval of the faculty adviser, the department, and the division director.

SCHOOL HEALTH EDUCATION

Students seeking careers as health teachers in schools will select the school health education area of emphasis. This program includes courses required for Oregon teacher certification. Application for formal admission to the teacher education program must be made after completion of 75 hours of academic work. Selection will be based on both professional and personal qualifications of the candidate. Courses required are:

	Hours
School in American Life (Ed 310)	3
Educational Psychology: Learning (Ed 312)	3
Methods of Reading (Ed 350)	3
Psychology of Adolescence (Ed 461)	3
Driver Education and Training (H 480)	3
Student Teaching (Ed 416)	12
Seminar: Student Teaching (Ed 407)	3
	30

COMMUNITY HEALTH

Students seeking professional positions with state and county health departments and voluntary and related health agencies will select the area of emphasis in community health. This area emphasizes courses in the communications fields of journalism, radio, television, public information methods, group discussion, and audio-visual techniques. Also included are courses in statistics, microbiology, food regulations, and community organization. Graduates will be prepared to accept employment with organizations engaged in informing the population of improved health knowledge and practices. Courses required are:

	Hours
General Microbiology (Mb 305)	4
Introduction to Statistics (St 311)	3
Community Organization (Soc 475)	3
Group Discussion Processes (Sp 323)	3
Radio Program Production (Sp 323)	3
Basic Television (Sp 367)	3
Journalism (J 111)	3
Public Information Methods (J 318)	3
Audio-Visual Aids (Ed 435)	3
Federal and State Food Regulations (FST 421)	2
	30

ENVIRONMENTAL HEALTH

Students seeking professional positions in the control of environmental health will select the environmental health area of emphasis. Graduates will be prepared to accept employment as sanitarians, food inspectors, water and air pollution specialists, and in other positions related to environmental health control. This area prepares science-oriented graduates in matters of control of the environment affecting personal and community health. This area of emphasis is available for health students at OSU because of the unique scientific and technological characteristics of the state's land grant university. Courses required are:

	Hours
General Microbiology (Mb 305)	4
Food Microbiology (Mb 444)	4
Microbial Contamination Control (Mb 440)	4
Food Grades and Standards (FST 271)	2
Federal and State Food Regulations (FST 421)	2
Basic Meteorology (AtS 302,303)	6
Introduction to Statistics (St 311)	3
Community Organization (Soc 475)	3
General Physics (Ph 201,202)	8
	36

Graduate Programs

The Master of Education degree with a major in health education is conferred through the School of Education which requires that the minor be in education. Candidates for doctoral degrees may complete a minor in health by completing graduate health courses as approved by the candidate's doctoral committee and the Graduate Council.

Health Courses

Lower Division Service Courses

H 150. General Hygiene.
1 hour any term. 2 ①
Health principles and practice in the promotion of personal and community health directed toward improvement in the quality of health, the extension of the prime of life and an increase in life expectancy. Satisfies hygiene requirement for men.

H 160. General Hygiene.
2 hours any term. 2 ①
Health principles and practice in the promotion of personal and community health directed toward improvement in the quality of health, the extension of the prime of life and an increase in life expectancy. Satisfies hygiene requirement; may be elected by both men and women.

H 170. General Hygiene.
3 hours. 3 ①
Health principles and practice in the promotion of personal and community health directed toward improvement in the quality of health, the extension of the prime of life and an increase in life expectancy. Specially directed to students having a need for a more extensive and intensive study of the subject. Satisfies hygiene requirement for both men and women.

Lower Division Professional Course

H 123. Introduction to Health Education.
3 hours. 3 ①
Background and philosophy; statistical facts that indicate need; modern practices; organizations; opportunities for professional work in field.

Upper Division Professional Courses
Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

H 321. School Health Education.
3 hours. 3 ①
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.

H 322. School Health Services.
3 hours. 3 ①
Development, maintenance, and protection of health of student; services, examinations, screening, special services, communicable disease control, emergency care, school environment, forms and records. Prerequisite: SEd 123 or junior standing.

H 331. Sanitation.
3 hours. 1 ② 1 ①
Principles of sanitation with particular reference to food, water, refuse and sewage disposal, stream and air pollution, housing, insect and rodent control and conditions in contemporary urban and rural living. Prerequisite: one term of general microbiology or equivalent.

H 332. Communicable and Noncommunicable Diseases.
3 hours. 3 ①
Modern concepts of diseases; prevention and control of disease, characteristics of common communicable diseases; chronic disease problem, specific chronic diseases, and programs of prevention and control. Prerequisite: one year of biological science and one term of microbiology.

H 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.

H 360. Safety Education.
3 hours. 3 ①
All phases of safety; home, fire, industrial, water, rural, school, and traffic safety; elementary, secondary, and adult.

H 401. Research. (G)
Terms and hours to be arranged.

H 403. Thesis. (G)
Terms and hours to be arranged.

H 405. Reading and Conference. (G)
Terms and hours to be arranged.

H 407. Seminar. (G)
Terms and hours to be arranged.

H 408. Workshop. (G)
Terms and hours to be arranged.

H 424. Community Health Promotion.
(G) 3 hours. 3 ①
Development of the community health movement; the community and its health; extension of life; maternal, infant, child, adult, and senior citizen health promotion; mental health promotion. Prerequisite: one year of upper division biological science; senior or graduate standing.

H 425. Community Health Services.
(G) 3 hours. 3 ①
Water supplies; waste disposal; protection of food; community safety services; programs to prevent and control drug abuse; disease control services. Prerequisite: one year of upper division biological science; senior or graduate standing.

H 426. Health Agencies and Programs.
(G) 3 hours. 3 ①
Air pollution programs; noise abatement; general environment controls; community health agencies; state official health agencies; voluntary health agencies; national and international health organizations. Prerequisite: one year of upper division biological science; senior or graduate standing.

H 431. Environmental Health. (G)
3 hours. 3 ①
Environmental factors affecting public health; application of principles of sanitation and health science to solution of environmental problems. Prerequisite: anatomy, physiology, microbiology, one year of chemistry, and one year of upper division health courses.

H 432. Control of Chronic Disease.
(G) 3 hours. 3 ①
Nature of chronic diseases and application of established control measures. Prerequisite: anatomy, physiology, microbiology, one year of chemistry, and one year of upper division health courses.

H 433. Health Aspects of Gerontology.
(G) 3 hours. 3 ①
Promotion of normal health in the aged; procedures for dealing with deviations most likely to occur; personal, home, and community resources available to the senior citizen. Prerequisite: anatomy, physiology, and microbiology, one year of chemistry, and one year of upper division health courses.

H 441. Health Services Programs. (G)
3 hours. 3 ①
Health services provided in elementary and secondary schools, what they consist of, how organized, responsibilities of teachers, cooperation with community agencies. Prerequisite: one year of upper division biological science, H 321 and 322 or equivalent.

H 442. Health Instruction Programs.
(G) 3 hours. 3 ①
Health instruction at the elementary and secondary school levels with emphasis on the needs and interests of students; the organization of an instructional program, and new, effective methods of teaching health. Prerequisite: one year of upper division biological science, H 321 and 322 or equivalent.

H 443. Healthful School Living. (G)
3 hours. 3 ①
In-depth study of problem areas such as drugs, smoking, mental health, sex education, environment; content, methods and community involvement will be emphasized. Prerequisite: one year upper division biological science, H 321 and 322 or equivalent.

H 444. Sex Education. (G)
3 hours. 3 ①
Aspects of sex and reproduction fundamental to sex education; relation of the school to other community institutions. Development of teaching units for public school programs with emphasis on the normal. Prerequisite: one year of upper division biological science; one year upper division health education; secondary teaching methods.

H 451. Health of the School-Age Child. (G)
3 hours. 3 ①
Special health problems and the school's opportunities and responsibilities. Prerequisite: PE 170 and one year of upper division biological science.

H 452. Physical Growth and Development. (G)
3 hours. 3 ①
Normal physical changes from birth to adulthood with consideration of deviations; levels of growth and development. Prerequisite: Ed 310,312 and one year of upper division biological science.

H 453. Epidemiology. (G)
3 hours spring. 3 ①
Basic principles underlying the study and control of communicable and organic diseases in the general population. Prerequisite: Mb 305 or equivalent, plus one year of upper division biological science.

H 461. School Health Administration. (G) 3 hours. 3 ①
Types of administrative control; budgetary problems; school health-public health integration; responsibilities of school health personnel. The case study method and incident process. Studies of actual school health programs. Prerequisite: one year of upper division biological science and one year of upper division school health courses or equivalent.

H 471. Community Health Education. (G) 3 hours. 3 ①
Nature, principles, and procedures of community health action in terms of the needs of people in the health and parahealth fields. Prerequisite: at least 18 hours of graduate work in health and one year of upper division psychology.

H 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. Prerequisite: Ed 310,312.

PHYSICAL EDUCATION COURSES

The Departments of Physical Education for Men and Physical Education for Women offer undergraduate study programs leading to baccalaureate degrees for students seeking professional careers as physical education teachers and related non-teaching fields. Physical education is an applied body of knowledge based on the sciences, social sciences, and humanities concerned with the effects of human performance on man and society. The departments promote research and expansion of knowledge in the areas of exercise physiology, performance mechanics, therapeutic programs, athletic training, sports psychology, sport sociology, esthetics of human performance, psychomotor learning, and other fields of specialization.

Undergraduate Program

The basic physical education curriculum meets university requirements for the bachelor's degree and provides general education in the sciences, social sciences, and humanities needed for professional preparation. In addition to the general education and professional courses listed in the basic program, undergraduate major students will complete an area of emphasis selected from (1) School Physical Education, (2) School Health and Physical Education, or (3) Applied Physical Education. The basic program outlined below will be required of all baccalaureate degree candidates.

Lower Division

	Hours
Biological science sequence	9–12
Science or social science sequence	9
English Composition (WR 121,222)	6
Humanities sequence	9
General Psychology (Psy 200)	5
Social science sequence	9
Speech	3
Physical Education Foundations (PE 131)	3
General Hygiene (H 170)	3
Nutrition (FN 225)	3
Professional Activities (PE 194,294)	12
Area of emphasis or electives	22–25

Upper Division

	Hours
Elementary Human Anatomy (Z 321, 322)	6
Physiology (Z 331,332)	6
English Composition (WR 323)	3
School Health Services (H 322)	3
First Aid (H 358)	3
Physical Education Practicum (PE 333)	2
Professional Activities (PE 394,494)	10
Organization of Health and Physical Education (PE 441)	3
Physical Education Curriculum (PE 442)	3
Evaluation of Physical Education (PE 443)	3
Principles of Physical Education (PE 445)	3
Athletic coaching courses (for men)	6
Physical Education Practicum (PE 334, 335), Intramural Sports Programs (PE 340), Sports Officiating (PE 362), athletic coaching (for women)	11
Area of emphasis or electives	40–45

Areas of Emphasis

Depending upon his professional goal, each major student will select one area of emphasis appropriate for preparation in that area. Substitutions or changes in the courses listed in each area of emphasis require approval of the faculty adviser, the department, and the division director.

SCHOOL PHYSICAL EDUCATION

Students seeking to become physical education teachers in schools will select the school physical education area of emphasis. The program includes those courses required for Oregon teacher certification. Application for formal admission to the teacher education program must be made after completion of 75 hours of academic work. Selection will be based on both professional and personal qualifications of the candidate. Courses required are:

	Hours
Kinesiology (PE 423)	3
Physiology of Exercise (PE 433)	3
Adapted Physical Education (PE 444)	3
School in American Life (Ed 310)	3
Educational Psychology: Learning (Ed 312)	3
Methods in Reading (Ed 350)	3
Special Secondary Methods: Physical Education (Ed 408h)	12
Psychology of Adolescence (Ed 461)	3
Student Teaching (Ed 416)	3
Seminar: Student Teaching (Ed 407)	3
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SCHOOL HEALTH AND PHYSICAL EDUCATION

Students seeking to become physical education and health education teachers in schools will select the health and physical education area of emphasis. The program includes courses required for Oregon certification as a health and physical education teacher in schools. Application for formal admission to the teacher education program must be made after completion of 75 term hours of academic work. Selection will be based on both professional and personal qualifications of the candidate. Courses required are:

	Hours
School in American Life (Ed 310)	3
Educational Psychology: Learning (Ed 312)	3
Methods in Reading (Ed 350)	3
Special Secondary Methods: Physical Education (Ed 408h)	3
Special Secondary Methods: Health Education (Ed 408i)	3
Psychology of Adolescence (Ed 461)	3
Student Teaching (Ed 416)	12
Seminar: Student Teaching (Ed 407)	3
School Health Education (H 321)	3
Safety Education (H 360)	3
Communicable and Noncommunicable Diseases (H 333)	3
Community Health Promotion (H 424)	3
	48

APPLIED PHYSICAL EDUCATION

Qualified students who seek nonteaching professional careers may complete an area of emphasis of not less than 36 term hours of approved courses unified by the requirements of the professional goal. Such programs will require the approval of the department, the curriculum committee of the division, and the division director. Qualified students may arrange a program with greater concentration in business, communications, statistics, physiology, chemistry, or the arts where the courses are unified by the requirements of professional positions such as in dance, physical therapy, athletic administration, sports communications, or scientific research in human performance.

Graduate Program

Candidates for the Master of Education degree offered through the School of Education may complete a graduate minor in physical education. Doctoral degree candidates may complete a minor in physical education by completing physical education graduate courses as approved by the candidate's doctoral committee and the Graduate Council.

Service Courses for Men

These courses numbered 101-199 satisfy university physical education requirements. These same courses carrying the numbers 301-399 may be used for elective credit.

Lower Division Courses

ADAPTIVES

MPE 101. Restrictive.
1 hour. 3 ①

AQUATICS

MPE 103. Beginning Crew.
1 hour. 3 ①

MPE 104. Intermediate Crew.
1 hour. 3 ①
Prerequisite: MPE 103.

MPE 105. Advanced Crew.
1 hour. 3 ①
Prerequisite: 1 term crew.

MPE 107. **Beginning Scuba Diving.**
1 hour. 3 ①
Prerequisite: 2 terms of physical education.

MPE 108. **Advanced Scuba Diving.**
1 hour. 3 ①
Prerequisite: MPE 107.

MPE 110. **Beginning Swimming.**
1 hour. 3 ①
Prerequisite: Nonswimmers.

MPE 111. **Intermediate Swimming.**
1 hour. 3 ①
Prerequisite: MPE 110.

MPE 112. **Advanced Swimming.**
1 hour. 3 ①
Prerequisite: MPE 111.

MPE 113. **Life Saving.**
1 hour. 3 ①
Prerequisite: MPE 111.

MPE 114. **Water Safety Instruction.**
1 hour. 3 ①
Prerequisite: Senior life saving.

MPE 115. **Water Polo.**
1 hour. 3 ①
Prerequisite: MPE 111.

COMBATIVES

MPE 117. **Beginning Judo.**
1 hour. 3 ①

MPE 118. **Intermediate Judo.**
1 hour. 3 ①
Prerequisite: MPE 117.

MPE 119. **Advanced Judo.**
1 hour. 3 ①
Prerequisite: MPE 118.

MPE 120. **Self Defense.**
1 hour. 3 ①

MPE 121. **Wrestling.**
1 hour. 3 ①

MPE 122. **Rhythmic Conditioning.**
1 hour. 3 ①

CONDITIONING

MPE 123. **Beginning Weight Training.**
1 hour. 3 ①

MPE 124. **Circuit Weight Training.**
1 hour. 3 ①
Prerequisite: MPE 123.

MPE 125. **Advanced Weight Training.**
1 hour. 3 ①
Prerequisite: MPE 123.

INDIVIDUAL ACTIVITIES

MPE 129. **Beginning Badminton.**
1 hour. 3 ①

MPE 130. **Intermediate Badminton.**
1 hour. 3 ①

MPE 134. **Beginning Fitness Appreciation.**
1 hour. 3 ①

MPE 135. **Advanced Fitness Appreciation.**
1 hour. 3 ①
Prerequisite: MPE 134.

MPE 137. **Beginning Golf.**
1 hour. 3 ①

MPE 138. **Intermediate Golf.**
1 hour. 3 ①
Prerequisite: MPE 137.

MPE 140. **Beginning Gymnastics.**
1 hour. 3 ①

MPE 141. **Intermediate Gymnastics.**
1 hour. 3 ①
Prerequisite: MPE 140.

MPE 143. **Man and Movement.**
1 hour. 3 ①

MPE 144. **Mountaineering.**
1 hour. 3 ①

MPE 146. **Orienteering.**
1 hour. 3 ①

MPE 148. **Skiing.**
1 hour. 3 ①

MPE 151. **Beginning Tennis.**
1 hour. 3 ①

MPE 152. **Intermediate Tennis.**
1 hour. 3 ①
Prerequisite: MPE 151.

MPE 153. **Advanced Tennis.**
1 hour. 3 ①
Prerequisite: MPE 152.

TEAM ACTIVITIES

MPE 155. **Beginning Basketball.**
1 hour. 3 ①

MPE 156. **Intermediate Basketball.**
1 hour. 3 ①
Prerequisite: MPE 155.

MPE 160. **Outdoor Sports.**
1 hour. 3 ①

MPE 166. **Rugby.**
1 hour. 3 ①

MPE 168. **Beginning Soccer.**
1 hour. 3 ①

MPE 169. **Intermediate Soccer.**
1 hour. 3 ①
Prerequisite: MPE 168.

MPE 171. **Softball.**
1 hour. 3 ①

MPE 174. **Beginning Volleyball.**
1 hour. 3 ①

MPE 175. **Intermediate Volleyball.**
1 hour. 3 ①
Prerequisite: MPE 174.

MPE 176. **Advanced Doubles Volleyball.**
1 hour. 3 ①
Prerequisite: MPE 175.

VARSITY SPORTS

MPE 180. **Varsity Baseball.**
1 hour daily.

MPE 181. **Freshman Basketball.**
1 hour daily.

MPE 182. **Varsity Basketball.**
1 hour daily.

MPE 183. **Varsity Crew.**
1 hour daily.

MPE 184. **Cross Country.**
1 hour daily.

MPE 185. **Freshman Football.**
1 hour daily.

MPE 186. **Varsity Football.**
1 hour daily.

MPE 187. **Varsity Golf.**
1 hour daily.

MPE 188. **Varsity Swimming.**
1 hour daily.

MPE 189. **Varsity Tennis.**
1 hour daily.

MPE 190. **Varsity Track.**

MPE 191. **Varsity Wrestling.**
1 hour daily.

Service Courses for Women

These courses numbered 101-199 satisfy university physical education requirements. These same courses carrying the numbers 301-399 may be used for elective credit.

Lower Division Courses

ADAPTIVES

WPE 101. **Posture-Relaxation.**
1 hour. 3 ①

MPE 103. **Weight Control.**
1 hour. 3 ①
Prerequisite: 20% overweight.

AQUATICS

WPE 105. **Crew.**
1 hour. 3 ①
Prerequisite: Swim 440 yards.

WPE 106. **Advanced Crew.**
1 hour. 3 ①

WPE 107. **Diving.**
1 hour. 3 ①

WPE 108. **Life Saving.**
1 hour. 3 ①

WPE 109. **Speed Swimming.**
1 hour. 3 ①

WPE 110. **Beginning Synchronized Swimming.**
1 hour. 3 ①

WPE 111. **Beginning Aquatic Arts.**
1 hour. 3 ①
Prerequisite: WPE 110.

WPE 112. **Intermediate Aquatic Arts.**
1 hour. 3 ①
Prerequisite: WPE 111.

WPE 114. **Beginning Swimming.**
1 hour. 3 ①

WPE 115. **Intermediate Swimming.**
1 hour. 3 ①

WPE 116. **Advanced Swimming.**
1 hour. 3 ①

CONDITIONING

WPE 123. **Conditioning.**
1 hour. 3 ①

WPE 124. **Gymnastic Conditioning.**
1 hour. 3 ①

WPE 125. **Ski Conditioning.**
1 hour. 3 ①

INDIVIDUAL ACTIVITIES

WPE 129. **Badminton.**
1 hour. 3 ①

WPE 137. **Beginning Golf.**
1 hour. 3 ①

WPE 138. **Intermediate Golf.**
1 hour. 3 ①

WPE 140. **Beginning Gymnastics.**
1 hour. 3 ①

WPE 141. **Intermediate Gymnastics.**
1 hour. 3 ①

WPE 142. **Advanced Gymnastics.**
1 hour. 3 ①

WPE 145. **Self Defense.**
1 hour. 3 ①

WPE 148. **Skiing.**
1 hour. 3 ①

WPE 151. **Beginning Tennis.**
1 hour. 3 ①

WPE 152. **Intermediate Tennis.**
1 hour. 3 ①

WPE 153. **Advanced Tennis.**
1 hour. 3 ①

WPE 154. **Beginning Track and Field.**
1 hour. 3 ①

WPE 155. **Intermediate Track and Field.**
1 hour. 3 ①

WPE 156. **Tumbling.**
1 hour. 3 ①

TEAM SPORTS

WPE 160. **Beginning Basketball.**
1 hour. 3 ①

WPE 161. **Intermediate Basketball.**
1 hour. 3 ①

WPE 162. **Advanced Basketball.**
1 hour. 3 ①

WPE 164. **Hockey.**
1 hour. 3 ①

WPE 168. **Hockey-Soccer.**
1 hour. 3 ①

WPE 169. **Soccer-Speedball.**
1 hour. 3 ①

WPE 171. **Beginning Softball.**
1 hour. 3 ①

WPE 173. **Advanced Softball.**
1 hour. 3 ①

WPE 174. **Beginning Volleyball.**
1 hour. 3 ①

WPE 175. **Intermediate Volleyball.**
1 hour. 3 ①

WPE 176. **Advanced Volleyball.**
1 hour. 3 ①

Service Courses for Men and Women

These courses numbered 101-199 satisfy university physical education requirements. These same courses carrying the numbers 301-399 may be used for elective credit.

Lower Division Courses

CPE 101. **Archery.**
1 hour. 3 ①

CPE 105. **Billiards.**
1 hour. 3 ①

CPE 108. **Beginning Bowling.**
1 hour. 3 ①

CPE 109. **Intermediate Bowling.**
1 hour. 3 ①
Prerequisite: CPE 108.

CPE 112. **Canoeing.**
1 hour. 3 ①
Prerequisite: Swim 440 yards.

CPE 116. **Beginning Ballet Dance.**
1 hour. 3 ①

CPE 117. **Intermediate Ballet Dance.**
1 hour. 3 ①

CPE 120. **Beginning Ballroom Dance.**
1 hour. 3 ①

CPE 121. **Intermediate Ballroom Dance.**
1 hour. 3 ①

CPE 125. **Beginning Folk Dance.**
1 hour. 3 ①

CPE 126. **Intermediate Folk Dance.**
1 hour. 3 ①

CPE 127. **Advanced Folk Dance.**
1 hour. 3 ①

CPE 128. **Folk Performance Dance.**
1 hour. 3 ①

CPE 131. **Beginning Modern Dance.**
1 hour. 3 ①

CPE 132. **Intermediate Modern Dance.**
1 hour. 3 ①

CPE 133. **Advanced Modern Dance.**
1 hour. 3 ①

CPE 136. **Modern Composition Dance.**
1 hour. 3 ①

CPE 139. **Modern Performance Dance.**
1 hour. 3 ①

CPE 143. **Square Dance.**
1 hour. 3 ①

CPE 147. **Beginning Fencing.**
1 hour. 3 ①

CPE 148. **Intermediate Fencing.**
1 hour. 3 ①

CPE 151. **Gymnastics.**
1 hour. 3 ①

CPE 154. **Mountaineering.**
1 hour. 3 ①

CPE 157. **Orienteering.**
1 hour. 3 ①

CPE 160. **Beginning Riding.**
1 hour. 3 ①

CPE 161. **Intermediate Riding.**
1 hour. 3 ①

CPE 162. **Advanced Riding.**
1 hour. 3 ①

CPE 164. **Jumping Riding.**
1 hour. 3 ①

CPE 168. **Skiing.**
1 hour. 3 ①

CPE 172. **Water Safety Instruction.**
1 hour. 3 ①
Prerequisite: Senior Life Saving.

Professional Courses

Lower Division Courses

PE 131. **Physical Education Foundations.**
3 hours. 3 ①
Qualifications for teaching and coaching; place of physical education and athletics; values to development of children and youth; general purposes of program.

PE 132. **Pre-Therapy.**
2 hours. 2 ①
Qualification needed to become registered physical therapist or occupational therapist. Relationship of physical therapy and occupational therapy to field of medicine; values.

PE 194. **Professional Activities.**
2 hours each term, three terms. 2 ②
Fall: individual and dual sports (men); fundamental body movement; modern dance, body mechanics, posture, relaxation (women); sports skills (elementary). Prerequisite: pass competency test.
Winter: indoor team sports (men); fundamental body movements, modern dance, body mechanics, posture, relaxation (women); gymnastics (women).
Spring: field sports (men); aquatics (women); rhythms (elementary).

PE 240. Recreation Leadership.
3 hours. 3 ①
Games for family recreation, parties, picnics, clubs, and community centers.

PE 253. Dance Education.
3 hours. 3 ①
Modern developments; aims and objectives; history; modern practices; opportunity in field.

PE 294. Professional Activities.
2 hours each term, three terms. 2 ②
Fall: wrestling (men); field sports (women); physical fitness (elementary).
Winter: aquatics (men); gymnastics (women).
Spring: rhythms (men); track and field (women). Prerequisite: pass competency test.

Upper Division Courses

Courses numbered 400-499 and designated (g) or (G) may be taken for graduate credit.

PE 320. Elementary School Physical Education.
3 hours. 3 ①
Purposes; progressive programs for grades 1-8; obtaining objectives; evaluation.

PE 321. Games and Relays for the Elementary School.
2 hours. 2 ①
Progressive activity skills for all grades, including games, relays, team activities; practical instruction: opportunity to analyze performance of children of various ages. Prerequisite: PE 194 (games skills).

PE 322. Rhythms for the Elementary School. 2 hours. 2 ①
Progressive activity skills for all grades, including rhythms and dance; practical instruction; opportunity to analyze performance of children of various ages. Prerequisite: PE 194 (rhythms).

PE 323. Posture and Conditioning for the Elementary School.
2 hours. 2 ①
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. Prerequisite: PE 194 (gymnastics).

PE 333,334,335. Physical Education Practicum.
2 hours each term. 4 ①
Teaching physical activities; problems of directed teaching. Prerequisite: PE 194,294; PE 333 for PE 334.

PE 340. Intramural Sports Programs.
2 hours. 2 ①
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.

PE 359. Athletic Training.
2 hours. 1 ① 1 ②
Athletic injuries; practical and theoretical aspects of massage, taping, and bandaging; diet and conditioning; various physical therapeutic procedures. Prerequisite: Z 322.

PE 360. Sports Officiating (Men).
3 hours. 3 ①
Rules, mechanics, and procedures for 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 361. Aquatic Production.
3 hours. 3 ①
Development of aquatic production programs including planning, staging, lighting, sound production, and composition. Prerequisite: PE 194 (Aquatics).

PE 362. Sports Officiating (Women).
1 hour each term, three terms. 1 ①
Rules, mechanics, and procedures for 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.

PE 363. Gymnastics Coaching.
2 hours. 2 ① 1 ②
Developing competitive gymnastics teams; conducting meets; judging procedures, coaching problems; facilities and equipment; safety procedures. Prerequisite: PE 294.

PE 364. Swimming and Diving Coaching. 2 hours. 2 ① 1 ②
Stroke mechanics, coaching psychology, swimming physiology, meet operation, rule interpretations, pool design, and training programs.

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.

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
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 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 369. Wrestling Coaching.
2 hours. 2 ① 1 ②
Offense and defense in modern wrestling; equipment and facilities; meets and tournaments; coaching problems; wrestling styles; weight training and conditioning. 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: gymnasium games (men); badminton, tennis (women).
Winter: gymnastics (men); basic rhythms (women).
Spring: track and field (men); team sports (women). Prerequisite: pass competency tests.

[1]**PE 405. Reading and Conference.** (g)
Terms and hours to be arranged.

[1]**PE 407. Seminar.** (g)
Terms and hours to be arranged.

[1]**PE 408. Workshop.** (g)
Terms and hours to be arranged.

PE 423. Kinesiology. (g)
3 hours. 2 ① 1 ②
Action of muscles and skeleton in physical activities. Prerequisite: Z 321,322.

[1]Credit for PE 405,407,408 singly or combined must not exceed 9 hours.

PE 433. Physiology of Exercise. (g)
3 hours. 2 ① 1 ②
Physiological effect of physical activity. Prerequisite: Z 331,332.

PE 435. Playground Leadership.
3 hours spring. 3 ①
Nature and function of play; adaptation of activities; program making. Playground instruction, management, and supervision.

PE 441. Organization of Health and Physical Education.
3 hours. 3 ①
Historical background, state and local requirements, administrative practices, class organization and procedures, operational policies. Prerequisite: PE 333 or 320.

PE 442. Physical Education Curriculum. 3 hours. 3 ①
Factors in selecting activities, program variations, planning instructional units, interschool athletics, intramural sports, program standards, and evaluation. Prerequisite: PE 333.

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 333 or 320.

PE 444. Adapted Physical Education.
(g) 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: PE 423.

PE 445. Principles of Physical Education.
3 hours. 3 ①
Principles and their relation to general education. Prerequisite: PE 333.

PE 446. Tests and Measurements in Physical Education. (g)
3 hours. 3 ①
Typical tests; scoring; test construction. Prerequisite: PE 443.

PE 447. Concepts of Physical Activity.
(g) 3 hours. 3 ①
Development of basic concepts and their relationship to physical activity programs. Prerequisite: PE 445.

PE 448. Administration of Physical Education. (g)
3 hours. 3 ①
Problems; organization of departments and of instructional and recreational programs; supervision of physical plant. Prerequisite: PE 441.

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 college. Prerequisite: Ed 416.

PE 451. Competitive Athletics. (g)
3 hours. 3 ①
Analysis of competitive athletic programs in schools and colleges with emphasis on new developments and findings. Prerequisite: PE 441.

PE 452. History of Physical Education.
(g) 3 hours. 3 ①
History of physical education from early societies to modern times. Prerequisite: PE 445.

PE 453. **Research in Physical Education.** (g)
3 hours. 3 ①
Review of research with application of results to school and college physical education programs. Prerequisite: PE 446.

PE 454. **Therapeutic Physical Education.** (g)
3 hours. 3 ①
Therapeutic programs including basic principles, evaluative procedures, activities, and organization. Prerequisite: PE 444.

PE 455. **Facilities.** (g)
3 hours. 3 ①
Planning construction of indoor and outdoor physical education facilities; relationship of staff, architect, and community; analysis of gymnasium and field spaces. Prerequisite: PE 448.

PE 456. **Perceptual Motor Skill Training.** (g)
3 hours. 3 ①
Relationship between motor learning and communicative skills; use of testing instruments; experience with underachieving students. Prerequisite: Ed 416.

PE 457. **Curriculum Construction.** (g)
3 hours. 3 ①
Analysis of physical education curriculum; state and local curriculum programs; developing curriculum materials for schools and colleges. Prerequisite: PE 442.

PE 458. **Supervision.** (g)
3 hours. 3 ①
Supervisory practices and organization applied to physical education program development. Prerequisite: PE 448, 457.

PE 494. **Professional Activities.**
2 hours. 2 ②
Methods, techniques, basic skills.
Fall: tennis, golf (men); archery, bowling, golf (women).
Winter: weight training and fitness (men); advanced rhythms (women).
Spring: archery, bowling, golf (women). Prerequisite: pass competency test.

RECREATION

The Division of Health and Physical Education offers professional and service courses for students seeking a major in physical education with an option in recreation. Selected courses listed by the School of Education and the Department of Physical Education provide preparation for students interested in professional recreation fields. With guidance from faculty, students interested in recreation will select courses from the applied fields of agriculture, forestry, oceanography, and business. Consult with advisers in the Division regarding selection of courses for the recreation option.

Candidates for the Master of Education degree offered through the School of Education may complete a graduate minor in recreation. Doctoral degree candidates may complete a minor in recreation by completing selected graduate courses as approved by the candidate's doctoral committee and the Graduate Council.

Lower Division Courses

Ed 121. **Introduction to Recreation.**
3 hours. 3 ①
Community recreation; public recreation movement; types of recreation; organized recreation in present social order.

PE 240. **Recreation Leadership.**
3 hours. 3 ①
See PROFESSIONAL COURSES, page 173.

Ed 263. **Camp Counseling.**
3 hours. 3 ①
Counselor training; responsibility in camp; camper problems; camp relationships. Three-day practical camping field trip.

Upper Division Courses

Ed 347,348,349. **Field Work.**
2 hours each term. 2 ①
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 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 in education; study of school camp, its organization, administration, and leadership. Prerequisite: Ed 365.

Ed 421. **Principles and Philosophy of Recreation.** (g)
3 hours. 3 ①
Leisure and recreation in American culture; present status and principles basic to field. Prerequisite: senior or graduate standing.

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.

Ed 423. **Organization and Administration of Recreation.** (g)
3 hours. 3 ①
Organizing, administering, and conducting recreation programs; problems in recreation. Prerequisite: senior or graduate standing. Consent of instructor required.

Ed 425. **Youth Agencies.** (G)
3 hours. 3 ①
Youth-serving organizations; organization and leadership of school and community clubs. Prerequisite: senior or graduate standing. Consent of instructor required.

Ed 426. **Community Recreation.** (G)
3 hours. 3 ①
The developing philosophy of recreation; current trends and problems in interrelationships of community agencies offering recreation programs. Prerequisite: Ed 423.

PE 435. **Playground Leadership.**
3 hours. 3 ①
See PROFESSIONAL COURSES, page 174.

THE ARMED FORCES OFFICER EDUCATION at Oregon State University has progressed with the growth of the University. About 1872 Corvallis College began teaching military tactics as required by the Morrill Act of 1862 which established land-grant universities. Cadets trained in the early years served in the Spanish-American War. On June 3, 1916. Congress passed an act which caused the Cadet Regiment to reorganize in 1917 as a Reserve Officer Training Corps unit. In World War I, World War II, and the Korean and Viet Nam conflicts former students have served with distinction in our armed forces and have given proof of the high quality of their preparation and the value to the nation of such military instruction. Since 1962 ROTC has been voluntary. Since 1965 two-year programs have been available for men having finished two college years who had not taken ROTC previously.

Oregon State University is one of the 33 colleges and universities that offer AROTC (Army); NROTC (Navy and Marine Corps); and AFROTC (Air Force). Training in the Department of Military Science leads to a commission as an officer in one of the seventeen branches of the U. S. Army. 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. Training in the Department of Aerospace Studies, activated on July 1, 1949, as one of the first AFROTC units established, leads to active duty aerospace flight training in a commissioned status or to other careers on the aerospace team.

Mission and Objectives. The ROTC selects and prepares young men, through a program of instruction coordinated with the students' normal academic curriculum, 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 the basic working knowledge required of a young officer.

Membership in ROTC does not preclude registration under the Universal Military Training and Service Act of 1951. Each student enrolled and of age must register with his draft board. In all programs, however, while participating in training, students are deferred from military service.

Reserve Officers Training Corps

Armed Forces Officer Education

Uniforms and allowances. Students in each of the units receive uniforms to be worn at drill periods and on special occasions. During the final two years students receive $50 per month retainer pay for up to 600 days. Travel to and from any summer camps or cruises is paid. While at camp or on cruise the members receive food and quarters at government expense in addition to basic pay. See the individual service sections for further information on the various camps and cruises. Those selected for the scholarship programs receive tuition, books, and fees plus $50 per month retainer pay.

Flight training. Eligible students in each of the three units may request and be selected for flight training during their senior year. This training, provided at government expense, leads to a private pilot license and an opportunity to continue flight training in a commissioned officer status.

How to enroll. See the Army, Navy, or Air Force sections for enrollment details for the various ROTC programs. All three departments are manned throughout the year during normal school hours to answer any inquiries regarding the ROTC programs.

Department of Aerospace Studies

Personnel detailed from the U. S. Air Force as of January 1970.

Professor HALM (Colonel), Commander.
Associate Professor: Major COSTELLO.
Assistant Professors: Majors HOLM, PHILLIPS.
Instructors: Master Sergeant WARDSWORTH; Technical Sergeant TURNBULL; Staff Sergeant HARKINS.

Air Force officers are required to create the ideas, develop and operate the specialized equipment, fly the planes, manage the weapon systems, and lead the men who are the aerospace power for peace. The Air Force requirement for professional officers spans most academic fields. Today's officers must be college graduates. Many pursue advanced degrees. Developing the attributes necessary for the career professional officer is the mission of the Air Force ROTC. Eligible students desiring to be officers in the United States Air Force through the AFROTC program may take either a two-year or a four-year sequence of studies:

Four-Year Program

1. Students must register for AS 1 (AS 111) in the fall term of their freshman year and continue in sequence throughout the four-year curriculum.
2. Curriculum: 30 credit hours in Aerospace Studies I (AS 111,112, 113); Aerospace Studies II (AS 211,212,213); Aerospace Studies III (AS 311,312,313); AS 314 (four weeks field training); and Aerospace Studies IV (AS 411,412,413).
3. Financial assistance grants are offered only to students enrolled in the four-year program.
4. Previous military experience (ROTC, Academy, or military service) may allow the Professor of Aerospace Studies to waive all or part of the General Military Course (freshman and sophomore years) for students enrolled in the four-year AFROTC program.

Two-Year Program

1. This program provides an opportunity for students who did not elect the four-year ROTC program upon entering college.
2. Application is made early in the fall term of the student's sophomore year. Processing is accomplished during the winter term and selections are made in spring term of the sophomore year. Selectee's attend mandatory six-week summer field training (AS 214) prior to the junior year of college. Applicants must have two years remaining in college *after* the six-week field training. This may be undergraduate or graduate work or a combination.
3. Curriculum: 24 credit hours in AS 214 (six-week field training); Aerospace Studies III (AS 311,312,313); and Aerospace Studies IV (AS 411,412,413).
4. Two-year program applicants *are not* eligible for financial assistance grants.

Commitments: The student agrees to accept a commission in the Air Force, if offered, only after enrolling in AS 311. EXCEPTION: A financial-assistance grant recipient incurs a commitment to accept a commission upon accepting a grant.

Financial-Assistance Grants are available for a limited number of qualified four-year program students on a competitive basis. High school seniors interested in applying for ROTC financial assistance grants should consult their high school counselors early in their senior year. University cadets already in the four-year ROTC program compete for the grants on the basis of grade-point average, Air Force Officer Qualifying Test scores, and an interview board's evaluation. Students receiving financial assistance grants must be able to complete the Air Force ROTC program, receive a degree, and be commissioned by age 25. Each grant covers the cost for full tuition, laboratory fees, incidental expenses, and an allowance for textbooks.

Field Training: Under either Air Force ROTC program the student takes only one summer field training session. The six-week field training for the two-year program pays approximately $140. The four-week field training for the four-year program pays approximately $160. This pay is in addition to travel pay to and from the field training location.

Standards: Cadets must be male U. S. citizens of sound physical condition and high moral character. They must receive a degree and complete ROTC by age 28 to be recommended for commissioning as Air Force officers.

Distinguished Military Graduates: Outstanding advanced course cadets may be designated Distinguished Air Force ROTC Cadets and are given the opportunity to apply for commissions as regular officers in the Air Force.

Comajors: A student may include PS 418, 420, and 443 to provide a comajor in Aerospace Studies with the major he submits for a degree. The two-year program student must also include Sp 407.

Further Educational Opportunities: After completion of AFROTC requirements, advanced degrees may be sought by delaying active duty commitments. Some commissioned officers continue advanced studies with the Air Force Institute of Technology. Special provisions are available for medical, law, and meteorology students. For further information, contact the Air Force ROTC.

Lower Division Courses

AS 111,112,113. Aerospace Studies I.
1 hour each term. 1 ① 1 ①
General Military Course (GMC). Foundations of world military systems; exploring causes of world conflict; factors and instruments of national power; nature and principles of war; military systems; U. S. Department of Defense; military structure; USAF organization and doctrine; strategic offensive and defensive forces; leadership, discipline, tradition, and courtesies of the service.

AS 211,212,213. Aerospace Studies II.
1 hour each term. 1 ① 1 ①
General Military Course (GMC). U.S. general purpose and aerospace support forces. Function of these forces in limited war. The mission, resources, and operation of tactical air forces with attention to counter-insurgency functions. Review of Army, Navy, and Marine general purpose forces. Trends and implications: An examination of the conflict between communism and democracies in terms of theories, objectives and strategy. The alliance and collective security agreements of U. S. and specific problems involved in the search for peace. Corps training to expand development of junior officers. Prerequisite: AS 1.

AS 214. Field Training. 6 hours summer.
Six-week field training (for two-year program applicants); education and training comparable to that received by the four-year program cadet during his freshman (AS I) and sophomore (AS II) years on campus and his four-week field training period (AS 314). Conducted at an Air Force Base. Prerequisite: *Application* preceding fall term.

Upper Division Courses

AS 311,312,313. Aerospace Studies III.
3 hours each term. 3 ① 1 ①
Professional Officer's Course (POC). Growth and development of aerospace power; nature of military conflict; aerospace power as a prime security element; concepts, doctrine, and methods of force employment in military operations; contemporary thought and projected technological developments for manned aircraft; role of technology; national space effort; solar system effect on space operations; orbit, trajectory, and vehicle principles and problems; current and planned space operations. Corps training to continue officer development. Prerequisite: AS I and II *or* AS 214.

AS 314. Field Training. 6 hours summer.
Four-week field training (for four-year program students); supplements campus courses in developing leadership and discipline. Mission, organization and functions of an Air Force Base; marksmanship, survival, and physical training; aircrew and aircraft indoctrination; orientation on specific opportunities in career fields. Conducted at an Air Force Base. Prerequisite: AS III.

AS 350. Aerospace Studies.
3 hours. 2 ②
Principles of flight, weather, and navigation; aerodynamic reactions; meteorology; flight computers; navigation; flight planning; and associated federal air regulations. Prerequisite: AS 312.

AS 405. Reading and Conference: Aerospace Studies.
1 to 3 hours. Terms and hours arranged by instructor.
Supervised individual work. Consent of instructor required.

AS 411,412,413. Aerospace Studies IV.
3 hours each term. 3 ① 1 ①
Professional Officer's Course (POC). Professionalism; leadership and management theory, practice, tools and controls; responsibilities; military justice; human relations; personnel policies; channels of communication; problem solving. Prerequisite: AS III.

Department of Military Science

Personnel detailed from United States Army as of January 1970.

Professor: Colonel TERREL (Infantry) Commandant.

Associate Professor: Major KANE (Infantry).

Assistant Professors: Captains BOYD (Field Artillery), CLINTON (Armor), HENDERSON (Infantry), ROWE (Infantry).

Instructors: Sergeant Major HUGHES, Master Sergeant KADLEC, Sergeant First Class ASLIN, Sergeant First Class JACKSON, Staff Sergeant BONHAM.

Instruction in the Military Science Department is designed to produce junior officers for the United States Army in both the reserve and regular components. The basic military education this department provides, in conjunction with the student's regular course of study, provides the background and attributes essential to the Army officer.

The Army ROTC commissioning program is comprised of: (1) either the Basic Course or Basic Summer Camp; (2) the Advanced Course; (3) the Advanced Summer Camp; and (4) authorized electives from other schools of the University. Upon completion of the four-year military science course, the student will have received 33 credit hours, all of which are reflected in his university grade-point average. Those students taking the "two-year" course, that is, substituting Basic Summer Camp for the Basic Course, will have received 30 credit hours at completion of the Military Science Course.

a. The Basic Course consists of freshmen classes each term for which the student receives one credit hour each, and classes each term of the sophomore year for which he receives 2 credit hours per term. (Students who have not taken the Basic Course may attend a six-week Basic Summer Camp at the end of their sophomore year and also be eligible for the Advanced Course. This provision allows students transferring from junior colleges, or who for other reasons have not taken the Basic Course, to get into the commissioning program.)

b. Students in the Advanced Course, the junior and senior years, receive 3 credit hours per term.

c. The Advanced Summer Camp, which normally is attended between the junior and senior years, is six weeks in duration and 6 credit hours are awarded for it by the University.

d. While enrolled in the Advanced Course, the cadet will take 9 credit hours of selected electives. Credit for these electives is in addition to the Military Science Advanced Course and will satisfy requirements for ROTC and for the student's primary course of study. Electives will be selected with the advice of the departmental faculty from electives approved by the PMS. Only subjects which are not required in the student's normal academic curriculum during the freshman and sophomore years will be selected to meet this requirement. A student may submit Military Science as a comajor for a baccalaureate degree if he includes sufficient credit hours of either PS 417,418,420,422, or 443 as electives to increase hours creditable to Military Science to a total of 36.

Successful completion of the program in Military Science leads to a commission as an officer in one of seventeen branches of the Army. A student who successfully completes the cadet flight training program may be selected for Army Flight Training which will qualify him as an Army Aviator.

Enrollment in the Advanced Course. Each student enrolled in the Advanced Course of the ROTC must:

1. Be selected by the professor of Military Science and the President of Oregon State University.
2. Be able to complete requirements for commission before reaching 28 years of age.
3. Have successfully completed such survey and general screening tests as may be prescribed.
4. Have completed the Basic Course, or the Basic Summer Camp, or received credit in lieu thereof for having had 4 months or more of 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 correctable 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; to attend summer camp at time specified unless deferred for cogent reasons; to accept a commission if offered; and satisfy the service obligation after graduation.

Pay. Advanced Course cadets receive a subsistence allowance which totals more than $900. In addition, they are paid $240 for the six-week summer training session plus a 6¢-per-mile travel allowance to and from camp.

Commissions. For a reserve commission a student must meet the following minimum requirements:

1. He must have received a baccalaureate degree.
2. He must successfully complete the course in Military Science. The branch of service in which he is commissioned is determined by his academic concentration and the needs of the Army.

Distinguished Military Students may apply for appointment as commissioned officers in the Regular Army. They must possess outstanding qualities of military leadership, high moral character, and definite aptitude for the military services, be between the ages of 21 and 27 years, and meet certain physical standards.

Scholarships. Army ROTC offers four types of scholarships. Each pays full tuition, book costs, laboratory and incidental fees, and $50 each month subsistence pay for the term of the scholarship. (This is not paid in addition to the subsistence pay that all Advanced Course cadets get, but is an alternative financial aid program.) The four-year scholarships are awarded to selected applicants from among high-school seniors.

Three-year, two-year, and one-year scholarships are available to selected freshman, sophomore, and junior ROTC cadets. Students who substitute the Basic Summer Camp for the Basic Course are not eligible for a scholarship. Full information on Army ROTC Scholarships may be obtained by conducting the Military Science Department of the University.

Lower Division Courses

MS 111,112,113. Military Science I.
1 hour each term. 2 ①
Leadership laboratory: organization of the Army and ROTC; individual weapons and marksmanship; U. S. Army and National Security; elective subjects totaling 3 credit hours chosen from general academic courses in effective communications, science comprehension, psychology, or political development and political institutions.

MS 211,212,213. Military Science II.
2 hours each term. 3 ①
Leadership laboratory; map and aerial photo reading; introduction to operations and basic tactics; counter insurgency; American military history.

MS 214. Basic Summer Camp.
6 hours.
Six weeks of instruction at Fort Knox, Kentucky; substitute for the first two years of the ROTC program.

Upper Division Courses

MS 311,312,313. Military Science III.
3 hours each term. 4 ①
Leadership laboratory; military teaching principles; branches of the Army; small unit tactics and communications; precamp orientation; internal defense development; selected academic subjects.

MS 314. Advanced Summer Camp.
6 hours.
Practical and theoretical instruction for six weeks at Fort Lewis, Washington. Prerequisite: MS 311,312,313.

MS 405. Reading and Conference.
3 hours. Terms to be arranged.
Consent of Professor of Military Science required. Prerequisite: enrollment in MS 411,412,413.

MS 411,412,413. Military Science IV.
3 hours each term. 4 ①
Leadership laboratory; operations, logistics; role of the United States in world affairs; army administration; military law, service orientation; internal defense development; review of map reading; selected academic subjects.

Department of Naval Science

Personnel detailed from United States Navy and Marine Corps as of January 1970.

Professor HITCHCOCK (Captain, USN) Commanding Officer.
Associate Professor RATTE (Commander, USN) Executive Officer.
Assistant Professors: SWEENEY (Major, USMC), ANDERSON (Lieutenant Commander, USN), NEAD (Lieutenant, USN) TAYLOR (Lieutenant, USN), YOUNG (Lieutenant, USN), WILCOX (Lieutenant Commander, USN).
Instructors: SNYDER (Master Gunnery Sergeant, USMC), WERSEBE (Chief Quartermaster, USN), PONTHIEUX (Chief Yeoman, USN) PHILLIPS (Chief Storekeeper, USN), HUSTON (Chief Gunner's Mate, USN).

Regular students are selected by the Chief of Naval Personnel through national competition. Successful applicants are appointed Midshipmen USNR by the Secretary of the Navy. During a maximum of four years of college, the Navy pays tuition, cost of textbooks, other fees of an instructional nature, and subsistence allowance of $50 per month. Graduates are offered commissions as Ensigns, USN, or Second Lieutenant, USMC, and are required to serve on active duty for four years.

Contract students are selected by the Department of Naval Science at Oregon State University from among voluntary applicants during the new-student orientation period. They are paid subsistence amounting to $50 per month during their last two years only. They are offered commissions as Ensign, USNR, or Second Lieutenant, USMCR upon graduation and are required to serve on active duty for three years.

The active duty obligation in the foregoing categories defers participating students from military service during university training.

Any undergraduate student may, with the prior approval of the Professor of Naval Science, undertake naval science courses for credit. Such students, however, are classified as Naval Science students and are not actually enrolled in the NROTC program which leads to a commission upon graduation.

Requirements. *Every acceptable NROTC 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 or tentatively accepted 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. (*Regular students* only)
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 4 inches, maximum 6 feet 6 inches. Vision, 20/20 each eye without correction. Waivers for defective visual acuity no worse than 20/100 in each eye may be granted under certain conditions. *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 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 three years (for contract student).

Status and Curriculum. Students enrolled in the NROTC program are not on active duty. They wear the uniform only for drills, on special occasions, and during the summer at sea training periods.

The program of study covers four years and fits into curricula leading to first baccalaureate degrees. It includes the following minimum requirements:

1. 34 term hours of Naval Science.
*2. One year of college physics or chemistry. One year of a biological earth science may be substituted if approved by the Professor of Naval Science.
*3. One year course of instruction in calculus with analytic geometry. One year of statistics and probability may be substituted if approved by the Professor of Naval Science.
4. One term of computer science. Mth 151 is considered norm for this requirement.
5. One term of National Security and Foreign Policy (PS 210) is considered norm for this requirement.
6. Proficiency in written and oral expression. (One year of English is considered adequate.)
7. Two years of physical education. Each student must qualify as a swimmer and will be instructed in lifesaving and resuscitation.

Naval Science (including summer at sea training) pursued for four years in one of the undergraduate curricula constitutes a co-major with several of the majors offered in degree-granting divisions of schools.

Lower Division Courses

NS 111,112,113. Naval Science I.
3 hours each term. 5 ①
Naval Organization and Administration, Naval Ships Systems. NS 111: Introduction to structure and principles of naval organization. *NS 112, 113:* Types, structures, purpose, and safe operation of naval ships.

NS 211,212,213. Naval Science II.
3 hours fall and winter; 1 hour spring. 5 ①, 5 ①, 2 ①
American Military Affairs and National Security Policy. NS 211, 212: Military affairs in the United States from American Revolution to present. *NS 213:* Formulation and implementation of American security policy.

Upper Division Courses

NS 311,312,313. Naval Science III.
3 hours each term. 5 ①
Navigation and Naval Operations: NS 311, 312: Science of navigation—piloting, celestial navigation, and electronic aids. *NS 313:* Fleet tactics and maneuvers, fleet communications, rules of the nautical road, and relative movement problems.

NS 321,322,323. Naval Science III: Marine Option.
3 hours each term. 5 ①
Evolution of Art of War and Modern Basic Strategy and Tactics: Art of war from Alexander to present; principles of modern strategy and small unit tactics. For U. S. Marine Corps candidates.

NS 411,412,413. Naval Science IV.
3 hours each term. 5 ①
Naval Weapons: Weapons systems and the systems approach; linear analysis of ballistics and weapons; dynamics of basic components of weapons control systems investigated and stated as transfer functions.

NS 421,422,423. Naval Science IV: Marine Option.
3 hours each term. 5 ①
Amphibious Warfare and Administration: Theory of amphibious operations in World War II and Korean conflict; administration; leadership; and military justice. For U. S. Marine Corps candidates.

NS 450. Summer At-Sea Training.
6 hours summer.
Six- to eight-week training cruise taken aboard naval ships as arranged by professor of Naval Science.

* To be completed by end of junior year.

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 and 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 the University, the academic deans, the chairmen of the 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 Graduate Committees of the several schools. 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 committees. The Graduate Council meets on the second and fourth Thursdays of each month. The Dean of the Graduate School is chairman of the Graduate Council and an ex-officio member of all graduate committees.

Oregon State College granted its first advanced degrees (A.M.) in 1876. In 1897 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 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 on this campus to the Graduate School.

Graduate School

Henry P. Hansen, Ph.D., Dean
Wendell H. Slabaugh, Ph.D., Associate Dean
Carl E. Bond, Ph.D., Assistant Dean

GRADUATE COUNCIL

H. P. HANSEN (chairman), C. E. BOND, R. F. CAIN, K. L. CHAMBERS, F. W. FOX, R. O. MCMAHON, T. R. MEEHAN, JUNE G. PATTULLO, FLORENCE E. PETZEL, H. W. SCHULTZ, R. E. SHIRLEY, W. H. SLABAUGH, J. R. WELTY.

GRADUATE COMMITTEES

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Business and Technology: L. B. STRICKLER (chairman), J. M. CHRISMER, N. S. DECKARD, J. A. PFANNER (ex officio), R. E. SHIRLEY.

Education: R. B. BARON, G. F. CRAVEN, F. W. FOX, R. E. KING, A. L. LELAND, A. R. MEEKS, H. A. TEN PAS.

Engineering: G. W. GLEESON (chairman), F. J. BURGESS, J. G. KNUDSEN, R. D. OLLEMAN, J. L. RIGGS, L. SLEGEL, L. N. STONE, C. E. WICKS.

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Home Economics: FLORENCE PETZEL (chairman), MAY DUBOIS, VIRGINIA HARGER, BETTY E. HAWTHORNE, J. P. O'NEILL, MARTHA PLONK, ELIZABETH YEARICK.

Humanities and Social Sciences: H. H. PLAMBECK, Sociology (chairman); W. R. CROOKS, Psychology; W. C. FOREMAN, English; R. F. FUQUAY, Political Science; P. GUNN, Art; T. R. MEEHAN, History; B. H. WILKINS, Economics.

Pharmacy: H. W. SCHULTZ (chairman), G. H. CONSTANTINE, R. F. DOERGE, G. B. FINK, H. C. FORSLUND, R. W. SAGER, C. O. WILSON.

Science: K. L. CHAMBERS (chairman), H. T. EASTERDAY, R. A. GUENTHER, L. D. KULM, W. P. NAGEL, JUNE G. PATTULLO, R. A. SCHMIDT.

JOINT-CAMPUS PROGRAM

Regularly enrolled graduate students at Oregon State University may enroll in graduate courses of the University of Oregon in Eugene when these courses are a part of their approved graduate programs. The joint-campus program offers the graduate student enrolled at OSU access to the specialized instructional and research resources of two major universities through a single matriculation and registration.

In a similar manner, graduate students at the University of Oregon may take graduate courses at Oregon State University without additional tuition. Students participating in the joint-campus program are considered students of their home university.

Students follow the standard advising and registration procedures, irrespective of whether work is taken on one or both campuses. Courses to be taken at the University of Oregon will be identified on registration materials by the symbol "JC 510 UO" preceding the course prefix, number, and title as listed in the U of O catalog. Credit earned on either campus by OSU students will be recorded in the OSU Registrar's Office. Tuition and fees will be the same as if all courses were taken at Oregon State University. Students participating in this program are responsible for their own transportation.

ADVANCED DEGREES

The degrees granted through the Graduate School of Oregon State University and the fields in which programs of study leading to the respective degrees are offered are listed below.

Doctor of Philosophy (Ph.D.)

School of Science fields

ATMOSPHERIC SCIENCES: atmospheric physics and chemistry, meso, radar, and synoptic meteorology, biometereology

BIOCHEMISTRY AND BIOPHYSICS: biochemistry, biophysics

BOTANY: anatomy, cytology, ecology, fungus physiology, genetics, morphology, mycology, nematology, plant pathology, palynology, phycology, physiology, physiology of parasitism, plant virology, systematic botany, forest physiology, forest pathology

CHEMISTRY: analytical chemistry, inorganic chemistry, organic chemistry, physical chemistry, radio and radiation chemistry

ENTOMOLOGY: acarology, applied entomology, aquatic entomology, forest entomology, general entomology, systematic entomology

GENERAL SCIENCE: radiation biology, physical science, biological science, radiological physics

GENETICS: formal genetics, cytology and cytogenetics, evolution and speciation, quantitative genetics, microbial genetics, fungus genetics, plant genetics and improvement, animal genetics and improvement, forest genetics

GEOLOGY: areal geology, economic geology, geomorphology, invertebrate paleontology, micropaleontology, palynology, igneous and sedimentary petrology, sedimentology, stratigraphy, volcanology

MATHEMATICS: analysis, algebra, applied mathematics, computer science and technology, geometry

MICROBIOLOGY AND HYGIENE: dairy microbiology, food microbiology, hygiene and sanitation, industrial microbiology, marine microbiology, microbial genetics, microbial physiology, microbiology of water and sewage, pathogenic microbiology, soil microbiology, virology, molecular biology

OCEANOGRAPHY: biological, chemical, geological and physical oceanography, geophysics

PHYSICS: atomic physics, nuclear physics, particle physics, solid state, theoretical physics

STATISTICS: applied statistics, biometry, mathematical statistics, operations research

ZOOLOGY: cellular biology, embryology and anatomy, genetics, invertebrate zoology, natural history and ecology, parasitology, physiology

School of Agriculture fields

AGRICULTURAL ECONOMICS: agricultural finance and taxation, agricultural marketing, agricultural prices, econometrics and mathematical economics, farm management, fisheries economics, marine economics, natural resource development, production economics, transportation economics

ANIMAL SCIENCE: genetics, meals, nutrition, physiology, range management

FARM CROPS: crop breeding and genetics, crop physiology and ecology, crop production, genetics, pasture production and management, range management, seed physiology, seed technology, weed control

FISHERIES: aquiculture, fish genetics, ichthyology, invertebrate fisheries, limnology, parasites and diseases, physiology and ecology of marine and freshwater fishes, toxicology, water pollution biology

FOOD SCIENCE AND TECHNOLOGY: food science

GENETICS: (See School of Science fields above)

HORTICULTURE: floriculture, nursery management, ornamental horticulture, pomology, vegetable crops

POULTRY SCIENCE: breeding, genetics, management, nutrition, reproduction physiology

RANGE MANAGEMENT: interdepartmental major

SOILS: irrigation, forest soils, soil chemistry, soil fertility, soil genesis, soil physics, clay mineralogy, plant nutrition, soil classification, morphology, soil microbiology

WILDLIFE SCIENCE: wildlife management, behavior, food habits and nutrition, parasites and diseases, population dynamics, reproductive biology, toxicology of pesticides, wildlife ecology

School of Education fields

EDUCATION: education, guidance, college student personnel administration

SCIENCE EDUCATION

School of Engineering fields

CHEMICAL ENGINEERING: chemical engineering

CIVIL ENGINEERING: highway engineering, hydraulic engineering, sanitary engineering, structural engineering, engineering surveying, water resources engineering, ocean engineering, soil mechanics and foundation engineering

ELECTRICAL AND ELECTRONICS ENGINEERING: communication, computers, control, digital systems, electrical engineering, electronics, instrumentation, medical electronics, network synthesis, power, solid state electronics

INDUSTRIAL ENGINEERING: materials handling, methods analysis, operations research, plant layout, production control, work simplification

MECHANICAL AND NUCLEAR ENGINEERING: (Mechanical) aeronautics, air pollution, applied mechanics, automotive design, heat transfer, fluid mechanics, ocean engineering, thermodynamics; (Nuclear) experimental reactor engineering, nuclear power generation, nuclear reactor analysis

METALLURGICAL ENGINEERING: physical and structural metallurgy, metallurgical analysis and interpretation, materials science

School of Forestry fields

FOREST MANAGEMENT: fire control, forest economics, forest genetics, forest management, forest photogrammetry, forest tree physiology, silviculture, forest hydrology, forest biometry

FOREST PRODUCTS: wood science

School of Home Economics fields

FAMILY LIFE: child development, family relationships

FOODS AND NUTRITION: foods, nutrition

HOME MANAGEMENT: home management

School of Pharmacy fields

PHARMACEUTICAL CHEMISTRY

PHARMACEUTICAL SCIENCE

PHARMACOGNOSY

PHARMACOLOGY

Doctor of Education (Ed.D)

School of Education fields

EDUCATION: education, guidance, college student personnel administration

SCIENCE EDUCATION

Master of Arts (M.A.)

School of Science fields

ATMOSPHERIC SCIENCES

BIOCHEMISTRY AND BIOPHYSICS

BOTANY

CHEMISTRY

ENTOMOLOGY

GENERAL SCIENCE: history of science, radiological health, radiological physics

GENETICS

GEOGRAPHY: Physical geography, resource geography

GEOLOGY

MATHEMATICS

MICROBIOLOGY AND HYGIENE

OCEANOGRAPHY

PHYSICS

STATISTICS

ZOOLOGY

School of Education fields

AGRICULTURAL EDUCATION

BUSINESS EDUCATION

EDUCATION

GUIDANCE

HEALTH EDUCATION

HOME ECONOMICS EDUCATION

INDUSTRIAL ARTS EDUCATION

REMEDIAL READING

SCIENCE EDUCATION

School of Engineering fields

AGRICULTURAL ENGINEERING

CHEMICAL ENGINEERING

CIVIL ENGINEERING

ELECTRICAL ENGINEERING

ENGINEERING SURVEYING

INDUSTRIAL ENGINEERING

MECHANICAL ENGINEERING

METALLURGICAL ENGINEERING

NUCLEAR ENGINEERING

School of Home Economics fields

CLOTHING, TEXTILES, AND RELATED ARTS

FAMILY LIFE

FOODS AND NUTRITION

HOME MANAGEMENT: housing, family economics

School of Pharmacy fields

PHARMACEUTICAL CHEMISTRY

PHARMACEUTICAL SCIENCE

PHARMACOGNOSY

PHARMACOLOGY

PHARMACY ADMINISTRATION

Master of Science (M.S.)

The Master of Science degree is offered in the same fields as listed above for the Master of Arts degree with the following additions:

School of Agriculture fields

AGRICULTURAL ECONOMICS

ANIMAL SCIENCE: livestock management, dairy production, meats, wool technology

FARM CROPS

FISHERIES

FOOD SCIENCE AND TECHNOLOGY

GENETICS

HORTICULTURE

WILDLIFE SCIENCE

POULTRY SCIENCE

RANGE MANAGEMENT

SOILS

VETERINARY MEDICINE: pathology, microbiology, parasitology, virology

School of Business and Technology

BUSINESS ADMINISTRATION: management science

School of Forestry fields

FOREST ENGINEERING

FOREST MANAGEMENT

FOREST PRODUCTS

School of Home Economics

INSTITUTION MANAGEMENT

Other Master's Degrees

The following additional master's degrees are offered in the fields indicated:

Master of Agriculture: AGRICULTURE: (See page 186.)

Master of Arts in General Studies: (See page 186.)

Master of Business Administration: (See page 187.)

Master of Education: AGRICULTURAL EDUCATION, BUSINESS EDUCATION, EDUCATION, GUIDANCE, HEALTH EDUCATION, HOME ECONOMICS EDUCATION, INDUSTRIAL ARTS EDUCATION, REMEDIAL READING, SCIENCE EDUCATION

Master of Forestry: FOREST ENGINEERING, FOREST MANAGEMENT, FOREST PRODUCTS

Master of Home Economics: CLOTHING, TEXTILES, AND RELATED ARTS; FAMILY LIFE; FOODS AND NUTRITION; GENERAL HOME ECONOMICS; HOME ECONOMICS EDUCATION; HOME MANAGEMENT

Master of Materials Science: (See page 187).

Master of Ocean Engineering: (See page 187.)

Master of Pharmacy: PHARMACY ADMINISTRATION, HOSPITAL PHARMACY

Engineer Degrees

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 Engineering
Mining Engineer (Min.E.)	Chemical Engineering

Minors

Any of the fields listed above may be offered as minor fields of study as a part of a student's graduate study program. In addition graduate minors in the following fields are also offered.

Agricultural Engineering Technology
Air Pollution
Anthropology
Art
College and University Teaching
Economic Geography
Economics
English
Extension Methods
History
Modern Languages
Music
Physical Education
Political Science
Psychology
Recreation
Remedial Reading
Sociology
Speech
Trade and Industrial Education
Water Resources

GENERAL REGULATIONS

Admission

A student desiring to enter the Graduate School at Oregon State University 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; (4) a non-refundable $10 application fee, and (5) two letters of reference. The applicant should contact the major department for any special requirements such as GRE scores. To be considered for admission to the Graduate School, an applicant much have a baccalaureate degree from an accredited college or university, and a scholastic record and background and other evidence that indicate he is capable of doing satisfactory graduate work. 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 department 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:

Regular Graduate students

Those who have met the academic requirements may be either classified or unclassified.

a. *Classified* are those who have been accepted by a major department to work toward an advanced degree.

b. *Unclassified* are 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 classified candidates later, if accepted by a department.

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. 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 do not qualify as regular graduate students may be admitted to this category. As a condition to admission the student shall sign a statement that he understands that while work completed prior to and while under this category may not be used for a graduate degree, it may be used as a basis for application for regular classified status. Normally, 15 hours with grades of B or better are required for reconsideration.

Test of English as a Foreign Language (TOEFL)

This test is required of all foreign applicants whose native language is not English, with a minimal score of 500.

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 (60 hours for five-year baccalaureate programs) 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.

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 one year of upper division work in addition to foundation 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.

Qualifying Examinations

Graduate students working for advanced degrees in many departments 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 showing 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 before the beginning of fall term, 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.

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 teaching and research assistants the maximum load is 12 term hours; for part-time assistants the maximum load is 15 term hours; fellows may carry the maximum load.

A graduate student using space and facilities or under supervision of a major professor must register for a minimum of 3 term hours.

The graduate program of each candidate should include a substantial amount of work with at least three faculty members offering graduate instruction.

Grade Requirement

A grade-point average of 3.00 (a B average) is required in both the major and the minor(s). Grades below C are not accepted for graduate credit.

Graduate Courses

All courses numbered in the 500's carry graduate credit, as do those in the 400's which have been approved by the Graduate Council. Approved courses in the 400's 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, 506, 507 and 508 may be used repeatedly. Number 503 covers both the thesis 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. Number 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) and Projects (506) are used for special work not given under a formal course number. They may include specified reading, laboratory work, field work, or compilation of information essential in the student's program. The work done under these numbers may be reported either in writing or orally to the instructor concerned. Seminar (507) is used both for departmental seminars and for special group work not given in a formal course. A maximum of 6 hours of blanket numbers other than thesis, or research in lieu of thesis for non-thesis degrees, may be used on the Master's degree program and 15 hours on the doctorate.

Oral Examination Schedule

Oral examinations, both preliminary and final, will not be scheduled during any period when classes are not in session, including between the summer session and fall term.

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 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 Graduate School Office by the first week of spring term preceding Commencement.

Students who complete degree requirements in the summer term should apply for graduation at the Graduate School Office by the end of the fourth week of the summer term. Diplomas will be mailed during the fall term.

Graduate Fees

Graduate students registered for 8 term hours of work or more pay tuition and fees in accordance with the schedule printed in the General Information section of this Catalog. Graduate students do not pay the nonresident fee. Students holding teaching or research assistantships pay fees totaling $38 per term. Graduate students registering for 7 hours of work or less (minimum three credit hours) pay the regular part-time fee. Payment of the fee 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 $25 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 University. 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.

GRADUATE APPOINTMENTS

A varying number of graduate teaching and research assistantships 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. Graduate assistants render service to the institution through teaching duties or research and pay fees amounting to $35 per term, which admit them to all services maintained by the university for the benefit of students. Graduate assistants may carry a maximum of 12 hours per term.

Teaching Assistantships. A teaching 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 hours per term. The stipend for a graduate assistant varies from $2,400 to $3,400.

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 teaching assistant.

Residence Hall Assistantships. Appointees are required to devote the equivalent of one-third time working with students in their residences. Positions available for men and women and married couples. Maximum enrollment 12 hours per term; stipend $1,800-$3,600 for 9 months.

Agricultural Experiment Station Graduate Research Assistantships. 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. Appointment and stipend are based on training, ability, and experience. The stipend varies from $3,120 to $4,122 on a twelve-month basis.

Memorial Union and Student Activities Assistantships. Six $2,100 Academic Year assistantships requiring approximately 12-15 hours per week. Four provide intern experiences in College Union Administration, and two in Administration of Student Activities, with preference given students enrolled in Student Personnel Administration in Higher Education program.

Oregon State Game Commission Research Assistantships. Assistantships in fisheries and wildlife and range management are supported by the Oregon Game Commission with stipends of $3,120 to $4,122 on a twelve-month basis. Training, ability, and experience are the appointing criteria. Apply to the Department of Fisheries and Wildlife or the Department of Range Management.

Engineering Experiment Station Assistantships. A variable number of assistantships are available through the Engineering Experiment Station under which the student devotes one-third of his time as an assistant on an approved station project. Such projects are in operation in each department of engineering except engineering physics, agricultural engineering, and manufacturing engineering technology. The current stipend is $2,700 to $3,000 on a nine-month appointment.

Fellowships. A number of Fellowships sponsored by industry, foundations, and government agencies are available to superior graduate students for graduate study in various departments at Oregon State University. These fellowships are awarded through the departments concerned, and application should be made by writing to the department. Fellows render no service to the institution, may carry 16 credit hours, and pay the full fee of $162 per term. The following fellowships are open to Oregon State University graduate students:

CROWN ZELLERBACH FOUNDATION FELLOWSHIP IN RESOURCE GEOGRAPHY: $2,000 to assist an outstanding graduate student majoring in Resource Geography.

DIAMOND-SHAMROCK SUMMER FELLOWSHIP: $600 for a graduate student in chemistry.

DOW CHEMICAL COMPANY FELLOWSHIP: $2,500 provided by the Dow Chemical Company for graduate fellowships in chemical engineering; a senior may be selected.

DUPONT GRANT: Annual awards up to $2,000 to assist graduat students in chemical engineering.

GENERAL FOODS FUND FELLOWSHIPS: Two grants for doctorate or master's degree study in any area of Home Economics; $3,500 for two years for candidate on doctoral program and $1,750 for a student on a master's degree program, provided by the General Foods Fund, Inc. of New York City.

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 $4,000 annually.

MARY J. L. MCDONALD FELLOWSHIPS IN FORESTRY: Annual grants of $300 to $1,500 each to assist graduate students in forestry.

SHELL AIDS: $5,000 for the advancement of graduate education in chemistry.

SOUTH SANTIAM EDUCATIONAL RESEARCH PROJECT FELLOWSHIPS: Several $2,000-$4,000 fellowships for students in forestry provided by the Louis W. and Maud Hill Foundation.

STAUFFER CHEMICAL COMPANY GRANT: Annual awards up to $2,000 to assist graduate students in chemical engineering.

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.

WEYERHAUSER FELLOWSHIP: One $4,000 fellowship provided by the Weyerhauser Company Foundation for graduate study and research in forestry.

CHESTER M. WILCOX MEMORIAL SCHOLARSHIP: Income from a trust fund left by A. D. Wilcox in honor of his brother to a graduate student for research in poultry science. Approximately $4,000 annually.

RESEARCH GRANTS: Various departments of the School of Science and other research 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. Applications 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, U. S. Department of Agriculture, American Heart Association, Oregon Heart Association, Nutrition Foundation, Life Insurance Medical Research Fund, and American Cancer Society.

NATIONAL SCIENCE FOUNDATION TRAINEESHIPS: Oregon State University participates in this Federal program for the support of graduate study in the natural sciences and engineering science.

NATIONAL DEFENSE EDUCATION ACT FELLOWSHIPS: (TITLE IV). Oregon State University participates in this Federal program and currently has a number of fellowships. The NDEA Title IV program will undoubtedly continue, and it is expected that additional areas of graduate study for the Ph.D. degree will be available.

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 including thesis and 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. Of the 45 term hours, a maximum of 6 term hours may be earned under "in absentia" registration, but no thesis credit may be thus registered. A maximum of 3 hours of small "g" courses is allowed on the major.

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 Division of Continuing Education 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.

Transferred Credit

A maximum of 15 term hours of graduate work done at another accredited institution, or in the Division of Continuing Education 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. Credit for out-of-state extension courses is not acceptable.

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 the first term of the 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 five years, but work taken between five and eight years before the program is completed may be validated under the supervision of the department, usually by assigned readings or examination or both. Courses more than eight years old are obsolete.

Qualifying Examinations. (See page 184.)

Thesis

A copy of the master's thesis in final form must be presented to the Graduate Office at least one week prior to the final oral examination. Copies of the thesis and abstract are then distributed to members of the examining committee. After the examination, two copies for the library and three copies of the abstract are deposited unbound in the Graduate Office. The student must obtain on the thesis approval page the signatures of the major professor, the head of the major department, and the Dean of the Graduate School.

Full information concerning the prescribed style for thesis is given in the booklet, "Preparation of the Thesis," available at the Book Store for thirty-five cents.

The credit allowed for the thesis, including the research and the preparation of the manuscript, varies from 6 to 12 term hours. In certain departments, the thesis requirement for the Master of Science and Master of Arts degrees is optional, to be determined in each case by the department and major professor. Check with the major department.

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.)

Final oral examinations must be scheduled in the Graduate Office five weeks before June Commencement and must be completed four weeks before Commencement. Corrected copies of the thesis with three copies of the abstract must be in the Graduate School Office not later than three weeks before Commencement.

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 theses based on research. Forty-five hours are required with a minimum of 9 hours in each of at least three agricultural or agriculturally related fields with not more than 21 hours in any one field. At least 15 hours must be in 400 (G) or 500 courses.

An advisory committee selected from these departments 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 from the date the student registers under the program. No thesis is required but a paper demanding 3 to 5 hours of work must be submitted to be registered as Reading and Conference 505 in the field of major interest.

Master of Arts in General Studies

This degree is granted for the attainment of a broad advanced knowledge and cultural achievement rather than for work in a specialized field under the traditional program of the departmental master's degree. A minimum of 9 hours in each of three departments (at least one of which must be in a field in which graduate majors are allocated to the institution) is required, with not more than 21 hours in any one department. The course work must be integrated and organic.

Option A. Thesis option. The thesis must coordinate the work in the three fields.

Option B. Students working toward this degree are advised by department faculty members under the supervision of the General Studies Committee. No thesis is required.

Master of Business Administration

The Master of Business Administration degree is designed for the individual holding an undergraduate degree either in business administration or in a nonbusiness area who seeks professional education which will aid him ultimately to develop into a competent and responsible executive in business, industry, or government, or to carry on research related to business problems and operations. The program involves a broad study of the field of business administration rather than intensive work in any one specialized area.

The M.B.A. program consists of 45 term hours of graduate work, 12 of which may be devoted to a nonbusiness minor. Prerequisite to the MBA graduate courses is a body of undergraduate work in business and economics totaling 40 to 45 term hours.

The time required by a full-time student to complete the program varies from one to two years, depending upon the extent to which the prerequisites are met prior to admission. M.B.A. candidates whose undergraduate degrees were earned in the field of business administration normally will be able to complete the requirements for the M.B.A. degree within one year.

The M.B.A. degree requires a comprehensive final written examination but no thesis is required.

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 earning credit through the Division of Continuing Education of the State System of Higher Education, but a minimum of 24 term hours (not to include thesis or field studies) must be earned on the Corvallis campus in two complete eight- or eleven-week summer terms or two academic-year quarters.

Credit for extension courses from outside the State System of Higher Education is not accepted except under unusual circumstances. In instances where it is accepted, *prior approval* must be obtained from the Dean of the Graduate School if such courses are to be submitted for program purposes. Where credit is transferred from another institution and the major is education or guidance, at least 12 term hours must be earned in the major on this campus. Where the minor is in education, administration, or guidance, at least 12 term hours must be earned in the minor on this campus. When the major *and* minor are in education or guidance, a minimum of 12 term hours in each must be earned on this campus. A maximum of 6 hours of Workshop 508 is allowed on the Ed.M. degree.

A candidate for the Master of Education degree must qualify under one of these options:

a. He must submit 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 24 hours of prescribed courses and 21 hours of electives—no more than 9 hours in any one field—drawn from the fields of anthropology, philosophy, psychology, sociology, family life, and those education courses relating to guidance.

c. He completes 45 term hours with 24 term hours in specific courses. The remaining 21 hours are elective under the direction of an adviser. No thesis or field studies are required. The final examination will be either oral or a written comprehensive examination covering all courses in the student's program. Under Option 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 or Diagnostic and Remedial Instruction in Reading 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.

d. Remedial Reading. He completes 45 term hours with 36 term hours in specific courses in reading, special education, and psychology. The remaining 9 hours are elective under the direction of an adviser. No thesis is required but there is both a written and oral final examination.

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 and a broader technical training is needed. 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 department 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 or departments concerned.

General requirements, except for those relating to the thesis and written report, are the same as for the Master of Science degree.

Master of Science in Management Science

Management science is a separate field of study in which mathematics and scientific methods are applied for the solution of business problems.

Management science encompasses subject matter areas such as management and information systems, operations research, forecasting, programming, computer systems, and Bayesian decision-making.

Candidates who have completed all prerequisite background in business and mathematics are usually able to complete the program in one calendar year. Graduates may enter positions concerned with operations research and management systems or go directly into management work.

Master of Materials Science

Graduate study in material science is organized on an interdepartmental basis under the direction of an Administrative Committee. The departments of Chemical Engineering, Chemistry, Mechanical Engineering, and Physics cooperate in the program. A minimum of 45 term hours is required for the degree distributed approximately 30 hours to a major including thesis, and 15 hours to a minor or minors.

Master of Ocean Engineering

The Master of Ocean Engineering is an interdisciplinary program offered in cooperation with the Department of Oceanography and other disciplines which may relate to ocean science. The program requires 45 term hours and is administered by an interdepartmental School of Engineering Committee with a major in one of the engineering disciplines and usually

a minor in oceanography. A student may be admitted to one of the engineering departments, and a study program is designed to fit the individual's professional objectives and to achieve a high degree of engineering competence pertinent to the ocean environment.

Master of Pharmacy

The Master of Pharmacy is offered with majors in pharmacy administration and hospital pharmacy. A thesis is optional for either major.

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:

a. 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, through the Division of Continuing Education 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.

b. Those who do not hold baccalaureate or master's degrees from Oregon State University are subject to the same requirements as (a) with the additional stipulation that at least 12 term hours of graduate work must be completed in an Oregon State program.

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 applies for the degree with the Registrar of Oregon State University 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; however, the equivalent of at least three years of full-time graduate work beyond the bachelor's degree is required. Normally, a student who has had all of his undergraduate and graduate training at Oregon State may not become a candidate for a doctoral degree at this institution.

Graduate Study Program

The student's doctoral study program is formulated and approved at a formal meeting of his doctoral committee which consists of a minimum of five members of the graduate faculty, including a representative of the Graduate Council appointed by the Graduate Dean. The other members of the doctoral committe are approved by the major department or interdepartmental committee and the Graduate Dean. If a minor is declared, the representative is approved by the minor department. When approved by the doctoral committee, the program is filed with the Graduate School office, and it becomes the obligation of the student to complete the requirements as formulated. In order to modify the program in any way, the student must obtain approval for such changes in the same manner approval of the original program was secured.

Residence

For the doctor's degree, the equivalent of at least three years of full-time work beyond the bachelor's degree is required, of which at least one academic year (usually the last) must be spent in continuous residence at Oregon State University, with a minimum of 36 hours of graduate work.

Qualifying Examinations. (See page 184.)

Language Requirements

The foreign language requirement is determined by the student's doctoral committee, subject to the same approval required for the graduate study program, and is so designated on the official doctoral program. Standards for the fulfillment of the foreign language requirement, however, are determined by the Graduate Council. Foreign language requirements must be completed before the oral preliminary examinations.

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. If more than one negative vote is recorded by the examining committee, the candidate will have failed the examination. Most departments require a written comprehensive examination to be taken before the oral preliminary examination. Oral preliminary examinations *will not be scheduled* for the period between *seven and three weeks before June Commencement.*

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. The preparation of an acceptable dissertation will require not less than one academic year. The booklet, "Preparation of the Thesis," is available at the Book Store.

Regulations concerning the doctoral dissertation are the same as those for the master's degree, as outlined on a previous page, except that the final draft must be presented to the Graduate Office at least *two weeks* prior to final examination.

An abstract of the doctoral thesis of not more than six hundred words will be published by University Microfilms in *Dissertation Abstracts.* 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 the University Microfilms and publication of the abstract in *Dissertation Abstracts.* Deadline for completing these arrangements is no later than three weeks before Commencement.

Final Examination

The final examination for the degree of Doctor of Philosophy may be written in part, but must include an oral examination. The oral examination is open to all members of the faculty and to advanced graduate students. (Date of the oral examination is published in the Staff Newsletter at least one week before it is held.) The examining committee consists of the student's doctoral committee and any additional members, including competent professors from other institutions, whom the major department may appoint. In the oral examination, the candidate is expected to defend his thesis and to show a satisfactory knowledge of his field. If more than one

negative vote is recorded by the examining committee, the candidate will have failed the examination.

The final oral examination must be taken within five years after the preliminary examination. If more than five years elapse, the candidate will be required to take another preliminary examination.

Final oral examinations must be scheduled in the Graduate Office appoximately *six weeks before June Commencement,* and must be *completed about four weeks before Commencement.* Exact dates will be publicized. Two final and complete copies of the dissertation with three copies of the abstract must be in the Graduate School office not later than *three weeks* before Commencement. Oral preliminary examinations may not be taken during the period from eight to three weeks before Commencement.

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 definite requirement. There is no rigid credit requirement, but the total number of term hours of graduate credit including thesis will approximate 135.

Along with the education major, one minor in a 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.

SPECIAL GRADUATE SCHOOL PROGRAMS

The following special and interdepartmental programs are offered by the Graduate School of Oregon State University. Courses and degrees which apply specifically to these programs are listed here rather than in other sections of this catalog.

COLLEGE TEACHING MINOR

Delmer M. Goode, coordinator
C. L. Anderson, F. M. Beer, J. K. Munford

Studies in College and University Teaching and Curriculum

Many 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.

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 College Student (CC 556), College and University Teaching (CC 557), American Higher Education (CC 558), College Teaching Procedures Seminar (.... 507), and College Teaching Studies (CC 506).

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.

Courses in Studies in College and University Teaching and Curriculum are as follows:

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: CC 556,557,558.

CC 507. **Seminar.** Terms and hours to be arranged.

..... 507. **Seminar** (College Teaching Procedures). 3 hours.
Student registers for this seminar in his major department and meets during the term with students from other fields and the instructor to study teaching procedures applicable at the college level.

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.

CC 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.

CC 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.

CC 558. **American Higher Education.** 3 hours. 3 ①
The American college and university; the old liberal arts college; influence of German university; rise of American university; structure and curriculum; international higher education. Prerequisite: graduate standing.

GENERAL STUDIES

The General Studies program at Oregon State University is supervised by a special committee of which Dr. H. H. Plambeck 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. The thesis requirement for the Master of Arts degree is optional.

Graduate Courses

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.

GENETICS

RALPH BOGART, Director of Genetics Institute

Genetics Board: P. E. BERNIER, H. R. CAMERON, chairman, DOROTHY K. FRASER, W. E. KRONSTAD, H. IRGENS-MOLLER, P. A. ROBERTS.

Graduate work in Genetics as a major or a minor can lead to the degrees of Master of Arts, Master of Science, and Doctor of Philosophy. Graduate studies in genetics are coordinated by the Genetics Board and the Director of the Genetics Institute, representing the genetics graduate faculty who are attached to many departments in the schools of Agriculture, Forestry, and Science.

In addition to the specific courses carrying a Genetics (Gen) number, graduate courses in formal genetics, cytology and cytogenetics, evolution and speciation, quantitative genetics, microbial genetics, plant genetics and improvement, animal genetics and improvement, and forest genetics are offered in various departments.

The following undergraduate courses in genetics are offered: Genetics (Z 341), Plant Breeding (FC 415), Horticultural Plant Breeding (Hrt 413), Poultry Breeding (P 441).

Graduate Courses

Gen 501. **Research.** Terms and hours to be arranged.

Gen 503. **Thesis.** Terms and hours to be arranged.

Gen 505. **Reading and Conference.** Terms and hours to be arranged.

Gen 507. **Seminar.** Terms and hours to be arranged.

NUTRITION

CLARA A. STORVICK, Director of the Nutrition Research Institute

Advisory Board: H. W. SCHULTZ, chairman, P. R. ELLIKER, O. H. MUTH, JEAN H. PETERS, F. M. STOUT, CLARA A. STORVICK, CHIH WANG.

An interdisciplinary graduate program leading to the M.S. or Ph.D. degree in Nutrition is available under the direction of the Nutrition Research Institute. Current research programs within which a major may conduct his research appropriate to his thesis include studies in the areas of amino acid, carbohydrate, lipid, and mineral metabolism, nutrient interrelationships, nutrient requirements, and nutritional imbalances. Facilities are available for studies on man, animals, and plants.

Graduate Courses

Nu 501. **Research.** Terms and hours to be arranged.

Nu 503. **Thesis.** Terms and hours to be arranged.

Nu 505. **Reading and Conference.** Terms and hours to be arranged.

Nu 507. **Seminar.** Terms and hours to be arranged.

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 three northwestern universities cooperating with the University of Washington Joint Center for Graduate Study which is located in Richland, Washington. Qualified employees of Battelle Northwest and other contractors at the Hanford Atomic Products Operation may earn graduate credits toward advanced degrees at Oregon State University.

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.

GS 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.

GRADUATE WORK AT PORTLAND

Twenty-one of the 45 term hours of work required for the Master of Education degree may be earned at the Portland Continuation Center of the Division of Continuing Education. In a number of fields, one-third of the work for the Master of Arts 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 University or University of Oregon according to major subject, in harmony with allocation of curricula and degrees.

Master of Engineering

This degree is applicable only to those engaged in authorized off-campus graduate instruction at the Portland Continuation Center. A minimum of 45 term hours is required, divided into approximately 30 hours for a major and 15 hours for a minor or minors. Included for a variable number of hours within the major will be a formal report in lieu of thesis, the scope and content of the report to be by approval of the major professor. Prerequisite to study for the degree will be a degree from an undergraduate curriculum in engineering and admission to the Graduate School. The general requirements for the degree are the same as for the Master of Science except for those related to the thesis and for the formal report.

GRADE TRANSCRIPTS

Students who complete graduate courses through the Portland Continuation Center must make arrangements to have transcripts of their grades sent to the Graduate School office at Oregon State University. Students expecting to complete degree requirements for the June Commencement must have transcripts in the Graduate Office not later than two weeks before Commencement. Students expecting to complete degree requirements during the regular summer term and to receive diplomas in September, must have their transcripts in the Graduate Office not later than two weeks before the end of the regular eight-week summer term.

Research and Extension

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. These efforts are coordinated through the office of the Dean of Research. The Dean of Research serves as Chairman of the Research Council which develops policies for matters pertaining to grant, contract, general, and exploratory research activity.

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. Extension activities are administered through the Division of Continuing Education and the Federal Cooperative Extension Service.

Roy A. Young, Ph.D., Dean of Research
Wayne V. Burt, Ph.D., Associate Dean of Research

Research at Oregon State University is supported by appropriations to the various Experiment Stations, Institutes, and Centers, by outside grants from various agencies for institutional and individual projects, and by instructional budgets as a part of normal academic activity. In addition to the General Research Fund, which is administered by the Graduate Council, and the Directed Research Fund and institutional grants from the National Science Foundation and Public Health Service which are administered by the Research Council, research is carried on through the following separately organized research activities:

Agricultural Experiment Station
Engineering Experiment Station
Forest Research Laboratory
Sea Grant Programs

Research Centers

Air Resources Center
Computer Center
Environmental Health Sciences Center
International Plant Protection Center
Marine Science Center
Radiation Center

Research Institutes

Genetics Institute
Institute of Nuclear Science and Engineering
Nutrition Research Institute
Science Research Institute
Transportation Research Institute
Water Resources Research Institute

The Dean of Research coordinates efforts of the various research organizations of the University, including Research Institutes and Centers, the Agricultural Experiment Station, and the Engineering Experiment Station; provides encouragement and assistance to faculty members in the development of research programs and handling of grant applications; advises the President regarding the general progress of the institution's research program; works in close association with the Dean of the Graduate School to insure maximum opportunity for the integration of graduate instruction and research; with the advice of the Research Council, recommends allocation of NSF institutional grant funds and other general research funds; coordinates administration of grant and contract operations with the Director of Business Affairs to facilitate the work of research personnel and to insure compliance with the regulations of granting agencies.

Directed Research

Directed Research funds are appropriated to provide staff on instructional appointments in the Schools of Science and Engineering increased opportunity to initiate research programs. Funds are used for staff salary to provide for released time from teaching, usually for one term of the academic year. Details can be obtained from the office of the Dean of Research.

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 may be used for 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.

NSF and PHS Institutional Grants

The National Science Foundation, since July 1960, has awarded an institutional grant annually to Oregon State University. The primary purpose of the grant is to strengthen the general research functions in mathematical, physical, biological, social, and engineering sciences as *defined by NSF*. These funds may be used to employ research staff, purchase research equipment, support visiting research specialists, and conduct other research related activities.

A similar institutional grant program was initiated by the Public Health Service in 1966 for support of *health-related* research and training. It is recommended by the PHS that the institutional grant be used to meet emerging opportunities in research, to explore new and unorthodox ideas, to recognize and support scientific talent earlier and, in general to utilize funds flexibly and in ways that will be catalytic both for improving and for fostering additional *health research* consistent with broader academic objectives. This grant is designed to complement rather than displace other Public Health Service awards, and to supplement institutional funds already devoted to health-related research or research training.

Faculty members may submit applications to the Research Council for support from institutional grants at any time.

Agricultural Experiment Station

WILBUR TARLTON COONEY, M.S., Dean of Agriculture.
G. BURTON WOOD, Ph.D., Associate Dean and Director.
ROBERT M. ALEXANDER, M.A., Assistant Director.
WILSON H. FOOTE, Ph.D., Assistant Director.
ROBERT W. HENDERSON, Ph.D., Assistant Director.
RALPH A. SOLUM, Fiscal Officer.

Agricultural Chemistry: Professors FREED (department head), SEYB, TERRIERE, WESWIG; Associate Professors BEAUDREAU, FANG, LIKENS, TINSLEY; Assistant Professors ADAMS, HAQUE, MORRIS, WHANGER; Instructor ZIMMERMAN; Research Associates BUHLER, CALDWELL, CLAEYS, DEENEY, DEJMAL, GILLETT, LINDSTROM, LU, MOSTAFA, SCOTT.

Agricultural Economics: Professors CASTLE (department head), BECKER, BLANCH, BROWN, EDWARDS, GAROIAN, HALTER, MASON, MUMFORD, SITTON; Associate Professors GRANO, LANGMO, MILLER, SMITH, STOEVENER, SUTHERLAND; Assistant Professors CONKLIN, JOHNSTON, NELSON, REEDER, RETTIG, SEEVERS, STEVENS, WILLSIE, YOUDE, YOUMANS; Instructors ARMBRUSTER, COPPEDGE, CROWLEY, DAWSON, HOLLOWAY, JENNINGS, JOHNSON, SHEPARD, THOMAS, VESTERBY; Research Associate BLENSLY.

Agricultural Engineering: Professors KIRK (acting department head), CROPSEY, HARMOND, LONG, LUNDE, SINNARD, WOLFE; Associate Professors BOOSTER, BRANDENBURG, BROOKS, CHRISTENSEN, KLEIN, PAGE, PARK; Assistant Professors BACKUS, GEORGE; Instructor VANCE.

Agricultural Information: Professor MASON; Assistant Professor SANDERSON.

Animal Science: Professors OLDFIELD (department head), BOGART, ENGLAND, POULTON, RALSTON; Associate Professors CHURCH, KENNICK, STOUT, WOLBERG, WU; Assistant Professors BEDELL, CHEEKE, KLIEWER, KNIGHT, SCHALLIG, STORMSHAK; Senior Instructor ADAIR; Instructor MEYERS.

Atmospheric Science: Associate Professor LOWRY; Assistant Professor BATES.

Botany and Plant Pathology: Professors SHAY (department head), BARTSCH, BISHOP, W. W. CHILCOTE, COCHRAN, CONVERSE, CORDEN, EVANS, HARDISON, HORNER, JENSEN, LEACH, PHINNEY, ROTH, SHEA, VAUGHAN, ZAK; Associate Professor ALLEN, CAMERON, CULVER, DENISON, HAMPTON, JONES, MALONEY, MCINTIRE, POWELSON, TRIONE; Assistant Professors DOOLEY, L. W. MOORE, NELSON, TRAPPE; Research Associate BECKER.

Entomology: Professors RITCHER (department head), BUTT, CROWELL, KRANTZ, OMAN, RUDINSKY, STEPHEN, SWENSON, TERRIERE; Associate Professors ANDERSON, DICKASON, GOULDING, NAGEL, ROSENSTIEL; Assistant Professors BERRY, KAMM, MITCHELL; Research Associates ROBERTS, SARTWELL.

Farm Crops: Professors COWAN (department head), FORE, FRAKES, FURTICK, GRABE, HORNER, LEACH, MCGUIRE, POULTON; Associate Professors APPLEBY, CALHOUN, D. O. CHILCOTE, CHING, HARDIN, HAUNOLD, JENSEN, KRONSTAD, METZGER, PLUCKNETT, RAMPTON; Assistant Professors BEDELL, BILLINGS, FENDALL, LEE, SCHALLIG; Instructors DANIELSON, LOPEZ, MORAN, SWANSON, ZIMMERMAN; Research Associates BOLTON, CARDENAS, HEPWORTH, ROMANOWSKI.

Fisheries and Wildlife: Professors SCOTT (department head), BOND, DOUDOROFF, HORTON, KRUEGER, KUHN, LONG, MILLEMANN, RAYNER, SIMON, WARREN, WIGHT; Associate Professors BREESE, DAVIS, FRYER, HALL, MCNEIL, VOHS; Assistant Professors CAMPBELL, CHADWICK, DONALDSON, GARRISON, LIGHTFOOT, SHUMWAY, SNOW, VERTS, WAGNER; Instructors COURTRIGHT, JUNTUNEN, LANTZ, REDMOND.

Food Science and Technology: Professors SCHULTZ (department head), CAIN, SAMUELS, SINNHUBER; Associate Professors ANGLEMIER, BILLS, CRAWFORD, HARVEY, KRUMPERMAN, LAW, MONTGOMERY, SATHER, WALES, YANG; Assistant Professors BEAVERS, BODYFELT, LINDSAY, SCANLAN, VARSEVELD, WROLSTAD, YU; Instructor SODERQUIST; Research Associates D. LEE, J. LEE, LIBBEY, NIXON, PAWLOWSKI.

Home Economics Research: Professors STORVICK (department head), MACKEY, WOODBURN, YEARICK; Associate Professor MILLER; Assistant Professors BENSON, BUBL, PETERS; Senior Instructor EDWARDS; Instructor WOODRING.

Horticulture: Professors APPLE (department head), COMPTON, FRAZIER, HANSEN, MACK, ROBERTS, WESTWOOD; Associate Professors BAGGETT, CRABTREE, GARREN, LAGERSTEDT, WADSWORTH; Assistant Professors CHAPLIN, LAWRENCE, MARTIN, SMITH, THOMPSON.

Microbiology: Professors ELLIKER (department head), ANDERSON, MORITA, PARKS, PILCHER, SANDINE; Associate Professors FRYER, PACHA; Assistant Professor KLEIN; Research Associates MADYASTHA, STEENBERGEN.

Poultry Science: Professors ARSCOTT (acting department head), BERNIER, HARPER, PARKER; Assistant Professor DORMINEY.

Soils: Professors CHENEY (department head), DAVEY, DAWSON, HARWARD, JACKSON, KNOX, LOPEZ, RETZER, TARRANT, YOUNGBERG; Associate Professors BOERSMA, DYRNESS, D. G. MOORE, D. P. MOORE, PARSONS, SIMONSON, VOMOCIL, YOUNG; Assistant Professors ROBERTS, VOLK, WITTY.

Statistics: Professors CALVIN (department head), PETERSEN; Assistant Professors HARTMANN, LAND, ROWE, YATES.

Veterinary Medicine: Professors DICKINSON (department head), BONE, KNAPP, MUTH, PETERSON, SMITH; Associate Professors DOST, HALL, HARR, KNEZEVICH, MATTSON; Assistant Professors ERICKSON, HELFER, STEVENS; Research Associate ARMSTRONG.

Branch Experiment Stations: Professors BULLOCK, GROSS, MCARTHUR, MELLENTHIN, ROHDE, TICKNOR; Associate Professors COYIER, HOFFMAN, JOHNSON, LOMBARD, PUMPHREY, RALEIGH, RAMIG, RUMBERG, WESTIGARD, YUNGEN, ZWICK; Assistant Professors CARTER, CLAYPOOL, DAVIDSON, ELLER, FITCH, MCDERMID, RYDRYCH, SCHWANKE, SNEVA; Senior Instructor SHEETS; Research Associate FACTEAU.

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 twelve branch stations so located as to cover the varying agricultural conditions of Oregon. It investigates problems in agriculture, home economics, forestry, fisheries, and wildlife; 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 management integrated 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. (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; determining of human nutrition requirements; and role of food in maintaining optimal health; selection, construction, and care of clothing and household fabrics.

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 Agricultural Research Division of the Station is made up of seventeen campus departments and twelve branch stations. Some staff members are full time in research while others also teach in the Schools of Agriculture, Science, Engineering, and Home Economics. In addition, some 150 graduate students devote half time to research as Research Assistants.

The research is aimed at problem solving and covers all phases of agricultural production, processing, and marketing; conservation, management, and use of renewable natural resources—soil, water, range, fish, and wildlife; human nutrition and home economics; the environmental sciences; and basic biological sciences which support the applied fields. Increasing attention is being devoted to basic research—the fundamental discoveries and knowledge essential to solving problems.

With the diversity of growing conditions in the State, the establishment of off-campus programs, including the branch stations, has been necessary. Crops and animals are produced in areas with rainfall varying from 8 to 100 inches, altitudes ranging from sea level to a mile high, a growing season extending from 63 to 283 days, and on land including more than 400 different soil types.

The research departments are indicated in faculty list above. The branch experiment stations are John Jacob Astor (Astoria), Eastern Oregon (Union), Klamath (Klamath Falls), Malheur (Ontario), Mid-Columbia (Hood River), North Willamette (Aurora), Pendleton (Pendleton), Sherman (Moro), Southern Oregon (Medford), Squaw Butte (Burns), Umatilla (Hermiston), and Central Oregon (Redmond).

Permanent field units or laboratories are maintained for research at Milton-Freewater for beef feeding, Newport and Port Orford for marine problems, Astoria for seafood processing, and Brookings for lily-bulb production.

Engineering Experiment Station

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.

Engineering School Graduate Committee: G. W. GLEESON (chairman), F. J. BURGESS, J. G. KNUDSEN, R. D. OLLEMAN, J. L. RIGGS, L. SLEGEL, L. N. STONE, C. E. WICKS.

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 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.

Forest Research Laboratory

CARL HENRY STOLTENBERG, Ph.D., Dean, Director.

DALE NESTRUD BEVER, M. F., Assistant Director.

RUDOLPH MARTIN KALLANDER, M. F., Assistant Director.

WILBUR T. VARAH, Fiscal Officer.

Forest Engineering: Professors DAVIES (department head), O'LEARY.

Forest Management: Professors DILWORTH (department head), BERG, CHING, FERRELL, JEMISON, KENISTON, OVERTON, WHEELER, YODER, YOUNGBERG; Associate Professors BELL, BLACK, HERMANN, HOOVEN, IRGENS-MOLLER, KRYGIER, LAVENDER, NAGEL, NEWTON, PAINE, SUTHERLAND; Assistant Professors BROWN, GAY, KANGUR, STREEBY, WARING, ZAERR; Assistants in Forest Management Research CARMICHAEL, CLEARY, DOERKSON, ELFERS.

Forest Products: Professors ELLIS (department head), ATHERTON, ESPENAS; Associate Professors AFT, BUBLITZ, CORDER, CURRIER, GRAHAM, J. JOHNSON, KRAHMER, LAVER, MCKIMMY, MCMAHON, VANVLIET; Assistant Professors HYDE, KOZLIK, LEHMANN, LIN, MILLER; Instructors KUNESH, POLENSEK; Assistants in Forest Products Research W. JOHNSON, LOVELAND, SCROGGINS, SIEBEN.

Forestry research at Oregon State University began in the 1920's. In 1941 an appropriation from the State general fund was made available for forest products research. State forestry research activities were expanded in 1947 when a forest products harvest tax was established to finance additional research. The program was given further impetus in 1957 with construction of the Oregon Forest Research Center in Corvallis, providing new facilities for the state forestry research program administered by the Forest Protection and Conservation Committee.

In 1961, the staff and functions of the Oregon Forest Research Center were transferred to Oregon State University when the Legislative Assembly enacted a law directing the State Board of Higher Education to establish a Forest Research Laboratory at Oregon State University. The statute also provided for the establishment of advisory committees of representatives from forest industry and public forestry agencies. As a result, the forestry research program benefits from the advice and counsel of advisory committees in forest management and in forest products.

The program of the Forest Research Laboratory is conducted by the faculty of the School of Forestry and cooperating faculty in other departments of the University. It constitutes one of the largest university forestry research programs in the nation. The program is designed to provide information which will enable wiser public and private decisions concerning the management and use of Oregon's forest resources and the operation of her wood-using industries. As a result of this research, Oregon's forests produce increased yields of wood products, water, forage, fish, wildlife, and recreation; wood products are harvested and used more efficiently; forests are used more intensively and effectively; employment, production, and profitability in dependent industries is strengthened; and assistance is provided in maintaining a quality environment for Oregon's people.

Activities are organized into three areas: Forest Engineering, Forest Management, and Forest Products. Forest Engineering is concerned with logging planning, road layout and design, timber transportation, and logging systems. Forest Management studies are concerned with physiological and ecological behavior of forest trees and plants, reforestation techniques, tree improvement, and control of forest damage by animals; with improved cultural practices, growth and yields of young-growth forests; remote sensing of the forest environment; with the relationship of forestry activities to the quality and quantity of water in forest streams; and with the effect of various public and private forestry programs on the forest economy and all Oregon residents. Forest products research is concerned with basic wood properties, the relationship of tree growth to wood quality, timber mechanics and wood engineering, wood and bark chemistry, pulp and paper, manufactured products, forest products processing and marketing, improved utilization, wood seasoning, wood treatment and preservation, and with the alleviation of air and water pollution. The Forest Research Laboratory helps support research activities of graduate students in forest genetics, forest economics, forest tree physiology, forest biometrics, forest hydrology, forest ecology, forest entomology, forest pathology, forest soils, and wood science with emphases in wood chemistry, wood physics, and wood structure and anatomy.

The Laboratory supplies results of research and provides technical information to forest land owners and managers, to manufacturers and users of forest products, to leaders of government and industry, and to others who are interested. The Laboratory also undertakes cooperative research financed by individuals, corporations, associations, and government agencies. Field experiments in forest genetics, young-growth management, forest hydrology, and reforestation are maintained on lands of the School of Forestry and of public and private cooperating agencies.

Sea-Grant Institutional Program

H. F. FROLANDER, Ph.D., Coordinator.

Advisory Committee

E. N. CASTLE, Head, Department of Agricultural Economics.

THOMAS G. SCOTT, Head, Department of Fisheries and Wildlife.

F. J. BURGESS, Head, Department of Civil Engineering.

J. G. KNUDSEN, Director, Engineering Experiment Station.

JOHN V. BYRNE, Chairman, Department of Oceanography.

IVAN PRATT, Professor of Zoology.

JOE COX, Assistant Director, Federal Cooperative Extension Service.

The Oregon State University Sea-Grant Institutional Program is supported by a grant from the National Science Foundation and by a matching state appropriation. The program includes training, research, and advisory activities in the Marine Sciences and Technology including marine biology, marine fisheries, aquiculture, seafood processing, marine minerals, marine economics, ocean engineering, and oceanography at Oregon State University; research in ocean law at the University of Oregon; and training in marine technology at Clatsop Community College.

Faculty and students from the Departments of Agricultural Economics, Business Administration, Fisheries and Wildlife, Food Science and Technology, Botany, Microbiology, Zoology, Oceanography, and from Chemical, Civil, Mechanical, and Electrical Engineering are actively participating in the various programs.

The Sea-Grant Program is an integrated interdisciplinary plan which emphasizes marine food resources. Resources of the University are applied to the solution of problems which relate to the production and utilization of food from the sea. Research and training programs involve both estuaries and open ocean.

The Marine Science Center at Newport is the coastal hub of the Sea-Grant Program. The Marine Biology Laboratory at Port Orford, the Netarts Bay research area, the Seafoods Laboratory at Astoria, and the various outlying research facilities near Corvallis are also important elements in the Sea-Grant Program.

RESEARCH CENTERS

Air Resources Center

ROBERT M. ALEXANDER, Director.

Advisory Committee

RICHARD W. BOUBEL, Professor of Mechanical Engineering.

EMERY N. CASTLE, Head, Department of Agricultural Economics and Director, Water Resources Research Institute.

VIRGIL H. FREED, Head, Department of Agricultural Chemistry and Director, Environmental Health Sciences Center.

E. WENDELL HEWSON, Chairman, Department of Atmospheric Sciences.

R. M. KALLANDER, Assistant Dean, School of Forestry.

J. RALPH SHAY, Head, Department of Botany and Plant Pathology.

The Air Resources Center provides for a comprehensive multidisciplinary approach to the identification of and contributions to the solution of atmospheric pollution problems by bringing together qualified scientists in the atmospheric sciences, agricultural and biological sciences, chemistry, engineering, forestry, biometrics, economics, political science, and other social sciences.

The Center facilitates the development and coordination of programs for (1) training graduate students in disciplines related to air resources, (2) training technicians in air pollution control technology in a joint effort with the Oregon Technical Institute, and (3) short courses, seminars, and intensive postgraduate instruction offered as short term institutes for industry and government personnel concerned with aspects of air pollution abatement and control.

Major efforts are devoted to air pollution problems that are unique to, or of major importance in, the Pacific Northwest. Among these are air pollution problems resulting from field burning, forest waste disposal and effluents from manufacturing activities such as aluminum plants and the pulp and paper industry.

The Air Resources Center also serves as a source of information for state and regional air pollution control agencies, for industry, and for the general public. Close coordination is maintained with the Oregon State Sanitary Authority and three regional authorities: Columbia Willamette, Mid-Willamette Valley, and Lane County.

Computer Center

L. D. HUNTER, Ph.D., Professor, Director.

D. D. AUFENKAMP, Doctorat d'Université, Director. (Leave of absence.)

G. D. ROSE, B.A., Research Associate, Assistant to Director, Manager of Operating Systems Development and Maintenance.

T. R. BRUNTNER, B.S., Instructor, Assistant to Director, Manager of Business Affairs.

J. W. FRYKLUND, B.S., Research Associate, Manager of On-line Hardware and Software Systems Development.

R. A. DAVIS, B.S., Research Associate, Manager of Operations and Applications Programing.

Assistant Professor: J. DAVIS.

Instructors: BACHELOR, BRENNE, THOENNES.

Research Associates: BAUGHMAN, EDWARDS, HOLZNAGEL, MAHAN, MURRAY, PORTER, SCHEURMAN, SCHOENBORN.

The Computer Center was established in 1965 as a separate organizational unit under the Dean of Administration to provide a focal point for computer-related activities on campus. Its functions include computational services, scientific consulting services, support of computer science programs and instruction in computers, and research basic to computers and computer systems. These activities have been developed to a great extent independently of each other in several departments of the University and have been brought together with the creation of the Center.

The computing facilities of the Center include: a Control Data 3,300, a PDP-8, an ATHENA and an ALWAC III-E. These machines are available for the support of instructional and research programs. A small research computer, NEBULA, is being constructed under the sponsorship of the Office of Naval Research. A Calma Company Digitizer is available for the conversion of data from analog graphical form to digital form on magnetic tape. The CDC 3300 operates under OS-3, a time-sharing system designed and developed by the Computer Center. A network of remote computer consoles has been installed on the OSU campus and at other colleges in Oregon to make facilities more readily accessible to users. These consoles permit direct access to the Control Data 3300 computer.

The Computer Center provides, in addition to computational facilities, mathematical and statistical consulting services for the formulation and analysis of problems and for considerations for new computer systems. A variety of instructional materials including video tapes have been prepared to assist students, faculty, and others to acquire an understanding of computers and a facility with the many specialized programs and languages available.

Faculty members associated with the Center are engaged in research and development activities in computer science and in use of computer systems, including projects in numerical methods of computation, programing systems and conversational languages, automata theory, computer organization, file-based systems, and instrumentation for computers and computer systems.

Environmental Health Sciences Center

V. H. FREED, Ph.D., Director.

J. M. WITT, Ph.D., Executive Secretary.

Executive Committee:

E. N. CASTLE, C. H. WANG, L. D. CALVIN, C. E. WARREN, W. R. CROOKS, D. C. PHILLIPS, J. D. LATTIN, R. M. ALEXANDER.

The Environmental Health Sciences Center was established in 1967 as an organizational unit under the Dean of Research to provide coordination and stimulation of environmental health training and research.

The problem of environmental quality and its effect on human welfare is becoming increasingly complex as both our population and technology expand. The ultimate solution to environmental problems requires strong, coordinated, interdisciplinary efforts from many subject matter areas, both to develop persons qualified in this field and to generate new knowledge.

The Environmental Health Sciences Center brings together research workers, advisers, faculty affiliates, and teachers from many departments with a wide variety of professional capabilities, including: chemistry, biochemistry, toxicology, nuclear chemistry, biology, entomology, agronomy, botany, food science, fisheries and wildlife, veterinary medicine, pharmacology, ecology, psychology, mathematics, economics, engineering, humanities and social sciences.

The broad mission of the Center is to facilitate and encourage research, training, and support of qualified graduate students; sponsor conferences, symposia, and meetings for both

student training and communication with the public; and to serve as an interdisciplinary resource group to state and local governmental agencies and society at large on problems relating to man's health and well-being and the management of the environment.

Specific areas of interest presently involve toxicology of environmental microchemical pollutants, movement of chemicals in the environment, utilization of solid waste products, chemical waste disposal, area planning and environmental engineering, economic factors of environmental quality, and mathematical modeling of environmental problems.

The Environmental Health Sciences Center is interested not only in research and public service, but in the training of qualified professional people in this field. Accordingly, the Environmental Health Sciences Center offers traineeships for support of graduate students interested in preparing for a career in environmental health sciences. The student will normally major in one of the traditional subject matter departments and augment this training with courses designed to give him both understanding and perspective. A number of such courses have been developed through the cooperation of subject matter departments and the Center.

The administrative office of the Center is located in Weniger Hall; however, the research facilities are a part of and are located in the various cooperating departments.

International Plant Protection Center

W. R. FURTICK, Ph.D., Director.

L. F. TAYLOR, Ph.D., Assistant Director.

Advisory Committee: G. B. WOOD, G. M. LEAR, G. R. SITTON, R. M. KALLANDER, G. CRABTREE, E. A. DICKASON, J. R. SHAY, V. H. FREED.

The International Plant Protection Center was established in 1969 to increase the capability of Oregon State University to conduct effective research, extension, and instructional programs in plant protection at the state level and as an aid to developing nations. The Center coordinates domestic and international programs in plant protection, including programs in entomology, plant pathology, weed control, and control of other pests of crops and their stored products. These programs are now centered largely in the various departments in the School of Agriculture, the Agricultural Experiment Station, and the School of Forestry, but will involve an increasing participation of the Computer Center and other university areas.

Coordinating activities include contacts with federal agencies, foundations, private industry, other countries, other universities, and with departments and schools of Oregon State University.

Marine Science Center

Newport, Oregon

WAYNE V. BURT, Ph.D., Sc.D., Director.
THOMAS G. SCOTT, Ph.D., Associate Director.

Yaquina Marine Biology Laboratory

Professor JOEL W. HEDGPETH, Head.
Assistant Professor J. J. GONOR.
Research Associates R. G. REDMOND, D. A. YOUNG.
Assistants in Oceanography VICKI J. OSIS, WILLIAM E. STOUT, ALAN THUM.

Pacific Fisheries Laboratory

Associate Professor W. J. MCNEIL, Head.
Assistant Professors W. P. BREESE, C. D. SNOW.
Assistants in Fisheries N. E. STEWART, J. A. BUTLER.

Marine Advisory Program

Professor WILLIAM Q. WICK, Leader.
Instructor DONALD E. GILES, Marine Science Education.

Oregon State University is a regional center for all types of marine research and instruction. Off-campus activities are concentrated at a 49-acre site on the south shore of Yaquina Bay, about a mile from the ocean. A large dock on the main ship channel will accommodate research vessels up to 250 feet in length. Vessels up to 80 feet are accommodated by a smaller dock and boat basin.

The Center was opened in 1965 and has 38,000 square feet of floor space. One wing houses the Yaquina Marine Biology Laboratory with facilities for research and instruction in marine biology and oceanography. An auditorium and public aquarium-museum are located in the central wing, along with two other meeting rooms. The third wing houses the Pacific Fisheries Laboratory with facilities for research and instruction in fisheries, marine botany, pollution biology, and engineering. A nontoxic seawater system provides seawater free of metal contaminants to the aquarium and all biological laboratories. Dormitory-type sleeping accommodations are available for eight men and six women.

A program of research and instruction is being developed in cooperation with the departments of Zoology, Botany, Microbiology, Civil Engineering, Fisheries and Wildlife, and Oceanography. The laboratory is operating on a twelve-month basis.

Research workers may sample open-ocean organisms from the oceanographic vessels *Yaquina* and *Cayuse* and estuarine organisms from half a dozen small boats operated from the Center. Research units from the Federal Water Pollution Control Administration, Oregon State Game Commission, and the Fish Commission of Oregon are housed in the Center.

Public education and extension programs in oceanography and marine resources management are offered at the Center and to a limited extent throughout Oregon. Each year, more than one hundred and seventy-five thousand persons visit the public aquarium-museum, attend conferences and seminars, participate in public lecture series or university credit courses, or view films and slide programs on marine science at the Center. About ten thousand elementary and high school students annually participate in graded exercises during visits to the Center. Extension educators work with the commercial fishing industry, citizens, and governmental groups to activate research results. Educational materials on many phases of marine science are prepared and distributed to the interested public through television, radio, newspapers, and printed leaflets.

Radiation Center

CHIH H. WANG, Ph.D., Director.

The Radiation Center is a campus-wide research and training facility designed to accommodate programs involving the use of radioisotopes and radiation. Housed in the Center are major nuclear and radiation devices, including a TRIGA-II research nuclear reactor (licensed to be operated at 1,000 Kw steady-power level and 2,200 Megawatts in the pulsing mode), an AGN-201 training nuclear reactor, a 3,300 curie cobalt-60 source, a 300 kVp x-ray generator, a number of multichannel analyzers and associated detectors, a 14 Mev neutron generator, neutron diffraction apparatus, neutron radiography facility, and a variety of instruments for radiation measurement and monitoring. Special facilities include laboratories for large and small animal experiments and plant experiments.

Staff members of the Radiation Center receive joint appointments in the Center and the appropriate academic departments. The Center staff provide services such as consultation on the feasibility of design and execution of radioisotope and radiation experiments; hazard evaluation of experiments or devices involving use of radioisotopes or other ionizing radiation; nuclear engineering; nuclear power plants; neutron activation analysis; neutron radiography; neutron diffraction experiments; radiation effects on biological systems; radiation dosimetry; production of short-lived radioisotopes; and problems of nuclear instrumentation and radioactive-waste disposal.

The Radiation Center laboratories are available to all research workers and instruction programs on the campus requiring the use of such facilities.

RESEARCH INSTITUTES

Genetics Institute

RALPH BOGART, Ph.D., Director.

Professors: P. E. BERNIER, L. D. CALVIN, K. L. CHAMBERS, K. K. CHING, J. R. COWAN, E. J. DORNFELD, D. C. ENGLAND, W. H. FOOTE, R. V. FRAKES, W. A. FRAZIER, J. A. HARPER, IRWIN ISENBERG, W. S. OVERTON, L. W. PARKS, W. E. SANDINE, J. R. SHAY, R. C. SIMON, W. P. STEPHEN, R. M. STORM, C. H. WANG.

Associate Professors: J. R. BAGGETT, ROBERT CAMPBELL, T. M. CHING, P. DAWSON, D. K. FRASER, PATRICIA HARRIS, ALFRED HAUNOLD, W. E. KRONSTAD, R. J. METZGER, H. IRGENS-MOLLER, D. S. NACHTWEY, A. OWCZARZAK, PAUL ROBERTS, R. R. SILEN, F. M. STOUT.

Assistant Professors: D. L. COPES, R. H. KLIEWER, FRANCIS LAWRENCE, KENNETH ROWE, F. C. SORENSON, MAXINE M. THOMPSON.

Established in 1963, the Genetics Institute serves to integrate the research activities in genetics carried on by personnel in the biological science departments of the University. The function of the Institute is to strengthen genetics as a unifying discipline for biology, biochemistry, and biophysics. The Genetics Institute is administered by a director, assisted by an elected Genetics Board. The Institute staff comprises some 33 geneticists from the several departments in the Schools of Agriculture, Forestry, and Science.

Extensive facilities for genetics research are provided by the departments with which the geneticists are affiliated. Active research is under way in the following areas: formal genetics, cytology and cytogenetics, evolution and speciation, quantitative genetics, microbial and fungal genetics, plant genetics and improvement, animal genetics and improvement, and forest genetics. These facilities and the competent faculty provide outstanding opportunities for graduate teaching and research.

Nuclear Science and Engineering Institute

CHIH H. WANG, Ph.D., Director

Professors: A. W. ANDERSON, RALPH BOGART, L. P. BUPP, H. T. EASTERDAY, H. J. EVANS, D. J. KIMELDORF, S. E. KNAPP, J. G. KNUDSEN, D. B. NICODEMUS, T. H. NORRIS, J. E. OLDFIELD, C. L. OSTERBERG, O. G. PAASCHE, ROMAN SCHMITT, R. O. SINNHUBER, E. D. TROUT.

Associate Professors: D. R. BUHLER, E. A. DALY, MALCOLM DANIELS, W. H. ELLETT, S. C. FANG, V. A. MADSEN, R. R. MICHAEL, D. S. NACHTWEY, D. J. REED, J. C. RINGLE, A. H. ROBINSON, L. W. SWENSON, D. L. WILLIS.

Assistant Professors: W. W. S. AU, PETER FESSENDEN, W. V. FORSTER, T. G. KELLEY, WALTER LOVELAND.

Instructor: A. G. JOHNSON.

This Institute functions as a coordination body on curricular matters at the graduate and undergraduate levels in nuclear science and engineering and implements fellowship programs, graduate training programs, short-course programs, and seminar programs that are not managed by individual departments and are interdisciplinary in nature. It was established in 1966.

Nutrition Research Institute

CLARA A. STORVICK, Ph.D., Director.

Emeritus Professors: M. L. FINCKE, J. R. HAAG, G. TANK.

Professors: G. H. ARSCOTT R. R. BECKER, W. G. BROWN, O. C. COMPTON, M. D. DAWSON, E. M. DICKINSON, P. R. ELLIKER, H. J. EVANS, V. H. FREED, B. E. HAWTHORNE, T. L. JACKSON, H. M. KRUEGER, O. H. MUTH, J. E. OLDFIELD, R. G. PETERSEN, A. T. RALSTON, H. W. SCHULTZ, R. O. SINNHUBER, C. A. STORVICK, L. C. TERRIERE, C. H. WANG, P. H. WESWIG, G. B. WOOD, E. S. YEARICK.

Associate Professors: A. F. ANGLEMIER, G. S. BEAUDREAU, D. O. CHILCOTE, D. C. CHURCH, RALPH, GARREN, L. K. LAW, L. T. MILLER, D. P. MOORE, F. M. STOUT, I. J. TINSLEY, J. H. WALES.

Assistant Professors: F. W. ADAMS, T. E. BEDELL, E. M. BENSON, D. L. CRAWFORD, D. J. LEE, J. M. PETERS, P. D. WHANGER.

Instructors: M. A. EDWARDS, M. J. WOODRING.

Established in 1965, this Institute recognizes that food needs and resources constitute a continuing problem of civilization. It has as its broad objectives the stimulation, encouragement, facilitation, and coordination of research efforts in the varied fields of nutrition as practiced in the departments and schools of Oregon State University. These objectives are served through the sponsorship of interdepartmental and institutional seminars, symposia, and workshops, through coordination of nutrition course offerings, and through facilitating entry of qualified scientists and graduate students into nutrition research through their particular disciplines. With the counsel of an Advisory Board, the Institute is administered by a Director under the Dean of Research with the cooperation of the Dean of Administration. The deans of Agriculture, Home Economics, Science, and the Graduate School serve as consultants to the Institute.

Science Research Institute

JOHN M. WARD, Ph.D., Director.

R. W. NEWBURGH, Ph.D., and A. B. SCOTT, Ph.D., Assistant Directors.

Professors: R. R. BECKER, I. ISENBERG, W. D. LOOMIS, D. L MACDONALD, R. W. NEWBURGH, A. B. SCOTT, C. H. WANG, J. M. WARD, K. E. VAN HOLDE.

Associate Professors: D. J. BAISTED, F. W. DECKER, W. GAMBLE, D. J. REED.

Assistant Professors: S. ANDERSON, R. D. DYSON, W. C. JOHNSON, J. A. KIGER, JR.

Research Associates: S. L. BAIRD, JR., F. N. DOST, H. D. ELLERTON, N. F. ELLERTON, M. HABIBULLA, T. HATTORI, W. HILL, R. HOWARD, H. ISHIKAWA, K. MADYASTHA, K. NICKERSON, V. SEERY.

Organized in 1952, this Institute operates within the framework of the School of Science. It has three functions: to assist scientists at Oregon State in obtaining support for research projects; to aid in expediting their research programs and

promote interdisciplinary research; and to pursue an active research program fitted to the interest and competence of the Institute staff.

Principal quarters of the Institute are in Weniger Hall, with facilities also in Gilbert Hall and Covell Hall. Current studies include projects in biochemistry, biophysics, organic chemistry, solid state chemistry, electrochemistry, microbiology, entomology, plant pathology, forest products, pharmacology, and atmospheric science. They derive support from OSU, government agencies, foundations, and industrial concerns. Staff members and research assistants receive joint appointments in the Institute and the appropriate teaching departments.

Transportation Research Institute

EMERY N. CASTLE, Ph.D., Director.

The Transportation Research Institute brings together the resources of the institution for research on transportation of agricultural and forest products, maintenance and operation problems in the trucking industry, traffic problems, and other problems related to the transportation industry.

Water Resources Research Institute

EMERY N. CASTLE, Ph.D., Director.

PETER C. KLINGEMAN, Ph.D., Assistant Director.

WILLIAM H. BUCKLEY, M.A., Executive Secretary.

The Water Resources Research Institute was established in 1960 to foster, encourage, and facilitate research and education related to all factors that affect the quantity and quality of water available for beneficial use. The Institute is administered through the Schools of Agriculture, Engineering, and Forestry and its members include all personnel in higher learning in Oregon who are engaged in water resources research and training. The membership currently numbers about 180 persons in 20 different departments.

Extensive facilities are available to Institute members and students for research and training. These include forested watershed lands and associated field equipment, soils laboratories, water and waste treatment plants, experimental waste treatment facilities, freshwater and marine science laboratories including oceanographic research vessels, experimental streams, an electronic computing center, a hydraulics laboratory, and a radiation center. Research assistantships and fellowships are available through many of the member departments, and the Institute provides support for selected portions of the research and training program in water resources.

Extension

Division of Continuing Education

R. DUANE ANDREWS, Director
219 Gill Coliseum, OSU Campus, Corvallis 97331

LEROY PIERSON, Administration
1633 SW Park, PSU Campus, Portland 97207

ROBERT NICHOLAS, Programming
1633 SW Park, PSU Campus, Portland 97207

Continuing Education, a division of the Oregon State System of Higher Education, administers a diversified program of adult education throughout the state. As an agency of the Chancellor's office, the Division extends both credit and noncredit courses from the State System colleges and universities. It also develops seminars, workshops, conferences, consultant services, and special programs in many fields. The Division's program of lifelong learning encompasses courses for business and industry, engineering and technology, health sciences, social welfare, civil defense, religion, communications, nursing, community planning, liberal arts, science, contemporary problems, and others. Qualified adults may arrange with institutions to work toward degrees in these classes, most of which are held evenings, or they may choose to audit courses for personal enrichment or professional advancement. Regional offices are located on state campuses in Ashland, Corvallis, Eugene, Klamath Falls, LaGrande, Monmouth, and Portland. Other programming offices are located at Salem and Coos Bay.

Oregon Educational Broadcasting extends many cultural and informative programs for the Division, plus a limited number of credit classes. Broadcasts beamed from KOAP-TV and KOAP-FM in Portland, and on KOAC-TV and KOAC-AM in Corvallis, reach a potential 83% of Oregon's population.

The Division's **Office of Independent Study,** located at Eugene, brings learning to Oregon's doorstep with correspondence courses on both the college credit and high school credit levels. Nearly 5,000 students are enrolled in such courses currently.

Audiovisual Instruction, located on campus at Corvallis, manages one of the largest educational film and tape libraries in western United States. A constantly changing selection of motion picture films, tape recordings, slides, and other audiovisual aids are available to schools, colleges, community groups, and the general public. AVI also offers consulting services for planning and producing educational films.

Federal Cooperative Extension Service

Administration*

WILBUR T. COONEY, M.S., Dean of Agriculture.

GENE M. LEAR, M.P.A., Director, Associate Dean of Agriculture.

JOSEPH R. COX, M.S., Assistant Director.

JACKSON W. ROSS, M.S., Assistant Director.

JEAN W. SCHEEL, M.A., Assistant Director.

ESTHER A. TASKERUD, Sc.D., Assistant Director.

BURTON S. HUTTON, B.S., State Leader, 4-H Youth Development.

WILLIAM G. NIBLER, M.Ed., State Leader, County Extension Programs.

Supervision

MARY E. ABBOTT, M.A., Extension District Supervisor.

EVELYN A. FUNK, M.Ed., Extension District Supervisor.

MURLE SCALES, M.S., Extension District Supervisor.

TURNER BOND, M.S., Extension District Supervisor.

H. JOE MYERS, M.S., Extension District Supervisor.

LOUIS M. OESTER, Ed.M., Extension District Supervisor.

Federal Cooperative Extension performs one of the three major functions of Oregon State University, which are: resident teaching, research, and extension teaching. The staff extends information from OSU, the United States Department of Agriculture, and other 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 campus staff of subject-matter specialists in agriculture and home economics work on approved projects for adults and youth.

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, important among which is organization for self-help, to bring widespread application of the principles presented. Thousands of Oregon citizens provide volunteer leadership or teaching to assist with Extension educational programs. Most of them work in the 4-H Club and adult home economics programs conducted annually with over 57,000 participants.

Extension Projects. To assure maximum efficiency, extension work is conducted on the basis of planned projects. These require approval by the proper OSU authority and the U. S. Secretary of Agriculture before Federal and State funds appropriated for the work may be expended. The projects from which citizens of the State are receiving benefit include:

Administration—provides overall direction and leadership for Extension's statewide educational programs, staff training, and other personnel functions.

Extension Information—dissemination of information through mass media of communication, including servicing and training of personnel in communications methods, and development and use of mass media and visual aids. Part of this project is supported jointly with the Division of Continuing Education.

Agricultural Production, Management, and Natural Resource Development. This project is concerned with the application of science and technology to the organization and operation of farming and ranching enterprises and the conservation and development of agricultural resources. Subject matter fields involved are: animal husbandry, crops, certification of seeds and plants, dairying, agricultural engineering, entomology, farm management, range management, forestry, horticulture, plant pathology, poultry, soils, and fish and wildlife management.

Marketing and Utilization of Agricultural Products. Work with marketing firms is emphasized. Objectives are to create greater efficiencies in processing, handling, and distribution through the application of new technology and improved marketing practices; to expand the market for Oregon farm products; and to get rapid adjustment by farmers, consumers, and marketing firms to changes in technology, supply, and demand. In addition to agricultural economics, subject matter fields involved include food technology, dairy technology, and wood technology.

Home Economics and Consumer Education. Areas include child development and human and family relations, foods and nutrition, home management and equipment, family economics, clothing and textiles, housing, and home furnishings. The project contributes toward economic well being, desirable human relationships, assumption of civic responsibilities, and appreciation of the land in which we live.

4-H Club and Youth Work. Oregon State University provides an off-campus education to boys and girls of Oregon between the ages of 9 and 19 to help them acquire knowledge, skills, and attitudes that will contribute to their success as mature citizens in their home, their community, and their vocation. Agricultural and home economics projects are emphasized, but many others also are included. Understanding and appreciation of conservation and natural resource use and development is a part of the project. Special programs conducted with Oregon elementary school students—mostly sixth graders—are now reaching over 24,000 students. Many agencies and school officials cooperate in conducting these programs.

Community Resource Development. Work under this project is designed to assist Oregon citizens to: understand principles and develop skills in the organization and leadership of groups; learn how to proceed systematically in the identification and resolution of public issues—local, state, national, and international; understand the political process through which public decisions are achieved and implemented in a democracy; plan and develop public facilities and services in such areas as health, safety, civil defense, recreation, general economic and social improvement; develop and implement long-range plans for the conservation and use of natural resources in the public interest—land, water, forests, and wildlife.

Organization and Supervision of County Extension Operations—provide the basis for conducting the extension program at the county level.

* Department Heads of the School of Agriculture have part-time appointment with the Cooperative Extension Service (less than 12 percent).

Oregon State University Faculty

As of January 1970

This list includes the Oregon State University officers of administration, instruction, research, and extension at Corvallis, in the counties, and at experiment stations in various parts of the state. It includes also U. S. Department of Agriculture scientists and those staff members of the State System of Higher Education who hold academic rank and are stationed in Corvallis. The main listing includes only faculty members with rank of *instructor* or above. Faculty with academic rank of *assistant* are listed separately at the end of the main roster.

The date following the name indicates the year of appointment to the OSU faculty. If there is more than one date, a break in service is indicated. For example, "(1939-46, 1948)" indicates appointment to the faculty from 1939 to 1946, a break in service, and then continuous service since 1948.

LESTER M. AAEN (1969)
Instructor in Business Administration.
B.S., Oregon State, 1968.

MARY EUNICE ABBOTT (1959)
Assistant State Leader, Extension Home Economics.
B.A., Oklahoma Baptist University, 1932; M.A., Oklahoma State, 1956.

KITTY GREENE ABRAHAM (1969)
Instructor in Family Life.
B.S., Winthrop College, 1968; M.A., George Peabody College, 1969.

ARTHUR EUGENE ABRASSART (1966)
Assistant Professor of Business Administration.
B.S.M.E., Illinois Institute of Technology, 1963; M.A. Economics, Illinois, 1964; Ph.D. Economics, Illinois, 1967.

JOHN ADAIR (1953)
Senior Instructor in Animal Science.
B.S., Oregon State, 1950.

EDWIN RAY ADAMS (1966)
Assistant Professor, Manager of Consultation and Training, Instructional Materials and Equipment Services, Division of Continuing Education.
B.A., Central Washington State, 1955, M.A., 1958.

FRANK WILLIAM ADAMS (1953)
Assistant Professor of Chemistry, Agricultural Chemistry.
B.S., Montana State, 1948; M.S., Oregon State, 1950, Ph.D., 1965.

RICHARD ALTON ADAMS (1947)
Director of Physical Planning & Construction (Professor).

THOMAS FRANCIS ADAMS (1946)
Director of Housing (Professor).
B.S., Oregon State, 1930.

MARILYN AGNES ADIX (1966)
Assistant Professor of Home Economics Education.
B.S., Iowa State, 1963; M.S., 1966.

LEONARD ALLEN ADOLF (1955)
Professor of History.
B.A. Ed., Central Washington College, 1943; B.A., Washington, 1946, Ph.D., 1953.

WALTER MILO ADRION (1939)
Professor Emeritus of Physical Education.
B.S., Eastern Michigan University, 1924; M.A., Michigan, 1939.

ARTHUR LEMUEL ALBERT (1923)
Professor Emeritus of Communication Engineering.
B.S., Oregon State, 1923, M.S., 1926, E.E., 1939.

BILL ALDRIDGE (1968)
Associate Professor of Education; Associate Director Educational Research Center.
B.S., Oregon State, 1959, M.Ed., 1964; D.Ed., Oregon, 1967.

GERALD CORWIN ALEXANDER (1955)
Associate Professor of Electrical Engineering.
B.S., Oregon State, 1951; Sc.M., MIT, 1960.

ROBERT M. ALEXANDER (1946)
Assistant Director (Professor), Agricultural Experiment Station, Director, Air Resources Center.
B.S., Oregon State, 1942; M.A., Harvard, 1949.

LEONARD JOHN ALLEN (1915)
State 4-H Club Leader (Emeritus.)
B.S., Oregon State, 1914, M.S., 1915.

THOMAS CORT ALLEN, JR. (1962)
Associate Professor of Plant Pathology.
B.S., Wisconsin, 1953; Ph.D., California (Davis), 1956.

IRA SHIMMIN ALLISON (1928)
Professor Emeritus of Geology.
A.B., Hanover College, 1917; Ph.D., Minnesota, 1924.

DELMAR ISAAC ALLMAN (1937)
Professor Emeritus of Physical Education.
B.S., Michigan State Normal College, 1928; M.S., Michigan, 1931, Dr.P.H., 1936.

MARGARET MARIE ALLYN (1954)
County Extension Agent, Home Economics (Assistant Professor) Emeritus Columbia County.
B.A., Iowa, 1926.

RONALD HERBERT ALVARADO (1962)
Associate Professor of Zoology.
B.A., California (Riverside), 1956; M.S., Washington State, 1959, Ph.D., 1962.

MATSU-KICHI AMANO (1967)
Assistant Professor of Business Administration.
B.A., Meiji Gakuin University, 1959; M.B.A., UCLA, 1962, Ph.D., 1966.

DONALD LOUIS AMORT (1959)
Associate Professor of Electrical Engineering.
B.S. (E. Eng.), Oregon State, 1954, M.S. (E. Eng.), 1960.

WILBERT LOWELL ANDERSEN (1950-51, 1956)
County Extension Agent (Assistant Professor).
B.S., Oregon State, 1950.
On sabbatical leave 1969-70.

ARTHUR WALLACE ANDERSON (1953)
Professor of Microbiology.
B.S., North Dakota State, 1942; M.S., Wisconsin, 1947; Ph.D., Oregon State, 1952.

CARL LEONARD ANDERSON (1949)
Professor of Health Education.
B.S., Michigan, 1928, M.S., 1932, Dr.P.H., 1934.

CLIFFORD ANDERSON (1970)
Associate Professor and Physician, Student Health Service.
B.S., Washington, 1939; M.D., Oregon, 1944; M.P.H., Harvard, 1960.

DONALD EUGENE ANDERSON (1944-45, 1950)
Extension Dairy Specialist (Associate Professor).
B.S., Iowa State, 1939.

GERALD LEE ANDERSON (1967)
Assistant Professor of Naval Science.
B.S., Oregon State, 1961.

GORDON WILCOX ANDERSON (1962)
Associate Professor of Health Education.
B.S. in Ed., Central Washington College of Education, 1943; M.A., Colorado State College of Education, 1949; Ed.D., New York University, 1961.

JAMES EDWARD ANDERSON (1964)
Assistant Basketball Coach (Assistant Professor).
B.S., Oregon State, 1959, M.Ed., 1962.

NELSON CHRISTIAN ANDERSON (1946)
Polk County Extension Agent (Professor).
B.S., North Dakota Agricultural College, 1942.

NORMAN HERBERT ANDERSON (1962)
Associate Professor of Entomology.
B.S.A. (Honors), British Columbia, 1955; M.S. Oregon State, 1958; D.I.C., Imperial College, 1961; Ph.D., London, 1961.

SONIA R. ANDERSON (1968)
Assistant Professor of Biochemistry and Biophysics.
B.S., Nebraska, 1961; Ph.D., Illinois, 1964.

R. DUANE ANDREWS (1965)
Director, Professor of Education, Division of Continuing Education.
B.Ed., Colorado State University, 1951; M.A., Wyoming, 1956, Ph.D., 1960.

DEE GUS ANDROS (1965)
Head Coach of Football (Professor), Intercollegiate Athletics.
B.S., Oklahoma, 1950, M.S., 1952.

ALLEN FRANCIS ANGLEMIER (1956)
Associate Professor of Food Science and Technology.
B.S., Fresno State, 1953; M.S., Oregon State, 1955, Ph.D., 1957.

PHILIP MARSHALL ANSELONE (1963)
Professor of Mathematics.
B.A., Puget Sound, 1949, M.S., 1950; Ph.D., Oregon State, 1957.
On sabbatical leave 1970-71.

PETER ANTON (1956)
Professor of Philosophy.
A.B., Indiana, 1952, M.A., 1954, Ph.D., 1960.

SPENCER BUTLER APPLE, JR. (1950)
Professor of Horticulture; Head of Department.
B.S., Texas A & M, 1933, M.S., 1936; Ph.D., Washington State, 1953.

ARNOLD PIERCE APPLEBY (1959)
Associate Professor of Agronomy.
B.S., Kansas State, 1957, M.S., 1958; Ph.D., Oregon State, 1962.

WALTER JOSEPH ARMBRUSTER (1967)
Instructor in Agricultural Economics.
B.S., Purdue, 1962, M.S., 1964.

JACK NORLIN ARMSTRONG (1967)
Research Associate (Instructor), Veterinary Medicine.
D.V.M., Washington State, 1960.

BRADFORD HENRY ARNOLD (1947)
Professor of Mathematics.
B.S., Washington, 1938, M.S., 1940; Ph.D., Princeton, 1942.

EVERETT WILFORD ARNOLD (1969)
Cluster Task Force (Instructor)
B.B.A., Washington, 1949; Ed.M., Oregon State, 1963.

GEORGE HENRY ARSCOTT (1953)
Professor of Poultry Nutrition, Acting Head of Department.
B.S., Oregon State, 1949; M.S., Maryland, 1950, Ph.D., 1953.

BETTY JANE ASHBAUGH (1963)
Washington County Extension Agent (Assistant Professor).
B.S., Oregon State, 1945.

ROBERT RAY ASLIN (1969)
Administrative NCO, Instructor in Military Science.

RICHARD ASTRO (1966)
Assistant Professor of English.
B.A., Oregon State, 1964; M.A., Colorado, 1965; Ph.D., Washington, 1969.

GEORGE H. ATHERTON (1961)
Professor of Forest Products (Mechanical Engineer).
B.S., Oregon State, 1950, M.S., 1966.

PAT H. ATTEBERRY (1966)
Professor of Industrial Education and Head of Department.
M.S., Kansas State at Pittsburg, 1952; Dr.Ed., Missouri, 1954.

VERNON DALE ATWOOD (1967)
Washington County Extension Agent, 4-H and Youth, (Instructor).
B.S. in Agr., Washington State, 1960.

WINFRED McKENZIE ATWOOD (1913)
Professor Emeritus of Botany.
A.B., Cornell College, 1907, A.M., 1910; M.S., Chicago, 1911, Ph.D., 1913.

WILSON WAI SING AU (1966)
Assistant Professor of Physics.
B.S., MIT, 1958, Ph.D., 1963.

LAWRENCE W. S. AULD (1968)
Associate Professor; Head, Technical Services, Library.
B.A., University of Northern Iowa, 1955; M.S. in L.S., Columbia, School of Library Service, 1958.

WILLIAM SAMUEL AVERILL (1930)
Multnomah County Extension Agent (Professor) Emeritus.
B.S., Oregon State, 1917.

JERRY KEITH BABBITT (1969)
Research Associate (Assistant Professor) in Food Science and Technology.
B.S., Washington State, 1965, M.S., 1967, Ph.D., 1969.

GILBERT ARTHUR BACHELOR (1961)
Instructor in Mathematics, Research Associate Computer Center.
B.A., Eastern Washington College, 1953; M.S., Oregon State, 1955.

DONALD ALGER BACKUS (1968)
Assistant Professor of Agricultural Engineering.
B.S.AE., Washington State, 1957, M.S.AE., 1960; Ph.D., Cornell, 1963.

AMIR AGHA BADIEI (1969)
Assistant Professor of Botany.
B.A., Tehran, 1957; M.S., Nevada, 1963; Ph.D., Oklahoma, 1965.

JAMES RONALD BAGGETT (1956)
Associate Professor of Horticulture.
B.S., Idaho, 1952; Ph.D., Oregon State, 1956.

LEEDS CRIM BAILEY (1941)
Malheur County Extension Agent, (Associate Professor).
B.S., Oregon State, 1941; M.A., Michigan State, 1962.

SAMUEL HALL BAILEY (1947)
Director of Information; Professor of Journalism.
B.S., Utah State, 1942; M.S., Wisconsin, 1947.

GEORGE WILLIAM BAIN (1946-52; 1953)
Malheur County Extension Agent (Associate Professor).
B.S., Oregon State, 1943.

DOUGLAS W. BAINBRIDGE (1967)
Professor of Metallurgical Engineering.
B.S., Wisconsin, 1943; M.S., California (Berkeley), 1952, Ph.D., 1957.

DEREK JOHN BAISTED (1964)
Associate Professor of Biochemistry and Biophysics.
B.Sc., Exeter University (England), 1957, Ph.D., 1960.

KATHERINE HASKELL READ BAKER (1941)
Professor Emeritus of Family Life.
A.B., Mills College, 1925; M.S., Purdue, 1938.

FLORENCE STAHL BAKKUM (1942-51, 1954)
Assistant Professor Emeritus of Mathematics.
B.A., Grinnell, 1916; M.A., Cornell, 1923.

GLENN ALMER BAKKUM (1935)
Professor Emeritus of Sociology.
B.S., Iowa State, 1920; M.A., Columbia, 1925; Ph.D., Cornell, 1928.

CHARLES S. BALLANTINE (1960)
Associate Professor of Mathematics.
B.S., Washington, 1953; Ph.D., Stanford, 1959.

FRANK LLEWELLYN BALLARD (1917)
Associate Director (Professor) Emeritus Federal Cooperative Extension Service.
B.S., Oregon State, 1916.

ROBERT CHARLES BARD (1969)
Assistant Professor of Geography.
B.S., Wisconsin, 1951, M.S., 1957.

SANDRA LEE BARKER (1968)
Instructor in English.
B.A., Oregon, 1963; M.A.T., Portland State, 1968.

GEORGE HECTOR BARNES (1943)
Professor Emeritus of Forest Management.
B.S., Washington, 1924; M.S., California, 1929; Ph.D., Duke, 1946.

LLOYD CARL BARON (1945-46, 1957)
Washington County Extension Agent (Professor).
B.S., Oregon State, 1940; M.Ag.Ed., Arizona, 1965.

ROBERT BENJAMIN DENIS BARON (1954)
Professor of Education.
B.A., Alberta, 1940, B.Ed., 1942, M.Ed., 1945; Ph.D., USC, 1948.

JAMES GARNET BARRATT, JR. (1950)
Athletic Director, Intercollegiate Athletics (Professor).
B.S., Oregon State, 1950.

GEORGENE VIOLETTE BARTE (1959)
Assistant Professor of Foods and Nutrition.
B.S., New Mexico, 1946; M.S., Iowa State, 1948.

ALFRED FRANK BARTSCH (1966)
Professor; Director, Pacific Northwest Water Laboratory, Federal Water Pollution Control Administration.
B.A., Minnesota, 1936; Ph.D., Wisconsin, 1939.

EARL M. BATES (1969)
Weather Bureau Agricultural Meteorologist (Assistant Professor).
B.S., Portland State, 1965.

JO ANN BAUGHMAN (1967)
Research Associate (Instructor), Computer Center.
B.A. (Science), B.A. (Education), Eastern Oregon College, 1961.

DONALD JOHN BAUMGARTNER (1967)
Assistant Professor of Civil Engineering, Pacific Northwest Water Laboratory, Federal Water Pollution Control Administration.
B.S., Illinois, 1955; M.S., MIT, 1958; Ph.D., Oregon State, 1967.

LESTER MILLER BEALS (1962)
Coordinator of Secondary Student Teaching, (Professor), Education.
A.B., Nebraska, 1932, M.A., 1934; Ed.D., Oregon, 1950.

GEORGE FRANCIS BEARDSLEY, JR. (1966)
Assistant Professor of Oceanography.
S.B., MIT, 1959, S.M., 1961, Ph.D., 1966.

GEORGE STANLEY BEAUDREAU (1963)
Associate Professor of Chemistry, Agricultural Chemistry.
B.S., Washington State, 1949; M.S., Oregon State, 1951, Ph.D., 1954.

DARRELL V. BEAVERS (1964)
Assistant Professor of Food Science and Technology.
B.S., California, 1940.

WILLIAM MARK BECK (1965)
Continuing Education Specialist in Science, Assistant Professor.
B.S., Southern Oregon, 1959; M.S., Oregon State, 1962.

GERALD LESTER BECKER (1968)
Associate Professor, Associate Director of Educational Research Center.
B.S., Idaho, 1950, M.S., 1951; Ed.D., Oregon, 1967.

MANNING HENRY BECKER (1948)
Extension Farm Management Specialist; Professor of Agricultural Economics.
B.S., Oregon State, 1947, M.S., 1948.

ROBERT RICHARD BECKER (1962)
Professor of Biochemistry.
B.S., North Dakota, 1948; M.S., Wisconsin, 1951, Ph.D., 1952.

THOMAS ERWIN BEDELL (1966)
Assistant Professor of Range Management.
B.S., California State Polytechnic College, 1953; M.S., California (Berkeley), 1957; Ph.D., Oregon State, 1966.

GORDON WILLIAM BEECROFT (1958)
Associate Professor of Civil Engineering.
B.S., Oregon State, 1952, C.E., 1960.

FRANK M. BEER (1947)
Professor Emeritus, General Science.
B.S., Oregon, 1929; M.S., Washington, 1939.

PAUL ALLEN BEEZHOLD (1969)
Instructor in English.
B.A., Washington, 1964; M.A., Oregon, 1969.

J RICHARD BELL (1962)
Professor of Civil Engineering.
B.S.C.E., Purdue, 1952; M.S.C.E., 1956, Ph.D., 1963.

JOHN FREDERICK BELL (1959)
Associate Professor of Forest Management.
B.S.F., Oregon State, 1949; M.F., Duke, 1951.

DAVID ANDREW BELLA (1967)
Assistant Professor of Civil Engineering.
B.S., Virginia Military Institute, 1961; M.S., New York University, 1964; Ph.D., 1967.

ELMA MARSHALL BEMIS (1944)
Binding Librarian Emeritus, Library.
A.B., Phillips, 1915, B.S., 1917, M.A., 1918; M.A., Colorado State College, 1942; B.S. (Lib. Sc.), Denver, 1944.

CLEON VERNON BENNETT (1958)
Assistant Professor of Speech Communication.
B.S., Murray State College (Kentucky), 1955; M.A., Southern Illinois, 1958.

NOEL LINDSAY BENNION (1937)
Extension Poultry Specialist (Professor Emeritus).
B.S., Utah State, 1928; M.S., Kansas State, 1932.

EVA MAE BENSON (1958)
Assistant Professor of Nutrition.
B.A., UCLA, 1949; M.A., Los Angeles State, 1955.

RONALD G. BENSON (1969)
Instructor in Business Administration.
B.S., Iowa, 1965, M.A., 1969.

ALAN BEN BERG (1961)
Professor of Forest Management.
B.S., Oregon State, 1941; M.F., Washington, 1955.

ROBERT WILLIAM BERGSTROM (1941-42, 1946-47, 1950)
Professor of Physical Education.
B.S., Oregon State, 1937; M.A., Columbia, 1942, Ed.D., 1947.

NORBORNE BERKELEY (1946)
Professor of History.
A.B., Oregon, 1924; M.A., Harvard, 1931.

PAUL EMILE BERNIER (1947)
Professor of Poultry Genetics.
B.S.A., Université Laval, 1932; Ph.D., California, 1947.

DONALD WILSON BERRY (1954)
Jackson County Extension Agent (Associate Professor).
B.S., Oregon State, 1947; M.S., University of California, 1962.

JOSEPH HOWARD BERRY (1951)
Assistant to the President Emeritus.
B.S., Oregon State, 1929, Ed.M., 1954.

RALPH EUGENE BERRY (1968)
Assistant Professor of Entomology.
B.S., Colorado State University, 1963, M.S., 1965; Ph.D., Kansas State, 1968.

RALPH STEPHEN BESSE (1922)
Professor Emeritus of Agriculture.
B.S.A., Missouri, 1913, M.S., 1915. Associate Director of Agricultural Experiment Station, 1949-53.

RALPH STEPHEN BESSE, JR. (1963)
Lane County Extension Chairman (Associate Professor).
B.S., Oregon State, 1943.

GARNET DOUGLAS BEST (1931)
Wallowa County Extension Agent (Associate Professor) Emeritus
B.S., Oregon State, 1925.

JOHN HERMAN BEUTER (1970)
Associate Professor of Forest Management.
B.S., Michigan State, 1957, M.S., 1958; Ph.D., Iowa State, 1966.

DALE NESTRUD BEVER (1961)
Professor of Forest Management, Assistant Dean, School of Forestry.
B.S., Oregon State, 1942, M.F., 1954.

HERMAN ELDON BIERMAN (1952)
Umatilla County Extension Agent (Assistant Professor).
B.S., Oregon State, 1948.

JOHN EDWARD BILLEY (1969)
Assistant Professor of Education.
B.S., West Virginia, 1958, M.S., 1959, Ed.D., 1969.

WILLIAM HOLLIS BILLINGS (1966)
Assistant Professor, Plant Materials Specialist, Plant Materials Center.
B.S., Kansas State, 1951.

DONALD DUANE BILLS (1961-64, 1965)
Associate Professor of Food Science and Technology.
B.S., Oregon State, 1959, M.S., 1964; Ph.D., 1966.

JULIUS FLOYD BINDER (1952)
Jefferson County Extension Agent, 4-H and Youth (Assistant Professor).
B.S., Kansas State, 1948; M.S., Colorado State University, 1967.

ANTHONY de GRAY BIRCH (1965)
University Budget Officer; Assistant Director Institutional Research (Assistant Professor).
B.S., Oregon State, 1962; M.B.A., Washington, 1964; M.S., Oregon State, 1969.

ROBERT HILL BIRDSALL (1952)
Professor of Journalism.
B.A., Idaho State, 1949; M.A., Stanford, 1952.

NORMAN IVAN BISHOP (1963)
Professor of Plant Physiology.
B.S., Utah, 1951, M.S., 1952, Ph.D., 1955.

HAROLD MAYFIELD BLACK (1949)
Clackamas County Extension Chairman, 4-H Club (Professor).
B.S., Oregon State, 1947; M.S., Michigan State, 1962.

HUGH CLARK BLACK (1962)
Associate Professor of Forest Wildlife Ecology.
B.S., Pennsylvania State, 1950; M.S., Oregon State, 1955; Ph.D., 1965.

ROBERT MILTON BLACK (1965)
Associate Professor of Meteorology, U. S. Weather Bureau, Advisory Agricultural Meteorologist, Agricultural Experiment Station.
B.S., Iowa State, 1960.

EVA BLACKWELL (1924)
Assistant Registrar (Assistant Professor) Emeritus.
B.S., Oregon State, 1924.

GRANT E. BLANCH (1945)
Professor of Agricultural Economics.
B.S., Utah State, 1940; M.S., Illinois, 1941; Ph.D., Cornell, 1944.

ROBERT CONRAD BLENSLY (1966)
Associate Professor of Agricultural Economics and Civil Engineering.
B.S., University of Colorado; M.S., Stanford, 1949.

JOHN HARVEY BLOCK (1966)
Assistant Professor of Pharmaceutical Chemistry.
B.S., B.Phr., Washington State, 1961, M.S., 1963; Ph.D., Wisconsin, 1966.

WILBUR LEROY BLUHM (1957)
Marion County Extension Agent (Associate Professor).
B.S., Nebraska, 1947; M.S., Purdue, 1964.

CHARLES HENRY BLUMENFELD (1962)
Executive Assistant to President.
A.B., Illinois, 1928, J.D., 1930.

GUNNAR BODVARSSON (1964)
Professor of Mathematics, Professor of Geophysical Oceanography.
B.S., Technical University of Berlin, 1943; Ph.D., California Institute of Technology, 1957.

FLOYD WALTER BODYFELT (1964)
Assistant Professor of Food Science and Technology; Extension Dairy Processing Specialist.
B.S., Oregon State, 1963; M.S., 1967.

OLAF ALEXANDER BOEDTKER (1963)
Associate Professor of Physics; Director, Engineering Physics.
B.S., Swiss Federal Institute of Technology, 1949; M.S., California Institute of Technology, 1958, Ph.D., 1961.

LARRY BOERSMA (1960)
Associate Professor of Soils.
M.S., The Netherlands, 1955; Ph.D., Cornell, 1959.

RALPH BOGART (1947)
Professor of Animal Genetics; Director, Genetics Institute.
B.S., Missouri, 1934; M.S., Kansas State, 1936; Ph.D., Cornell, 1940.

DAVID A. BOGDANOFF (1969)
Instructor in Business Administration.
B.S., Chicago, 1963; M.S., Stanford, 1967.

SIRAG SAM BOGHOSIAN (1965)
Associate Professor, Assistant Football Coach, Intercollegiate Athletics.
B.S., UCLA, 1956.

WILLIAM JOHN BOHNAKER (1969)
Instructor in English.
B.A., Oregon College of Education, 1967; M.A., Iowa, 1969.

CHARLES ALLAN BOICE (1966)
Assistant Professor; Department of Information Assistant; Editor, *Oregon Stater*.
B.S., Oregon, 1942, M.S., 1950.

GEORGE BAKER BOKORNEY (1963)
Manager Memorial Union Dining Service, Assistant Professor of Institution Management.
B.S., Oklahoma State, 1954, M.S., 1962.

WALTER BENO BOLLEN (1929)
Professor of Microbiology.
B.S., Oregon State, 1921, M.S., 1922; Ph.D., Iowa State, 1924.

FLOYD EUGENE BOLTON (1967)
Research Associate in Farm Crops.
B.S., Oklahoma State, 1959; M.S., 1961; Ph.D., Colorado State, 1968.

CARL ELDON BOND (1949)
Professor of Fisheries.
B.S., Oregon State, 1947; M.S., 1948; Ph.D., Michigan, 1963.

TURNER HANKS BOND (1943-48, 1950)
Extension District Supervisor (Professor).
B.S., Oregon State, 1938; M.S., Michigan State, 1961.

JESSE FRANKLIN BONE (1950)
Professor of Veterinary Medicine.
B.A., Washington State, 1937, B.S., 1949, D.V.M., 1950; M.S., Oregon State, 1953.

EARL EDWARD BONHAM (1955)
Wasco County Extension Agent, 4-H and Youth (Assistant Professor).
B.S., Oregon State, 1950.

SPENCER EUGENE BONHAM (1965)
Instructor in Military Science.

DEAN EMERSON BOOSTER (1956)
Associate Professor of Agricultural Engineering.
B.S., Oregon State, 1954, M.S., 1956.

THARALD BORGIR (1967)
Assistant Professor of Music.
M.M., Yale, 1960.

ROBERT JOHN BORNHEIMER (1967)
Chief Yeoman, USN, Instructor in Naval Science.

DAVID ARTHUR BOSTWICK (1953)
Associate Professor of Geology.
B.A., Montana, 1942; M.A., 1951, Ph.D., Wisconsin, 1958.

LIDO DAN BOTTI (1965)
Assistant Professor of Italian.
B.A., University of Portland, 1951, M.A., 1953.

RICHARD WILLIAM BOUBEL (1954)
Professor of Mechanical Engineering.
B.S., Oregon State, 1953, M.S., 1954; Ph.D., University of North Carolina, 1963.

ARTHUR JAMES BOUCOT (1969)
Chairman and Professor of Geology.
A.B., Harvard College, 1948; A.M., Harvard, 1949, Ph.D., 1953.

ARTHUR GEORGE BRISTOW BOUQUET (1909)
Professor Emeritus of Horticulture.
B.S., Oregon State, 1906; M.S., Cornell, 1930.

EDOUARD JOANY BOURBOUSSON (1943)
Professor Emeritus of French.
Licence és Lettres, 1915, Licence en Droit, 1916, Licence és Sciences, 1916, Lyon; Docteur en Droit, 1919, Paris; Docteur de l' Université de Lyon (Lettres, 1950).

WALDO BOWERS (1963)
Assistant Director of Admissions (Associate Professor).
B.A., American Intl. College, 1956; Ed.M., Oregon State, 1959.

MARIAN Y. BOWMAN (1964)
Assistant Professor of Art.
B.F.A., Texas, 1946, M.F.A., 1964.

V. JOSEPH BOWMAN, JR. (1969)
Assistant Professor of Statistics.
B.S., Stanford, 1965; Ph.D., Johns Hopkins, 1969.

GARY ALLAN BOYD (1969)
Assistant Professor of Military Science.
B.S., Oregon State, 1969.

JAMES ROBERT BOYDSTON (1964)
Associate Professor of Civil Engineering, Pacific Northwest Water Laboratory, Federal Water Pollution Control Administration.
B.S., Oregon State, 1949; M.S., Harvard, 1953.

JAMES JOSEPH BRADY (1937)
Professor of Physics.
B.A., Reed, 1927; M.A., Indiana, 1928; Ph.D., California, 1931.

NORMAN ROBERT BRANDENBURG (1950)
Associate Professor of Agricultural Engineering; Agricultural Engineer, U. S. Department of Agriculture.
B.S., Colorado, 1944; M.S., Oregon State, 1951.

VERA HASKELL BRANDON (1928)
Professor Emeritus of Home Economics. Acting Dean of the School of Home Economics 1950-54; Associate Dean 1954-55.
B.S., Oregon State, 1911, B.S., 1927, M.S., 1929; Ph.D., Iowa, 1936.

PATRICIA ELIZABETH BRANDT (1959-1961, 1964)
Assistant Humanities Reference Librarian (Assistant Professor).
B.S., Mt. Angel College, 1955; B. Mus. Ed., Willamette, 1957, M. Mus. Ed., 1958; M.A., Denver, 1959.

WILLIAM HENRY BRANDT (1956)
Associate Professor of Botany.
B.A., Montana, 1950; M.Sc., Ohio State, 1951, Ph.D., 1954.
On sabbatical leave September 16, 1969 to June 15, 1970.

THOMAS RENO BRANTNER (1967)
Assistant to the Director, Computer Center.
B.S., Oregon State, 1968.

EDWARD BROOKS BRAZEE (1964)
Assistant Reference Librarian (Assistant Professor).
B.A., Oregon, 1962; M. Librarianship, Washington, 1963.

WILBUR PAUL BREESE (1953)
Associate Professor of Fisheries; Marine Science Center, Newport.
B.S., Oregon State, 1951, M.S., 1953.

WILLIAM JAMES BRENNAN (1966)
Assistant Dean of Students; Assistant Professor.
B.S., Oregon State, 1962, M.Ed., 1966.

ROBERT NELSEN BRENNE (1965)
Instructor in Mathematics, Research Associate, Computer Center.
B.A., Reed College, 1953.

DONALD HADEN BREWER (1957)
Extension Certification Specialist (Assistant Professor).
B.S., Oregon State, 1955; M.S., Missouri, 1967.

MICHAEL P. BRINKMAN (1969)
Instructor in Graphic Art, Consulting Artist, Instructional Materials and Equipment Services, Division of Continuing Education.
B.S., Oregon, 1966.

GWYNETH ELAINE BRITTON (1965)
Assistant Professor of Education.
B.S., Lewis and Clark College, 1957; M.Ed., Oregon, 1963; Ed.D., Oregon State, 1968.

JOHN DOUGLAS BROCKWAY (1967)
Gunnery Sergeant, USMC, Instructor in Naval Science.

GERALD WALTER BROG (1956)
Umatilla County Extension Agent (Associate Professor).
B.S., Oregon State, 1954; M.S., Michigan State, 1964.

FLORENCE RYDER BROMLEY (1955)
Tillamook County Extension Agent (Home Economics) (Assistant Professor) Emeritus.
B.S., Oregon State, 1922, M.H.Ec., 1959.

VICTOR JACK BROOKES (1956)
Associate Professor of Entomology.
B.A., Michigan, 1950; M.S., Illinois, 1951, Ph.D., 1956.

EVELYN ANNE BROOKHYSER (1966)
Yamhill County Extension Agent, 4-H and Youth, (Instructor).
B.S., Stout State University, Wisconsin, 1966.

RICHARD LLEWELLYN BROOKS (1965)
Assistant Professor, Assistant Football Coach, Intercollegiate Athletics.
B.S., Oregon State, 1963, Ed.M., 1964.

ROYAL HARVARD BROOKS (1967)
Associate Professor of Agricultural Engineering.
B.S., Utah State, 1952; M.C.E., Colorado State University, 1960, Ph.D., 1965.

JOY E. BROUGHER (1962)
Lane County Extension Agent, 4-H and Youth (Assistant Professor).
B.S., Oregon State, 1959; M.H.Ec., 1970.

DICK (ALVIN R.) BROWN (1968)
Crook County Extension Agent (Instructor).
B.S., Oregon State, 1967.

CARL BROWN (1965)
Assistant Professor of Anthropology.
B.A., Mexico City College, 1959; M.A., Oregon, 1967.

DOROTHY FURTICK BROWN (1955)
Extension Housing-Home Furnishings Specialist, (Associate Professor).
B.S., Colorado, 1949; M.S., Oregon State, 1964.

EVELYN STOWELL BROWN (1960)
Lincoln County Extension Agent, Home Economics (Assistant Professor).
B.S. in Education, State Teachers College (Framingham, Massachusetts), 1927.

GEORGE WALLACE BROWN (1966)
Assistant Professor of Forest Hydrology.
B.S., Colorado State University, 1960, M.S., 1962; Ph.D., Oregon State, 1967.

GORDON GEORGE BROWN (1916)
Associate Professor Emeritus of Horticulture, Mid-Columbia Experiment Station.
A.B., Pacific University, 1910; B.S., Oregon State, 1910.

JAMES RUSSELL BROWN (1962)
Associate Professor of Mathematics.
B.A., Oregon State, 1953, M.A., 1958; Ph.D., Yale, 1964.

KENNETH NEIL BROWN (1963)
Polk County Extension Agent (Assistant Professor).
B.S., Oregon State, 1961.

LYLE LEWIS BROWN (1969)
Coos County Extension Agent (Instructor).
B.S., Humboldt State, 1958; M.S., Nevada, 1961.

TYRUS STEARNS BROWN (1967)
Associate Professor, Director of Field Relations, School of Education.
B.S. Elem. Ed., Oregon College of Education, 1956, M.S., 1960, Ed.D., Oregon State, 1969.

WILLIAM GALEN BROWN (1955)
Professor of Agricultural Economics.
B.S., Kansas State, 1950; M.S., Iowa State, 1953, Ph.D., 1955.
Return from leave without pay March 15, 1970.

WILLIAM G. BROWNE (1968)
Assistant Professor of Business Administration.
B.S.E.E., Case Institute of Technology, 1960; M.B.A., Washington, 1965; Candidate of Philosophy, Michigan, 1967, Ph.D., 1968.

ROBERT M. BRUCE (1968)
Division of Continuing Education, Oregon Educational Broadcasting, Producer-Capitol Correspondent KOAC Capitol Studio, Salem.

HUGH DANIEL BRUNK (1969)
Professor of Statistics.
B.A., California (Berkeley), 1940; M.A., Rice Institute, 1942, Ph.D., 1944.

JEAN YOUNG BRUNK (1969)
Instructor in English.
B.A., Rice University, 1943; M.A., Missouri, 1958.

VELDA JEAN BRUST (1964)
Assistant Professor of Physical Education.
B.S., Oregon State, 1953; Certificate of Occupational Therapy, Southern California, 1955; Registered Occupational Therapist, 1956; Ed.M., Oregon State, 1961.

SYDNEY COLEMAN BRYANT (1963)
Hood River County Extension Agent, Home Economics (Instructor).
B.S., Oregon State, 1963.

JOSEPH CHESTER BRYE (1947)
Professor of Music.
B.M., Northwestern, 1940, M.M., 1941.

JANET LAIRD BUBL (1946-48, fall 1959, 1960)
Assistant Professor of Clothing and Textiles.
B.A., Vassar, 1940; M.S., Minnesota, 1941.

WALTER JOHN BUBLITZ (1966)
Associate Professor of Pulp and Paper.
B.S., Arizona, 1941; M.S., Institute of Paper Chemistry, 1947, Ph.D., 1949.

WILLIAM HARRY BUCKLEY (1962)
Assistant Professor, Executive Secretary, Water Resources Research Institute.
B.A., Oregon, 1949; M.A., Hawaii, 1963.

DAVID ALVIN BUCY (1955)
Assistant Professor of General Engineering.
B.S. Civil Engineering, Oregon State, 1955; P.E., State of Oregon, 1959; M.S. Metallurgical Engineering, Washington, 1969.

DONALD RAYMOND BUHLER (1967)
Associate Professor of Agricultural Chemistry.
B.S., Oregon State, 1950, M.S., 1953, Ph.D., 1956.

DELOSS EVERETT BULLIS (1917)
Professor Emeritus of Agricultural Chemistry.
B.S., Oregon State, 1917, M.S., 1929.

THOMAS R. BUNCH (1961-62, 1964)
Crook County Extension Chairman (Associate Professor).
B.S., Oregon State, 1961; M.S., Oregon State, 1965.

LAMAR PAUL BUPP (1968)
Professor of Nuclear Engineering.
B.S., California (Berkeley), 1943; Ph.D., Oregon State, 1951.

ALICE JOYCE BURBOTT (1963)
Research Associate in Biochemistry and Biophysics.
B.S., Lewis & Clark, 1953; M.A., Oregon State, 1963.

DAVID STEWART BURCH (1958)
Professor of Physics.
B.S., Washington, 1950, M.S., 1954, Ph.D., 1956.

LELAND L. BURGER (1969)
Professor of Mechanical and Nuclear Engineering.
B.S., Wyoming, 1939; Ph.D., Washington, 1948.

FREDRICK JOSEPH BURGESS (1953)
Professor of Civil Engineering and Head of Department.
B.S., Oregon State, 1950; M.S., Harvard, 1955.

DAVID JAMES BURKHART (1961)
Umatilla County Extension Agent (Associate Professor).
A.B., Northwest Nazarene College, 1951.

WILBUR WILLIS BURKHART, JR. (1947)
Area Extension Agent, North Willamette Valley (Associate Professor).
B.S., Oregon State, 1947.

JAMES ALMON BURR (1951-52, 1960)
Jefferson County Extension Agent (Assistant Professor).
B.S., Oregon State, 1951.

NEDRY V. BURRIS (1968)
Assistant to Director of Business Affairs, Assistant Professor.
LL.B., Northwestern College of Law (Portland, Oregon), 1951.

GEORGE SHERWIN BURT (1966)
Instructor in Psychology.
A.B., San Jose State, 1957, M.A., 1962.

WAYNE VINCENT BURT (1954)
Professor of Oceanography; Associate Dean of Research; Director, Marine Science Center.
B.S., Pacific College, 1939; M.S., Scripps Institution of Oceanography, 1948, Ph.D., 1952; Sc.D., George Fox College, 1963.

MARIE HARRIS BUSSARD (1957)
Assistant Professor of Foods and Nutrition.
B.S., Montana State, 1956, M.S., 1957.

IRENE BUTTS (1947)
Instructor Emeritus in English.
B.A., Oregon State, 1946.

JOHN VINCENT BYRNE (1960)
Professor of Oceanography; Chairman of Department.
A.B., Hamilton College, 1951; M.A., Columbia, 1953; Ph.D., USC, 1957.

ROBERT FARMER CAIN (1952)
Professor of Food Science and Technology.
B.S., Texas Technological College, 1938; M.S., Texas A and M, 1941; Ph.D., Oregon State, 1952.

DOUGLAS R. CALDWELL (1968)
Assistant Professor of Oceanography.
B.A., Chicago, 1955, B.S., 1957, M.S., 1958, Ph.D., 1963.

WILLIAM ELMER CALDWELL (1930)
Professor Emeritus of Chemistry.
Met.E., Montana School of Mines, 1924; B.S., Wisconsin, 1928, Ph.D., 1930.

WHEELER CALHOUN, JR. (1948)
Associate Professor of Agronomy.
B.S., Oregon State, 1946, M.S., 1953.

JEANENE MARIE CALKINS (1969)
Instructor in Foods and Nutrition.
B.S., Oregon State, 1968, M.S., 1969.

LEONARD J. CALVERT (1961-65, 1969)
Extension Information Specialist (Associate Professor), Agricultural Information.
B.A., Oregon, 1955.

LYLE DAVID CALVIN (1953)
Professor of Statistics, Chairman of Department.
B.S., Chicago, 1948; B.S., North Carolina State, 1947, Ph.D., 1953.

H. RONALD CAMERON (1955)
Associate Professor of Plant Pathology.
B.S., California, 1951; Ph.D., Wisconsin, 1955.

DONALD EUGENE CAMPBELL (1969)
Associate Professor of Physical Education.
B.A., Augustana College, 1950; M.S., Oregon, 1956; Ed.D., Colorado State College, 1963.

HOMER JEROME CAMPBELL (1957)
Assistant Professor of Fisheries; Fishery Biologist, Research Division, Oregon State Game Commission.
B.S., Oregon State, 1948, M.S., 1963.

JOHN CARL CAMPBELL (1948)
Associate Professor of General Engineering, Head of Department.
B.S., Kansas State, 1947; M.S., Oregon State, 1949.

ROBERT KENNETH CAMPBELL (1969)
Research Geneticist (Associate Professor) Forestry Sciences Laboratory.
B.A., Montana, 1951; M.S., Washington, 1954, Ph.D., 1958.

RONALD KENNETH CAMPBELL (1945)
Professor Emeritus of Organizational Behavior, Business and Technology.
A.B., Illinois, 1925; M.B.A., Harvard, 1928; Ph.D., Stanford, 1940. Certified Psychologist, Oregon.

WILLIAM ALEXANDER CAMPBELL (1966)
Professor of Music and Chairman of Department.
B.M., Eastman School of Music, University of Rochester, 1935; M.A., University of New York, 1940.

LYNN ELTON CANNON (1963)
Coos County Extension Chairman (Associate Professor).
B.S., Oregon State, 1958; M.Agr., 1965.

TILMAN MEADE CANTRELL (1956)
Professor of Sociology.
B.A., Texas, 1947, M.A., 1948.

JOSEPH CAPIZZI (1955-1963, 1965)
Extension Entomology Specialist (Associate Professor).
B.S., State Teachers College, Indiana, Pennsylvania, 1949; M.S., Oregon State, 1955.

JUAN CARDENAS (1966)
Research Associate in Farm Crops.
B.S., Oklahoma State, 1961, M.S., 1963; Ph.D., Illinois, 1966.

ANDREW GALBRAITH CAREY, JR. (1961)
Assistant Professor of Oceanography.
A.B., Princeton, 1955; Ph.D., Yale, 1962.

HERBERT DEYO CARLIN (1951)
Professor of History.
B.S., Oregon, 1940, M.S., 1947.

MARIAN CUSHING CARLIN (1954)
Associate Professor of Family Life.
B.Sc., Nebraska, 1939; M.Sc., Iowa State, 1943.

ANGELA RUTH CARLSON (1969)
Instructor in Music.
B.A., Idaho, 1964; M.M., Wisconsin, 1965.

DAVID HILDING CARLSON (1963)
Associate Professor of Mathematics.
B.A., San Diego State, 1957; M.S., Wisconsin, 1959, Ph.D., 1963.

ELAINE KATHRYN CARLSON (1958)
Extension Clothing Specialist (Associate Professor).
B.A., Northwest Nazarene College, 1942, B.Mus., 1947; M.S., Oregon State, 1960.

MARLAN CARLSON (1969)
Assistant Professor of Music.
B.M.E., Kansas, 1959, B.M., 1959; M.M., Eastman School of Music, 1961, D.M.A., 1964.

ROY WERNER CARLSON (1958)
Associate Professor of English.
B.A., University of Omaha, 1952; M.A., Washington, 1957; Ph.D., New Mexico, 1961.

THEODORE HAROLD CARLSON (1951)
Associate Professor of Journalism.
B.S., Oregon State, 1950; M.S., Oregon, 1967.

WILLIAM HUGH CARLSON (1945)
Professor Emeritus.
A.B., Nebraska, 1924; Certificate, New York State Library School, 1926; M.A. (Lib. Sc.) California, 1937.

JOHN WILLIAM CARNEGIE (1969)
Assistant Professor of General Science.
B.S., Oregon State, 1965, M.S., 1968, Ph.D., 1970.

ANDRE LOUIS CARON (1969)
Regional Engineer, National Council for Air and Stream Improvement.
B.S., Maine, 1956, M.S., 1963.

PAUL CARPENTER (1920-27, 1934)
Professor Emeritus of Agricultural Economics.
B.S., Minnesota, 1932.

GEORGE BARR CARSON, JR. (1961)
Professor of History, Chairman of Department.
B.A., College of Wooster, 1935; M.A., Chicago, 1940, Ph.D., 1942.

DAVID SOUTHARD CARTER (1961)
Professor of Mathematics, Acting Chairman of Department.
B.A., University of British Columbia, 1946, M.A., 1948; Ph.D., Princeton, 1952.

GEORGE EDWARD CARTER (1960)
Assistant Professor of Agronomy, Klamath Experiment Station.
B.S., Purdue, 1956; M.S., Michigan State, 1960.

RUTH HARRIETT CARTER (1952)
Senior Instructor Emeritus in English.
B.S., Boston University, 1930, M.Ed., 1934.

EMERY NEAL CASTLE (1954)
Professor of Agricultural Economics, Head of Department.
B.S., Kansas State, 1948, M.S., 1950; Ph.D. Iowa State, 1952.

PHILIP CATALFOMO (1963)
Associate Professor of Pharmacognosy.
B.S., Providence College, 1953; B.S., Connecticut, 1958; M.S., Washington, 1960, Ph.D., 1962.

RUFUS HENRY CATE, JR. (1945)
Douglas County Extension Chairman (Professor).
B.S., Oregon State, 1944; M.Ed., Colorado State University, 1954.

ELEONORE K. CERVANTES (1966)
Assistant Professor of German.
B.A., Washington, 1964, M.A., 1965.

FREDERICK ARNOLD CERVANTES (1965)
Assistant Professor of Political Science.
B.A., California (Riverside), 1960; M.A., Washington, 1963.

GEORGE GRETE CHADWICK (1958)
Associate Professor of Fisheries.
B.S., Oregon State, 1954, M.S., 1959.

WILLARD JOSEPH CHAMBERLIN (1915)
Professor Emeritus of Entomology.
B.S., Oregon State, 1915, M.S., 1921; Ph.D., Stanford, 1930.

KENTON LEE CHAMBERS (1960)
Professor of Botany; Curator of Herbarium.
A.B., Whittier, 1950; Ph.D., Stanford, 1956.

SHARON KAY CHAMBERS (1969)
Instructor in Physical Education for Women.
B.S., Montana, 1966, M.S., 1969.

PHILLIP C. CHAN (1969)
Visiting Associate Professor, Biochemistry and Biophysics.
B.S., Monmouth College, 1952; B.A., Columbia, 1952, Ph.D., 1957.

CHENG-CHENG CHANG (1968)
Assistant Professor of Electrical Engineering.
B.S., Taiwan University, 1959; M.E.E., Oklahoma, 1963; Ph.D., California (Berkeley), 1968.

JOHN PRESCOTT CHAPLIN (1966)
Instructor, Assistant Track Coach, Ticket Manager, Intercollegiate Athletics.
B.A., Washington State, 1963; M.A., Oregon State, 1967.

MICHAEL H. CHAPLIN (1968)
Assistant Professor of Horticulture.
B.S., Kentucky, 1965; M.S., Rutgers, 1966; Ph.D., Michigan State, 1968.

BERKLEY WARNER CHAPPELL (1963)
Associate Professor of Art.
B.F.A., University of Colorado, 1956, M.F.A., 1958.

HELEN GENEVA CHARLEY (1944)
Professor of Foods and Nutrition.
A.B., DePauw, 1930; M.S., Chicago, 1941.

PETER ROBERT CHEEKE (1969)
Assistant Professor of Animal Science.
B.S.A., British Columbia, 1963, M.S.A., 1965; Ph.D., Oregon State, 1969.

HORACE BELLATTI CHENEY (1952)
Professor of Soils, Head of Department.
B.S., Iowa State, 1935; Ph.D., Ohio State, 1942.

ROBERT WILLIAM CHICK (1962)
Dean of Students.
B.A., Missouri, 1946, M.Ed., 1950; Ed.D., Denver, 1960.

DAVID OWEN CHILCOTE (1953)
Associate Professor of Crop Physiology.
B.S., Oregon State, 1953, M.S., 1957; Ph.D., Purdue, 1961.

WILLIAM WESLEY CHILCOTE (1950)
Professor of Botany.
B.S., Iowa State, 1943, Ph.D., 1950.

HERBERT ELLSWORTH CHILDS (1935)
Professor of English.
A.B., Oberlin College, 1926; Ph.D., Washington, 1932.

KIM K. CHING (1961)
Professor of Forest Genetics.
B.S., Central University, China, 1942; M.F., Michigan State, 1948, Ph.D., 1954.

TE MAY TSOU CHING (1956)
Associate Professor of Seed Physiology.
B.S., Central University, China, 1944; M.S., Michigan State, 1950, Ph.D., 1954.

HARBANS SINGH CHONA (1966)
Documents Librarian (Assistant Professor).
B.A., Punjab University, 1954; M.A. (L.S.), Peabody Library School, George Peabody College, 1961.

PAUL N. P. CHOW (1966)
Research Associate, Agricultural Chemistry.
M.S., Rutgers, 1961; Ph.D., Nebraska, 1965.

THOMAS SU-WEN CHOW (1966)
Assistant Professor of Mathematics.
B.S., Cheng Kung University, 1958; M.A., California (Berkeley), 1963, Ph.D., 1966.

JOHN M. CHRISMER (1966)
Associate Professor of Business Education.
B.S., University of Denver, 1947; M.A., Willamette University, 1948; Ed.D., Nebraska, 1960.

BERT EINAR CHRISTENSEN (1931)
Professor of Chemistry; Chairman of Department.
B.S., Washington State, 1927; Ph.D., Washington, 1931.

DOROTHY JEAN CHRISTENSEN (1967)
Extension Agent-at-Large (Instructor).
B.S., Oregon State, 1967.

LENO VIRGIL CHRISTENSEN (1957)
Teacher Trainer in Agricultural Mechanics, Associate Professor of Agricultural Engineering.
B.Sc., Nebraska, 1941; M.S., Stout State University, 1966.

CLARENCE LEWIS CHURCH (1943-44, 1945)
Assistant Professor Emeritus of Physics.
A.B., Willamette, 1927; M.A., Southern California, 1936.

DAVID CALVIN CHURCH (1956)
Associate Professor of Animal Nutrition.
B.S., Kansas State, 1950; M.S., Idaho, 1952; Ph.D., Oklahoma State, 1956.

THOMAS EDWARD CHURCH (1969)
Josephine County Extension Agent. (Instructor).
B.S., Idaho, 1969.

ROBERT RAYMOND CLAEYS (1966)
Research Associate (Assistant Professor), Agricultural Chemistry.
B.S., University of Portland, 1960; Ph.D., Oregon State, 1968.

AVA MILAM CLARK (1911)
Professor Emeritus of Home Economics.
Ph.B., Chicago, 1910, M.A., 1911, Dean of the School of Home Economics 1917-50.

ELSIE K. CLARK (1960)
Polk County Extension Agent, Home Economics (Associate Professor).
B.S., New Mexico State, 1942.

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Assistant Professor of Education, Continuing Education Specialist in Counseling & Guidance.
B.S., Nebraska, 1941, M.A., 1948; Ed.D., Wyoming, 1964.

HARRY EDWIN CLARK (1951)
Extension Community Development Specialist (Associate Professor).
B.S., Oregon State, 1939, M.S., 1942; Ph.D., Wisconsin, 1960.

RONALD O. CLARKE (1963)
Associate Professor of Religious Studies.
B.S., Oregon State, 1950; B.D., Yale, 1953; Th.D., Pacific School of Religion, 1964.

DONALD WEDSEL CLAYPOOL (1964)
Assistant Professor, Superintendent of John Jacob Astor Experiment Station.
B.S., Berea, 1952; M.S., Kentucky, 1959.

LAURA MAE CLEAVELAND (1946)
Associate Professor of Institution Management; Manager Residence Halls Food Service.
B.S., Iowa State, 1930; M.S., Oregon State, 1942.

SCOTT PHILIP CLEVENGER (1945)
County Extension Agent-at-Large (Assistant Professor).
B.S., Oregon State, 1939.

ROY J. CLINTON (1968)
Captain, Assistant Professor of Military Science.
B.S., West Point USMA, 1963.

HAROLD COCKERLINE (1921)
Professor Emeritus of Electrical Engineering.
B.S. (in E.E.), Oregon, 1912.

LLOYD C. COCHRAN (1969)
Professor of Plant Pathology.
B.S., Purdue, 1928; M.S., Michigan, 1930, Ph.D., 1936.

RALPH COLBY (1928)
Professor Emeritus of English, Dean of Lower Division 1949-60, Dean of Humanities and Social Sciences 1960-62.
B.A., Minnesota, 1916, M.A., 1917; Ph.D., Illinois, 1928.

GEORGIA COLE (1960)
Assistant Director of Oregon State University Press (Assistant Professor).
A.B., Rockford College, 1930.

RALPH ORVAL COLEMAN (1919)
Professor Emeritus of Physical Education.
B.S., Oregon State, 1918; M.A., Columbia, 1929.

GAIL ANN COMISKY (1968)
Assistant Catalog Librarian.
B.A., Willamette University, 1966; M.L.S., Oregon, 1968.

OLIVER CECIL COMPTON (1948)
Professor of Horticulture.
B.S., California, 1931, M.S., 1932; Ph.D., Cornell, 1947.

HARLAN P. CONKEY (1969)
Audiologist in Speech Communication.
B.S., Kansas, 1959, M.S., 1961; Ed.D., Tulsa, 1969.

FRANK SIDNEY CONKLIN (1968)
Assistant Professor of Agricultural Economics.
B.S., Oregon State, 1954, M.S., 1959; Ph.D., Iowa State, 1968.

MELVIN J. CONKLIN (1926-39, 1950)
Associate Professor Emeritus of Agricultural Economics. Agricultural Experiment Station.
B.S., Montana State, 1922.

HELEN DWELLE CONNER (1963)
Malheur County Extension Agent, Home Economics (Assistant Professor).
B.S., Montana, 1963.

GEORGE HARMON CONSTANTINE, JR. (1966)
Assistant Professor of Pharmacognosy.
B.S. in Pharmacy, Utah, 1960, M.S., 1962; Ph.D., Oregon State, 1966.

FRANK PHILIP CONTE (1961)
Associate Professor of Zoology.
A.B., California, 1950, Ph.D., 1961.

RICHARD HUGO CONVERSE (1967)
Professor of Plant Pathology; Research Plant Pathologist, USDA.
B.S., California (Berkeley), 1947, M.S., 1948; Ph.D., California (Davis), 1951.

CLIVE WINTON COOK (1944)
Clackamas County Extension Agent (Assistant Professor).
B.S., Oregon State, 1933.

GORDON HENRY COOK (1965)
Hood River County Extension Agent (Instructor).
B.S., Oregon State, 1964.

WILBUR TARLTON COONEY (1937)
Dean of Agriculture (Professor).
B.S., Oregon State, 1937, M.S., 1942.

GARY LLOYD COOPER (1967)
Extension Certification Assistant (Instructor).
B.S., Kansas State, 1961, M.S., 1967.

DONALD LOUIS COPES (1964)
Assistant Professor, Forestry Sciences Laboratory.
B.S., Purdue, 1961; Ph.D., Idaho, 1967.

ROBERT O. COPPEDGE (1968)
Extension Agricultural Economist (Instructor).
B.B.A., New Mexico State, 1965, M.S., 1967.

MALCOLM ERNEST CORDEN (1958)
Professor of Plant Pathology.
B.S., Oregon State, 1952, Ph.D., 1955.

STANLEY EUGENE CORDER (1961)
Associate Professor of Forest Products (Mechanical Engineer).
B.S., Oregon State, 1950, M.S., 1967.

CLIFFORD BERNARD CORDY (1935)
Jackson County Extension Chairman (Professor Emeritus).
B.S., Oregon State, 1930; M.S., Michigan State, 1934; Ph.D., Florida, 1961.

CHARLES WILLIAM CORMACK (1963)
Associate Professor of Anthropology.
A.B., California at Los Angeles, 1937; M.S. (Econ.), University of London, 1939; Ph.D., Arizona, 1968.

EVERETT STEWART CORTRIGHT (1944)
Professor of Speech Communication
B.A., Iowa State Teachers, 1927; M.A., Michigan, 1941.

EARL SUREN COSTELLO (1969)
Major, USAF; Associate Professor of Aerospace Studies.
B.S., Washington State, 1953; M.B.A., George Washington University, 1965.

ROBERT CARL COURTRIGHT (1968)
Instructor in Fisheries. Head, OSU Marine Research Station, Port Orford.
B.S., Oregon State, 1964, M.S., 1967.

RICHARD WILLIAM COUCH (1966)
Assistant Professor of Geophysical Oceanography.
B.S., Michigan State, 1958; M.S., Oregon State, 1963, Ph.D., 1969.

BELVA HIGHT COVEY (1957)
Linn County Extension Agent, Home Economics (Associate Professor).
B.A., Penn College, Iowa, 1928.

JOHN RITCHIE COWAN (1948)
Professor of Agronomy, Head of Department.
B.S.A., Toronto, 1939; M.S., Minnesota, 1942, Ph.D., 1952.

GEORGE BRYAN COX (1927)
Professor Emeritus of Industrial Engineering and Industrial Arts.
B.S., Missouri, 1919; M.S., Oregon State, 1940.

JOSEPH ALFRED COX (1946)
Professor Emeritus of Physical Education.
B.A., Colorado College, 1926; M.S., Oregon State, 1938.

JOSEPH REW COX (1945-50, 1957)
Assistant Director, Federal Cooperative Extension Service (Professor).
B.S., Oregon State, 1939; M.S., Pacific University, 1964.

DUANE L. COYIER (1961)
Associate Professor of Plant Pathology, Mid-Columbia Experiment Station; Plant Pathologist, U. S. Department of Agriculture.
B.S., Wisconsin, 1950, Ph.D., 1961.

GARVIN DUDLEY CRABTREE (1958)
Associate Professor of Horticulture.
B.S., Oregon State, 1951; M.S., Cornell, 1955, Ph.D., 1958.

IRENE LOUISE CRAFT (1944)
Serials Librarian (Associate Professor), Library.
B.S., Fort Hays State, 1930; M.A., Nebraska, 1931; B.S. (Lib. Sci.), Illinois, 1941, M.S. (Lib. Sci.), 1943.

RICHARD ANDERSON CRAIG (1969)
Assistant Professor of Physics.
B.S.E., Illinois, 1959, M.S., 1960, Ph.D., 1966.

RICHARD PRICE CRAMER (1957)
Assistant Professor of Physical Education.
B.S., Oregon State, 1957, M.S., 1961.

GENE FRANCIS CRAVEN (1958)
Associate Professor of Science Education and of Physical Science.
B.S., Kansas State College (Pittsburg), 1954; M.S., Oregon State, 1958, Ph.D., 1966.

DAVID L. CRAWFORD (1964)
Associate Professor of Food Science and Technology, Program Director, Seafoods Laboratory, Astoria.
B.S., Oregon State, 1958, M.S., 1961, Ph.D. 1966.

DENNIS LEE CRAWFORD (1964)
Assistant Director of the Upward Bound Program at Oregon State. (Assistant Professor).
B.A., Linfield College, 1955; B.D., Colgate Rochester Divinity School, 1958; M.Ed., Oregon State, 1967.

PHILLIP ELLIS CRAWFORD (1967)
Instructor in Forestry, Assistant Director of Self-Learning Center.
B.S. (Forestry), Oregon State, 1965, B.S. (Business), 1966, M.B.A., 1967.

MICHAEL OTTO CREIGHTON (1969)
Assistant Professor of Sociology.
B.A., Cornell College, 1964; M.A., Northern Illinois University, 1968.

GRAYDON TALMADGE CREWS (1948)
Science Student Personnel Adviser (Professor).
B.S., Washington, 1938; M.S., Oregon State, 1950, Ed.D., 1957.

JANET LOU CRIST (1966)
Assistant Dean of Students (Assistant Professor).
B.A., Washington, 1962; M.S., Indiana, 1965.

JOSEPH ROBERT CROCKER, JR. (1962)
Assistant Professor of English.
A.B., Washington University, 1932, M.A., 1933.

HOWARD LESTER CROFF (1957)
Assistant Professor of General Engineering.
B.S., Oregon State, 1942.

WILLIAM RAMSDEN CROOKS (1947)
Professor of Psychology, Chairman of Department.
A.B., California, 1937; M.A., Connecticut, 1939; Ph.D., Minnesota, 1952.

MYRON GEORGE CROPSEY (1946)
Professor of Agricultural Engineering.
B.S., California, 1933; M.S., North Dakota Agricultural College, 1941; Ph.D., Michigan State, 1956.

FRANK RICHARD CROSS (1969)
Associate Professor of Education.
B.A., Wyoming, 1956, M.Ed., 1962, Ed.D., 1965.

BERYL L. CROWE (1966)
Assistant Professor of Political Science.
B.A., San Francisco State, 1959; M.A., California (Berkeley), 1961.

HAMBLIN HOWES CROWELL (1946)
Professor of Entomology.
B.S., Oregon State, 1935, M.S., 1937; Ph.D., Ohio State, 1940.

WILLIAM DAVID CROWLEY (1968)
Instructor in Agricultural Economics.
B.S., Montana State, 1963, M.S., 1967.

WILLIAM KENNETH CROZIER, JR. (1966)
Associate Professor of Art.
B.F.A., Washington State, 1954; M.F.A., Washington, 1959.

CLARK ELSON CRUM (1969)
Instructor in Business Administration.
B.S., California (Berkeley), 1960; M.B.A., Oregon State, 1969.

ANDREW JACKSON CULVER, JR. (1950)
Associate Plant Pathologist (Associate Professor of Plant Pathology), U.S. Department of Agriculture.
B.A., Delaware, 1943; M.S., Vermont, 1948.

ELIZABETH SIMPSON CURL (1965)
Instructor in Mathematics.
A.B., Western Maryland College, 1952.

HERBERT CHARLES CURL (1961)
Professor of Oceanography.
B.S., Wagner College, 1950; M.S., Ohio State, 1951; Ph.D., Florida State, 1956.

RAYMOND ALAN CURRIER (1961)
Associate Professor of Forest Products.
B.S., Massachusetts, 1950; M.S., New York State College of Forestry, 1952.

JOHN GRIFFIN CURRY (1960)
Assistant Professor of Sociology.
B.A., Colorado, 1946, M.A., 1950.
On leave without pay 1969-70.

RONALD HARVEY CURRY (1969)
Assistant Professor of Business Administration.
B.B.A., Niagara University, 1960; M.B.A., University of Denver, 1965.

IMOGENE CUSAC (1949)
Senior Instructor Emeritus, Education and Fine Arts Department Library.
B.A., Baylor, 1930; B.A. (Lib. Sc.), Oklahoma, 1931; B.A., Highlands, 1937.

MELVIN CUTLER (1963)
Professor of Physics.
B.S., City College of New York, 1943; A.M., Columbia, 1947, Ph.D., 1951.

HANS JUERGEN DAHLKE (1963)
Associate Professor of Mechanical Engineering.
B.S., San Diego State, 1957; M.S., Stanford, 1958, Ph.D., 1964.

CHARLES HENRY DAILEY, JR. (1947)
Professor; Physical Education for Men.
B.S., North Central College (Illinois), 1943; M.A., Michigan, 1947.
On sabbatical leave 1969-70.

ROBERT D. DALE (1965)
Assistant Professor of Philosophy.
B.S., Oregon State, 1957; M.A., Chicago, 1959.

CHARLES WESLEY DANE (1957)
Professor of Business Administration.
B.S.F.E., Oregon State, 1952, M.S., 1958, Registered Professional Engineer, 1960; D.B.A., Indiana, 1968.

MALCOLM DANIELS (1965)
Associate Professor of Chemistry, Radiation Center.
B.Sc. (Hons. Chem.), Kings College, University of Durham, 1951, Ph.D., 1955.

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RICHARD ELDEN DANKLEFF (1963)
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B.S., Columbia, 1949; M.A., Nebraska, 1954; Ph.D., Chicago, 1959.

RONALD DeWAYNE DAUGHERTY (1969)
Cluster Task Force (Instructor) School of Education.
B.S., Oregon State, 1962, M.S., 1966.

THOMAS PARNELL DAVIDSON (1950)
Assistant Professor of Horticulture, Superintendent, Umatilla Experiment Station.
B.S., Oregon State, 1949.

WILLIAM ALBERT DAVIES (1946)
Professor of Forest Engineering; Head of Department.
B.S.F., Washington, 1938, M.F., 1946.

WILLIAM ROBERT DAVIES (1969)
Instructor in Business Administration.
B.S., Oregon State, 1968, M.S., 1969.

GERALD EVERT DAVIS (1962)
Associate Professor of Fisheries.
B.S., Washington, 1956; M.S., Oregon State, 1960, Ph.D., 1963.

HOWARD FRED DAVIS (1968)
Associate Professor of Physics.
B.S., M.S., MIT, 1954; Ph.D., Rochester, 1960.

JAMES HARLEY DAVIS (1969)
Assistant Professor of Electrical and Electronics Engineering.
B.S.E.E., Wisconsin, 1964, M.S.E.E., 1965, Ph.D., E.E., 1969.

JOEL DAVIS (1963)
Assistant Professor of Mathematics.
B.A., Princeton, 1957; M.S., Wisconsin, 1961, Ph.D., 1965.

LINDA MAY DAVIS (1969)
Marion County Extension Agent, 4-H and Youth, (Instructor).
B.S., Andrews University, 1964.

LORIN RICHARD DAVIS (1969)
Associate Professor of Mechanical Engineering.
B.A., BYU, 1968, B.E.S.M.E., 1959; M.S.M.E., Purdue, 1961; Ph.D., Illinois, 1964.

NAOMI E. DAVIS (1969)
Umatilla County Extension Agent (Instructor).
B.S., Oregon State, 1966.

PHILIP BARR DAVIS (1958)
Professor of Agricultural Education, Head Teacher Trainer.
B.S., Oklahoma State, 1950, M.S., 1953; Ph.D., Michigan State, 1959.

RONALD ALLAN DAVIS (1967)
Research Associate, Computer Center; Manager, Operations and Applications Programming.
B.S., Oregon State, 1959.

WILBUR ARTHUR DAVIS (1966)
Associate Professor of Anthropology; Acting Chairman; Curator of Anthropology.
B.A., Reed College, 1949; M.A., Oregon, 1956, Ph.D., 1962.

MELISSA MARTIN DAWES (1915)
Professor Emeritus of Modern Languages.
A.B., Oregon, 1912; B.S., Oregon State, 1915; A.M., Columbia, 1920.

MURRAY DRAYTON DAWSON (1954)
Professor of Soils.
M.Agr.Sc., University of New Zealand, 1949, M.S., 1952; Ph.D., Cornell, 1954.

PETER SANFORD DAWSON (1969)
Associate Professor of Zoology.
B.S., Washington State, 1960; Ph.D., California (Berkeley), 1964.

GLEN DAVID DEALY (1967)
Associate Professor of Political Science.
B.A., Washington, 1957; M.A., George Washington University, 1958; Ph.D., California (Berkeley), 1965.

JOHN HARVEY DEARSTYNE (1968)
Instructor in Art.
B.F.A., Kansas City Art Institute, 1965; M.F.A., Indiana, 1968.

JOHN COURTNEY DECIUS (1949)
Professor of Chemistry.
A.B., Stanford, 1941, M.A., 1944; Ph.D., Harvard, 1947.

NOBLE S. DECKARD (1967)
Assistant Professor of Business Administration.
B.S., Butler University, 1956; M.B.A., University of Santa Clara, 1963; D.B.A., Washington, 1966.

FRED WILLIAM DECKER (1946)
Associate Professor of Atmospheric Sciences.
B.S., Oregon State, 1940; M.S., New York, 1943; Ph.D., Oregon State, 1952.

CHARLES A. De DEURWAERDER (1967)
Associate Professor of Landscape Architecture.
B.S., Massachusetts, 1953; M.L.A., 1957.

ANNE O'CONNELL DEENEY (1964)
Research Associate (Assistant Professor), Agricultural Chemistry.
B.S., Marylhurst College, 1948; M.S., Oregon State, 1959, Ph.D., 1963.

CARROLL WAYNE De KOCK (1967)
Assistant Professor of Chemistry.
B.S., Calvin College, 1960; Ph.D., Iowa State, 1965.

WILLIAM CLARK DENISON (1966)
Associate Professor of Botany, Curator of Mycological Herbarium.
A.B., Oberlin College, 1950, A.M., 1952; Ph.D., Cornell University, 1956.

ROBERT LEE DENNIS (1969)
Assistant Professor of Botany.
A.A., Mt. Vernon Junior College, 1962; B.A., Southern Illinois University, 1964; M.S., Iowa, 1966.

GEORGE WILLIAM DEWEY (1944)
Extension Specialist in Certification, (Assistant Professor Emeritus).
B.S., Michigan State, 1911.

ELVIS ARNIE DICKASON (1949)
Associate Professor of Entomology.
B.S., Oregon State, 1947, M.S., 1949; Ph.D., Michigan State, 1959.

ERNEST MILTON DICKINSON (1927-36, 1938)
Professor of Veterinary Medicine; Head of Department.
D.V.M., Ohio State, 1927; M.S., Oregon State, 1935.

R. VERN DICKINSON (1968)
Assistant Professor, Physical Education for Men.
B.S., UCLA, 1961, M.S., 1962.

MARIE DIEDESCH (1945)
Associate Professor of Clothing, Textiles, and Related Arts.
B.A., Washington State, 1933; M.S., Oregon State, 1941.

JOHN RICHARD DILWORTH (1946)
Professor of Forest Management; Head of Department.
B.S., Iowa State, 1937, M.S., 1938; Ph.D., Washington, 1956.

JOHN RICHARD DILWORTH, JR. (1968)
Extension Certification Assistant (Instructor).
B.S., Oregon State, 1967.

ROLAND EUGENE DIMICK (1929)
Professor Emeritus of Fisheries.
B.S., Oregon State, 1926, M.S., 1931.

RUSSELL GROVER DIX (1964)
Assistant Registrar (Assistant Professor).
B.S., Oregon State, 1962; M.F., 1964.

JEANETTE ALICE DIXON (1930-48, 1958)
Associate Professor of Physical Education.
B.S., Battle Creek College, 1930; M.S., Oregon State, 1940.

ROBERT F. DOERGE (1960)
Professor of Pharmaceutical Chemistry, Head of Department.
B.S., Minnesota, 1943, Ph.D., 1949.

THOMAS MARSHALL DOGGETT (1965)
Production Manager, KOAC-AM-TV, Assistant Professor Oregon Educational Broadcasting, Continuing Education.
B.S., Oregon, 1960.

MICHAEL W. DOLBY (1968)
Instructor, Assistant Football Coach, Intercollegiate Athletics.
B.S., Oregon State, 1962, M.S., 1967.

THURSTON ERMON DOLER (1949)
Professor of Speech Communication.
B.A., Furman, 1948; M.S., Purdue, 1949; Ph.D., Oregon, 1968.

JOHN RUSSELL DONALDSON (1966)
Assistant Professor of Fisheries.
B.S., Washington, 1951, M.S., 1954, Ph.D., 1966.

EDITH E. DONOVAN (1970)
Instructor in French.
Licence, University of Montpelier, France, 1966.

HARRISON L. DOOLEY (1965)
Assistant Professor of Botany & Plant Pathology; Plant Pathology; USDA-ARS-PRD.
B.S., Oklahoma State, 1954, M.S., 1961.

ROBERT WINSTON DORMINEY (1968)
Assistant Professor of Poultry.
B.S., Florida, 1964, M.S., 1965; Ph.D., Auburn University, 1968.

HAROLD CLARENCE DORN (1965)
Associate Professor of Journalism.
B.A., Nebraska, 1950, M.A., 1955.

ERNST JOHN DORNFELD (1938)
Professor of Zoology; Chairman of Department.
B.S., Marquette, 1933; M.A., Wisconsin, 1935, Ph.D., 1937.

FRANK NORMAN DOST (1962)
Research Associate, Science Research Institute (Associate Professor of Veterinary Medicine).
D.V.M., Washington State, 1951, B.S., 1953; M.S., Kansas State, 1959.

JEANNE DOST (1965)
Assistant Professor of Economics.
B.A., Washington State, 1951; A.M., Harvard, 1953, Ph.D., 1959.

EVE-MARY DOUDOROFF (1960-61, 1963)
Assistant Professor of French and German.
B.A., Incarnate Word College (San Antonio), 1957, M.A., 1959.

PETER DOUDOROFF (1953)
Professor of Fisheries.
A.B., Stanford, 1935; Ph.D., California, 1941.

JAMES MARLIN DOUGLASS (1968)
Assistant Professor, Director of Bands.
B.M.E., University of Denver, 1960; M.F.A., Ohio, 1962.

RIZPAH ANNA DOUGLASS (1949)
Josephine County Extension Agent, Home Economics (Associate Professor) (Retired).
B.S., Nebraska, 1923; M.A., Columbia, 1938.

CHARLES WHITNEY DRAKE (1966)
Associate Professor of Physics.
B.S., Maine, 1950; M.A., Wesleyan (Conn.), 1952; Ph.D., Yale, 1958.

WILLIAM HENRY DREESEN (1918)
Professor Emeritus of Economics.
A.B., Greenville College, 1907; M.A., Illinois, 1916, Ph.D., 1918.

KARL FRANCIS DRLICA (1950)
Associate Professor of Physical Education; Coach of Rowing.
B.S., Oregon State, 1940, M.S., 1952.

ULYSSES GRANT DUBACH (1913)
Dean of Men Emeritus.
A.B., Indiana, 1908; M.A., Harvard, 1908; Ph.D., Wisconsin, 1913.

MARVIN CLARENCE DUBBÉ (1952)
Associate Professor of English.
B.S., Columbia, 1929, M.A., 1932; Ed.D., Oregon State, 1956.

MAY DuBOIS (1939)
Professor of Home Economics Education.
B.S., Colorado State University, 1931, M.S., 1939; Ph.D., Ohio State, 1951.

LARRY ALBERT DUFF (1969)
Assistant Professor of Business Administration.
B.A., Nebraska, 1961; J.D., University of Denver, 1968.

ANDREW ADRIAN DUNCAN (1958)
Extension Specialist, Vegetable Production (Professor).
B.S., Maryland, 1950, M.S., 1952; Ph.D., 1956.

BARBARA JEAN DUNCAN (1965)
Multnomah County Extension Agent (Instructor).
B.S., Wyoming, 1963.

JAMES PAUL DUNCAN (1965)
Associate Dean of Students, Director of Residence Hall Program, Associate Professor.
B.A., Indiana, 1959, M.S., 1961, Ed.D., 1965.

DANIEL BENTLEY DUNHAM (1968)
Associate Director, Project C.O.R.E. (Instructor).
B.S., Oregon State, 1962, M.S., 1963.

JAMES WESLEY DUNN (1963)
University Development Officer (Assistant Professor), President's Office.
B.S., Oregon State, 1951; M.S., New York U., 1952.

JOHN ASHER DUNN (1969)
Assistant Professor of Anthropology.
B.A., St. John's University (Minnesota), 1964.

PAUL MILLARD DUNN (1942)
Professor of Forestry.
B.S., Iowa State, 1923, M.S., 1933.

LESLIE G. DUNNINGTON (1969)
Assistant Director Counseling Center; Assistant Professor of Psychology.
B.M.E., Central Missouri State; 1958, M.S., 1961; Ph.D., Wyoming, 1966.

MAXINE ELLEN DURST (1962)
Douglas County Extension Agent, 4-H and Youth (Assistant Professor).
B.S., Linfield College, 1962.

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Assistant Professor of Oceanography.
B.A., Miami, 1961; Ph.D., California (San Diego), 1966.

CHRISTEN THEODORE DYRNESS (1960)
Associate Professor; Principal Soil Scientist, U.S. Forest Service.
B.S., Wheaton College, 1954; M.S., Oregon State, 1956, Ph.D., 1960.

ROBERT DUANE DYSON (1967)
Assistant Professor of Biophysics, Department of Biochemistry & Biophysics.
B.A., Oregon, 1961; M.S., Illinois, 1963, Ph.D., 1965.

SHIRLEY ANNETTE EADS (1969)
Instructor in Speech Communication; Director of Forensics.
B.A., St. Martins College, 1967; M.A., Oregon, 1969.

DOROTHY MAY EAST (1961)
Assistant Professor of Foods and Nutrition.
B.S., Montana State, 1939; M.S., Oregon State, 1961.

HARRY TYSON EASTERDAY (1960)
Professor of Physics.
A.B., California, 1947, Ph.D., 1953.

EDISON ELLSWORTH EASTON (1951)
Professor and Associate Dean, School of Business and Technology.
B.S., Southern California, 1947; M.B.A., California, 1951; C.P.A., Oregon and California; D.B.A., Southern California, 1967.

ARNOLD CHRISTIAN EBERT (1936)
Agricultural Information Chairman (Associate Professor).
B.S., Oregon State, 1936.

CHARLES RICHARD ECKEL (1969)
Assistant Professor of Mathematics.
B.S., Kentucky, 1964; Ph.D., California (Berkeley), 1969.

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Professor Emeritus of Clothing, Textiles, and Related Arts.
B.S., Iowa State, 1925; M.A., Columbia, 1939.

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Wasco County Extension Agent, Home Economics (Instructor).
B.S., Oregon State, 1967.

JOHN A. EDWARDS (1961)
Professor of Agricultural Economics.
B.S. (Agric.), Wisconsin, 1950; M.A., Nebraska, 1952; Ph.D., Chicago, 1963.

LOUIS LAIRD EDWARDS (1955)
University Placement Coordinator aand Placement Director, School of Business and Technology; Associate Professor of Business Administration.
B.S., Montana State, 1935; M.E., Montana, 1949.

MARGARET ANN EDWARDS (1951)
Senior Instructor in Nutrition.
B.S., Washington State, 1937.

DOUGLAS McRAE EGAN (1967)
Associate Professor of Business Administration.
B.S., California, 1956; M.B.A., 1957; Ph.D., 1965.

DAVID EISEMAN (1968)
Instructor in Music.
A.B., California (Berkeley), 1963; M.M., Illinois, 1964.

DONNA EISEMAN (1968)
Instructor in Music.
B.M., Kansas, 1964; M.M., Illinois, 1966.

B. RAY ELLER (1961)
Assistant Professor of Animal Science, Eastern Oregon Experiment Station.
B.S., Abilene Christian College, 1959; M.S., Texas A & M, 1961.
On sabbatical leave 1969-70.

WILLIAM H. ELLETT (1968)
Associate Professor of Radiation Biophysics, General Science.
B.S., Rensselaer Polytechnic Institute, 1953; M.S., New York University, 1958; Ph.D., University of London, 1968.

PAUL R. ELLIKER (1947)
Professor of Microbiology, Chairman of Department.
B.S., Wisconsin, 1934, M.S., 1935, Ph.D., 1937.

WILLIAM PAUL ELLIOTT (1968)
Research Associate Oceanography.
A.B., St. John's College, 1947; M.S., Chicago, 1952; Ph.D., Texas A & M, 1958.

EVERETT LINCOLN ELLIS (1965)
Professor of Forest Products, Head of Department.
B.S.F., Washington, 1941; M.S., Michigan State, 1943; Ph.D., Washington, 1956.

JOHN KENNETH ELLIS (1964)
Associate Professor of Health Education.
B.Ed., Southern Illinois, 1943, B.S., 1944; M.P.H., Michigan, 1948, Ph.D., 1963.

RUSSELL EUGENE ELLIS, AIA (1949)
Professor of Architecture
B.S., Washington State, 1949, B.Arch.E., 1952. Architect, 1956.

JOSEPH WALDO ELLISON (1924)
Professor Emeritus of History.
A.B., California, 1917, M.A., 1919, Ph.D., 1923.

MARY FLORENCE ENGESSER (1946, 1957, and since 1963)
Instructor in English.
B.A., Western Maryland College, 1943; Ed.M., Oregon State, 1963.

WILLIAM FREDERICK ENGESSER (1941)
Professor of Industrial Engineering.
B.S., Northwestern, 1941, M.S., 1950.

DAVID CHARLES ENGLAND (1955)
Professor of Animal Science.
B.S., Washington State, 1949; M.S., Minnesota, 1950, Ph.D., 1952.

JOHN FRANKLIN ENGLE (1947)
Professor of Electrical Engineering.
B.S., Oregon State, 1947, M.S., 1951, E.E., 1958.

HAROLD EUGENE ENLOWS (1963-64)
Associate Professor of Geology, Acting Chairman of Department.
B.S., Tulsa, 1935; M.S., Chicago, 1936; Ph.D., Arizona, 1939; Aerological Engineer, United States Naval Academy, 1944.

ALICE E. EPPLE (1969)
Lane County Extension Agent, Home Economics (Assistant Professor).
B.S., Eastern Michigan, 1959.

LEROY F ERICKSON (1968)
Assistant Professor of Veterinary Medicine.
D.V.M., Illinois, 1960.

LEIF DEDRICK ESPENAS (1961)
Professor of Forest Products.
B.S., New York State College of Forestry, 1938; M.S., California, 1940.

FLORENCE SARAH EUREN (1946-49, 1957)
Assistant Serials Librarian (Instructor), Library.
B.E., Moorhead State Teachers College, 1937; B.S. (Lib. Sc.), Minnesota, 1946.

GWIL OWEN EVANS (1966)
Assistant Professor of Journalism; News Bureau Assistant; Sea Grant Information Representative, Extension Marine Advisory Program.
B.S., Oregon State, 1961; A.M., Stanford, 1962.

HAROLD J. EVANS (1961)
Professor of Plant Physiology.
B.S., Kentucky, 1946, M.S., 1948; Ph.D., Rutgers, 1950.

THOMAS PARKER EVANS (1968)
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ROBERT WILSON EVERY (1946)
Extension Entomology Specialist (Professor).
B.S., Idaho, 1939.

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Extension Dairy Specialist (Professor Emeritus).
B.S., Oregon State, 1932.

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Professor of Electrical Engineering; Engineering Consultant to the Department of Educational Media.
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B.A., Indiana State, 1965; LL.D., University of Havana, 1940; M.S., Indiana State, 1966.

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LEON GAROIAN (1947-56, 1959)
Extension Agricultural Economics; Chairman Marketing and Util. Sciences (Professor).
B.S., California Polytechnic, 1947; M.S., Wisconsin, 1955, Ph.D., 1959.

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Assistant Professor of General Engineering.
B.A., College of Puget Sound, 1933; B.A.Ed., Eastern Washington College of Education, 1937; M.A., Washington, 1951, Ph.D., 1956.

RALPH GARREN, JR. (1950)
Associate Professor of Horticulture.
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B.A., Dartmouth, 1940; M.A., Columbia, 1946, Ph.D., 1964.

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Instructor in English.
B.Ed., Illinois State, 1943; M.A., Columbia, 1946.

EVRA ALTA GARRISON (1930)
Assistant Professor Emeritus of Foods and Nutrition.
B.S., Nebraska, 1923; M.A., California, 1930.

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Instructor in Fisheries; Fishery Biologist, Research Division, Oregon State Game Commission.
B.S., Oregon State, 1959, M.S., 1961.

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Professor, Director of Student Health Service.
B.S., Creighton, 1930, M.D., 1932.

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Extension Range Management Specialist (Professor).
B.S., Nebraska, 1952, M.S., 1953; Ph.D., Utah State, 1956.

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Associate Professor of Clothing, Textiles, and Related Arts.
B.S., Nebraska, 1942; M.S., Kansas State, 1948; Ph.D., Penn State, 1960.

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Professor Emeritus of Clothing, Textiles, and Related Arts.
B.A., Washington, 1925, M.A., 1933.

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Wallowa County Extension Chairman (Associate Professor).
B.S., Wyoming, 1949.

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Assistant Professor of Hygiene and Health Education.
B.S., Oregon, 1929; M.A., New York University, 1931, Ed.D., 1951.

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Assistant Professor of Forest Management.
B.S., Colorado State University, 1955; Diploma of Forestry, Australian Forestry School, 1959; M.F., Duke University, 1962, Ph.D., 1966.

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Instructor in German.
A.B., Duke, 1963, M.A., 1966.

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Professor Emeritus of Entomology, Southern Oregon Experiment Station.
B.S., Oregon State, 1915; M.S., Wisconsin, 1918; Ph.D., Oregon State, 1953.

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Instructor in Speech Communication.
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B.S., Oregon State, 1950, Ed.M., 1959.

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Assistant to Medical Director Student Health Service; Assistant Professor of Physical Education and Hygiene.
B.B.A., Golden Gate College, 1957; M.S.H.A., Northwestern, 1959.

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B.S., Wisconsin, 1934; M.D., Chicago, 1936.

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Dean Emeritus of the School of Science; Professor Emeritus of Chemistry.
B.S., Oregon State, 1918, Ph.G., 1918, Ph.C., 1920; Ph.D., Yale, 1921.

GORDON WAVERLY GILKEY (1947)
Dean, School of Humanities and Social Sciences; Professor of Art.
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HELEN MARGARET GILKEY (1908-11, 1918)
Professor Emeritus of Botany.
B.S., Oregon State, 1907, M.S., 1911; Ph.D., California, 1915. Curator of Herbarium, 1918-51.

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B.S., Kansas, 1955; Ph.D., California, (Berkeley), 1962.

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Associate Professor of General Engineering; Personnel and Placement Officer.
B.S., Nebraska, 1928.

LINDA D. HALEY (1969)
Assistant in Biochemistry and Biophysics.
B.A., Westmont College, 1965.

LUCIA HALEY (1921)
Assistant Librarian (Associate Professor) Emeritus.
A.B., Washington, 1911; Graduate, Pratt Institute, 1912, B.L.S., 1942.

ARTHUR STUART HALL (1968)
Associate Scientist, Staff Veterinarian and Director of Clinical Pathology, Oregon Reg Primate Research Center, Assistant Professor, Veterinary Medicine.
B.S., Virginia Poly. Ins., 1959; D.V.M., Georgia, 1963; M.S., Wisconsin, 1965.

FRANCES ANN HALL (1930-58, 1961)
Klamath County Extension Agent (Associate Professor) Emeritus, Home Economics.
B.S., University of Puget Sound, 1925; M.S., Oregon State, 1930.

JACK VERNON HALL (1954)
Professor of Elementary Education.
B.A., Central Washington, 1944; M.A., Colorado State College, 1947, Ed.D., 1951.

JAMES DANE HALL (1963)
Associate Professor of Fisheries.
A.B., California, 1955; M.S., Michigan, 1960; Ph.D., 1963.

MARY JO HALL (1969)
Director (Assistant Professor), Office of Federal Relations, Division of Continuing Education.
B.S., Oregon, 1961, M.S., 1968.

PAIGE LeROY HALL (1954)
Lane County Extension Agent (Associate Professor) Emeritus.
B.S., Nebraska, 1930.

WILLIAM THOMAS HALL (1969)
Assistant Professor of History.
B.A., Oklahoma State, 1959; M.A., Oregon, 1962.

FRANK NILES HALM (1968)
Colonel, USAF; Professor of Aerospace Studies.
B.S., Maryland, 1955; M.B.A., George Washington University, 1960.

ALBERT NELSON HALTER (1960)
Professor of Agricultural Economics.
B.S., Iowa State, 1952; M.S., 1953; Ph.D., Michigan State, 1956.

ROBERT EDWARD HAMERNIK (1969)
Instructor in Civil Engineering.
B.S.C.E., Oklahoma, 1959, M.C.E., 1960.

MARGARET ELIZABETH HAMILTON (1957)
Multnomah County Extension Agent, Home Economics (Assistant Professor).
B.S., Oregon State, 1944; M.S., Columbia, 1966.

ROBERT ROY HAMILTON (1968)
Grant County Extension Agent (Instructor).
B.S., Washington State, 1966.

ELIZABETH CUSHMAN HAMLIN (1967)
Assistant Foreign Student Advisor, Assistant Professor.
B.S., Oregon State, 1946, M.Ed., 1966.

RICHARD O. HAMPTON (1965)
Associate Professor of Plant Pathology, Research Plant Pathologist, ARS, USDA.
B.S.A., Arkansas, 1951; M.S., Iowa State, 1954, Ph.D., 1957.

ASTRID FROLICH HANCOCK (1963)
Assistant Professor of Physical Education.
A.B., Mount Holyoke, 1956; M.Sc., Wisconsin, 1959.

ELMER HANSEN (1935)
Professor of Horticulture.
B.S., Oregon State, 1934, M.S., 1935; Ph.D., Chicago, 1946.

HENRY PAUL HANSEN (1939)
Dean of Graduate School; Professor of Palynology.
Ph.B., Wisconsin, 1930, Ph.M., 1931; Ph.D., Washington, 1937.

NIELS JOHN HANSEN (1943)
Polk County Extension Chairman (Professor).
B.S., Oregon State, 1941.

ROBERT GEORGE HANSEN (1963)
Assistant Professor of Geography.
Ph.B., North Dakota, 1957; M.A., Southern Illinois University, 1959.

RIZWANUL HAQUE (1966)
Assistant Professor, Agricultural Chemistry.
B.S., Agra, 1957; M.S., Aligarh, 1959; Ph.D., University of British Columbia, 1966.

DAVID POWELL HARDESTY (1968)
Instructor in Art.
B.F.A., Miami University, 1966; M.F.A., Cranbrook Academy of Art, 1968.

EDWARD EUGENE HARDIN (1957)
Associate Professor of Seed Technology.
B.S., Washington State, 1951.

JOHN ROBERT HARDISON (1944)
Professor of Plant Pathology; Research Plant Pathologist, U. S. Department of Agriculture.
B.S., Washington State, 1939; M.S., Michigan, 1940, Ph.D., 1942.

VIRGINIA FRANCES HARGER (1967)
Professor of Institution Management, Head of Department.
B.S., Washington State, 1934; M.S., Kansas State, 1938.

JESSE EDWARD HARMOND (1945)
Professor Emeritus of Agricultural Engineering.
B.S., Mississippi State, 1932.

STEPHEN RAY HARKINS (1969)
Staff Sergeant, USAF; Instructor in Aerospace Studies.

FRANKLIN STAFFORD HARPER (1966)
Instructor in English.
B.A. Journalism, San Diego State College, 1956; M.F.A. English-Creative Writing, Iowa, 1958.

JAMES ARTHUR HARPER (1942)
Professor of Poultry Science.
B.S., Oregon State, 1940; M.S., Penn State, 1942.

WELTON DOYLE HARPER (1963)
Assistant Professor of Physical Education.
B.S., Oregon State, 1951.

JAMES ROYCE HARR (1957)
Associate Professor of Veterinary Medicine.
B.S., Utah State, 1954; B.A., Washington State, 1955, D.V.M., 1957; M.S., Oregon State, 1961.

CHARLES NEWTON HARRIS (1946)
Professor Emeritus of Speech Communication.
B.S., Idaho, 1940; M.A., Colorado State College, 1945, Ed.D., 1960.

FREDERICK PHILIP HARRIS (1967)
Professor of Philosophy, Chairman of Department.
A.B., Willamette, 1955; M.A., Columbia, 1937, Ph.D., 1944.

IRWIN CECIL HARRIS (1945)
Manager of Student Publications and Public Events; Professor of Journalism.
B.S., Oregon State, 1941; M.S.J., Northwestern, 1943.

LONNIE BENJAMIN HARRIS (1969)
Director Minority and Special Services Program.

PATRICIA JEAN HARRIS (1964)
Associate Professor of Zoology.
B.A., California, 1954; M.S., Yale, 1958; Ph.D., California, 1962.

RALPH DANIEL HART (1969)
Union County Extension Agent (Assistant Professor).
B.S., Idaho, 1951, M.A., 1965.

LAFAYETTE GEORGE HARTER, JR. (1960)
Professor of Economics; Chairman of Department.
B.A., Antioch College, 1941; M.A., Stanford, 1948, Ph.D., 1960.

NORBERT ALFRED HARTMANN, JR. (1969)
Assistant Professor of Statistics.
A. A., Wharton County Junior College, 1962; B.A., Texas A&M, 1964, M.S., 1967, Ph.D., 1970.

EDWARD WINSLOW HARVEY (1938)
Associate Professor of Food Science and Technology; Seafoods Laboratory, Astoria.
B.S., Massachusetts, 1934, M.S., 1937, Ph.D., 1940.

FRANCES MADELEINE HARVEY (1946)
Josephine County Extension Agent, Home Economics (Associate Professor).
B.S., Idaho, 1943; M.S., Oklahoma State, 1957.

MOYLE E. HARWARD (1955)
Professor of Soils.
B.S., Brigham Young, 1948; M.S., Massachusetts, 1950; Ph.D., North Carolina State, 1952.

BARBARA JO HATCH (1970)
Deschutes County Extension Agent (Instructor), Home Economics.
B.S., Oregon State, 1966.

DUANE LEROY HATCH (1959)
Lane County Extension Agent (Assistant Professor).
B.S., Utah State, 1950.

TOSHIAKI HATTORI (1967)
Research Associate Biochemistry and Biophysics.
B.S., Kyoto University, 1957, M.S., 1959; Ph.D., Mie Prefectural University, 1967.

JAMES FRANZ HAUN (1964)
Associate Director of Housing (Assistant Professor).
B.S., Eastern Oregon College, 1954; M.Ed., Oregon, 1960; D.Ed., Oregon State, 1967.

ALFRED HAUNOLD (1965)
Associate Professor of Agronomy; Research Geneticist, Crops Research Division, ARS, USDA.
Diplom Ingenieur, Agriculture University, Vienna, 1951, Dr. Agric., 1952; Ph.D., Nebraska, 1960.

ERNEST MILLARD HAUSER (1930)
Malheur County Extension Agent, 4-H Club (Associate Professor Emeritus).
B.S., Oregon State, 1928.

STEPHEN JAMES HAWKES (1968)
Associate Professor of Chemistry.
B.Sc., London, 1953; Ph.D., London, 1963.

BETTY EILEEN HAWTHORNE (1946)
Dean, School of Home Economics; Professor of Foods and Nutrition.
B.S., Washington, 1941, M.S., 1944; Ph.D., Michigan State, 1954.

JAMES RONALD HAY (1966)
Marion County Extension Agent (Assistant Professor).
B.S., Oregon State, 1964, M.S., 1966.

EDWARD HENRY HEATH (1967)
Professor, Head, Department of Recreation.
B.A., College of Idaho, 1955; M.Ed., Idaho, 1956; Ph.D., Illinois, 1965.

GEORGE ROSS HEATH (1968)
Assistant Professor, Oceanography.
B.Sc., University of Adelaide, 1960, B.Sc. (Hons), 1961; Ph.D., California (San Diego), 1968.

JAMES LARRY HEATH (1966)
Assistant Professor of Industrial Education,
B.A., Chico State College, 1961, M.A., 1963; Ed.D., UCLA, 1967.

KATHLEEN FRANCES HEATH (1967)
Instructor in Physical Education for Women.
B.A., Marylhurst College, 1953; M.S., Illinois, 1963.

KENNETH WAYNE HEDBERG (1956)
Professor of Chemistry.
B.S., Oregon State, 1943; Ph.D., Cal Tech. 1948.
On sabbatical leave 1969-70.

DENNIS INGEMUND HEDGES (1966)
Assistant Athletic Director, Assistant Professor.
B.S., Oregon State, 1961.

JOEL WALKER HEDGPETH (1965)
Professor of Oceanography; Resident Director, Marine Science Center.
B.A., California (Berkeley), 1933, M.A., 1939, Ph.D., 1952.

PAUL ARTHUR HEIKKILA (1969)
Marine Extension Agent (Instructor).
B.S., Washington, 1968.

CASMER FRANKLIN HEILMAN (1967)
Instructor in Vocational Education.
B.S., Oregon State, 1959, Ed.M., 1966.

DONALD FREDERICK HEINRICHS (1966)
Assistant Professor of Oceanography.
B.S., Stanford, 1960, Ph.D., 1966.

OLIVER HARRY HEINTZELMAN (1949)
Professor of Geography.
B.A., Central Washington, 1940; M.A., Washington, 1948, Ph.D., 1952.

DONALD HAROLD HELFER (1963)
Assistant Professor of Veterinary Medicine.
B.S., Washington State, 1948; D.V.M., 1949; M.S., Oregon State, 1966.

ROBERT S. HENDERSON (1969)
Assistant Professor of Military Science.
B.A., Nevada, 1964.

ROBERT WESLEY HENDERSON (1938-41, 1946)
Assistant Director (Professor), Agricultural Experiment Station.
B.S., Oregon State, 1938; Ph.D., Minnesota, 1950.

ELIZABETH ARTIS HENLEY (1959)
Assistant Professor of English.
A.B., Washington, 1934, M.A., 1938.

WARREN ADAM HENNINGER (1969)
Malheur County Extension Agent, 4-H and Youth (Instructor).
B.S., Penn State, 1967; M.S., Oregon State, 1970.

HOMER MATHEWSON HEPWORTH (1967)
Research Associate in Farm Crops.
B.S., Wyoming, 1958, M.S., 1958; Ph.D., Colorado State, 1968.

ELZIE VANCE HERBERT (1920)
Order Librarian Emeritus (Assistant Professor).

FRANCIS ROBERT HERMAN (1963)
Mensurationist and Research Forester, Forestry Sciences Laboratory, U. S. Forest Service, Assistant Professor of Entomology.
B.S.F., Colorado State University, 1946, M.F., 1947.

FREYA FRIEDERIKE HERMANN (1962)
Assistant Professor of Pharmaceutical Science.
B.S., University of Munich, 1949; B.S., Oregon State, 1959; M.S., Ohio State, 1969.

RICHARD KARL HERMANN (1961)
Associate Professor of Forest Ecology.
B.S., Ludwig-Maximilian University, Munich, 1951; M.F., Yale, 1956; Ph.D., Oregon State, 1960.
On sabbatical leave, October 1, 1967-June 1, 1970.

BOB DALE HERNDON (1967)
Assistant Professor, Assistant Football Coach, Intercollegiate Athletics.
B.S., Oklahoma, 1953.

JOYCE MARIE HEROLD (1969)
Crook County Extension Agent, Home Economics (Instructor).
B.A., Oregon State, 1968.

JACOB ABRAHAM HERRMANN (1959)
Assistant Professor of Mathematics.
C.E., Cornell, 1930. Retired.

JORG HERTLING (1969)
Assistant Professor of Mathematics.
Ph.D., University of Vienna, 1966.

JAMES HERMAN HERZOG (1967)
Assistant Professor of Electronics and Electrical Engineering.
B.S., Northwestern, 1962; M.S., Michigan, 1963, Ph.D., 1967.

JOHN CLARENCE HESKETH (1951)
Baker County Extension Chairman (Professor).
B.S., Oregon State, 1951; M.S., Wisconsin, 1960.

MARGARET W. HEWITT (1961)
Librarian, Assistant Professor of Audiovisual Instruction, Division of Continuing Education.
B.A., Oregon, 1944; M.L.S., California (Berkeley), 1945.

RAY STORLA HEWITT (1953)
Professor of English.
A.B., Oregon, 1941, M.A., 1947; Ph.D., California, 1951.

DAVID GARNET HEWSON (1968)
Instructor in History.
B.A., Michigan, 1965; M.A., Harvard, 1967.

EDGAR WENDELL HEWSON (1968)
Professor of Atmospheric Sciences; Chairman of Department.
B.A., Mt. Allison, 1932; M.A., Dalhousie, 1933; M.A., Toronto, 1935; Ph.D., London, 1937.

HUGH JAMES HICKERSON (1959)
Yamhill County Extension Agent (Associate Professor).
B.S., Oregon State, 1952.

RICHARD MORGAN HIGHSMITH, JR. (1947)
Professor of Geography, Chairman of Department.
B.A., Central Washington, 1941; M.A., Washington, 1946, Ph.D., 1950.

IDA CATHERINE HILBERS (1940)
Assistant Catalog Librarian (Assistant Professor), Library.
B.A., Arizona, 1922, Certificate of Librarianship, 1928; M.A. (Lib. Sc.), California, 1931. Retired.

EMERY VERNON HILDEBRANDT (1953)
Associate Professor of Speech Communication.
B.S., Oregon State, 1950; M.A., Penn State, 1956.

KENNETH STEPHEN HILDERBRAND, JR. (1969)
Marine Extension Agent (Assistant Professor), Seafood Technologist.
B.S., Oregon State, 1962, M.S., 1964.

DONALD DAVID HILL (1927)
Professor Emeritus of Agronomy.
B.S., Oregon State, 1925; M.S., Kansas State, 1927; Ph.D., Cornell, 1936.

STEPHEN D. HILL (1969)
Research Fellow in Chemical Engineering.
B.S., Oregon State, 1960; M.S., Rice Institute, 1967.

HOWARD HERBERT HILLEMANN (1946)
Professor of Zoology.
B.S., Marquette, 1933; M.A., Wisconsin, 1939, Ph.D., 1942.

EUGENE HILLIARD (1969)
Assistant Coach in Football.
B.S., Oregon State, 1964, M.Ed., 1965.

IVY ELIZABETH HILTY (1959)
Jefferson County Extension Agent, Home Economics (Assistant Professor).
B.S., Oklahoma Panhandle Agricultural Mechanical College, 1937.

ROBERT C. HINZ (1950)
General Manager, KOAC-AM-TV; Associate Professor, Oregon Educational Broadcasting, Division of Continuing Education.
B.A., Oregon, 1950.

FREDERICK LEE HISAW, JR. (1958)
Associate Professor of Zoology.
B.S., (Agr.), Missouri, 1950, M.S., 1952; Ph.D., Harvard, 1955.

JOHN HENDERSON HITCHCOCK (1966)
Commanding Officer and Professor of Naval Science.
A.B. Economics, Washington, 1940; M.S. Public Administration, Ohio State, 1951.

PHILIP WEN-JEN HO (1953)
Assistant Catalog Librarian (Assistant Professor), Library.
B.A., Yenching University (China), 1939, M.A., 1941; M.L., Washington, 1953.

DATA MAXINE HOCHHALTER (1959)
Jackson County Extension Agent, Home Economics (Assistant Professor).
B.S., North Dakota Agricultural College, 1940; M.A., Washington State, 1954.

DANIEL LEE HODGES (Summer 1968, and since 1969)
Visiting Assistant Professor of Sociology.
B.A., Colby College, 1961; M.A., Oregon, 1968.

FREDERICK DALE HOECKER (1946-58, 1963)
Josephine County Extension Agent (Assistant Professor).
B.S., Oregon State, 1946.
On leave 1969-71.

WYMAN DELOS HOEYE (1959)
Assistant Professor of Mechanical Engineering Technology.
B.S., Oregon State, 1951, M.S., 1958.

ELBERT NEIL HOFFMAN (1942)
Associate Professor of Agronomy, Superintendent, Malheur Experiment Station.
B.S., Oregon State, 1939.

THOMAS CLARK HOGG (1965)
Associate Professor of Anthropology.
B.S., Oregon, 1958, M.A., 1963, Ph.D., 1965.

GLENN WILLIS HOLCOMB (1920)
Professor Emeritus of Civil Engineering.
B.S., Michigan, 1919; M.S., Oregon State, 1931.

HAROLD FULLER HOLLANDS (1948)
Professor Emeritus of Agricultural Economics.
B.S., Minnesota, 1923, Ph.D., 1939.

MILTON LEE HOLLOWAY (1968)
Instructor, Agricultural Economics.
B.S., Texas Technological College, 1966, M.S., 1967.

JOHN R. HOLM (1968)
Major USAF, Assistant Professor of Aerospace Studies.
B.S., Wisconsin State, 1956.

JAMES FREDERICK HOLMES (1968)
Assistant Professor of Electrical and Electronics Engineering.
B.S., Washington, 1959; M.S., Maryland, 1963; Ph.D., Washington, 1968.

MARY MARGARET HOLTHOUSE (1965)
Department of Information Assistant, Extension Information Specialist (Instructor).
B.S., Oregon State, 1937, M.H.Ec., 1967.

EDWARD FRANK HOOVEN (1961)
Associate Professor of Forest Wildlife Ecology.
B.S., Washington, 1948; M.S., Oregon State, 1958.

CHESTER ELLSWORTH HORNER (1951)
Professor of Plant Pathology; Pathologist, U. S. Department of Agriculture.
B.A., Walla Walla, 1950; Ph.D., Oregon State, 1954.

ELVERA CHARLOTTE HORRELL (1942)
Extension Agricultural Economist, Emeritus. (Assistant Professor).

HOWARD FRANKLIN HORTON (1958)
Professor of Fisheries.
B.S., California Polytechnic, 1953; M.S., Oregon State, 1955, Ph.D., 1963.

GEZA HORVATH (1968)
Instructor in History.
B.A., Marian College, 1963; M.A., Indiana, 1966.

HELEN SCRUGGS HORVATH (1965)
Assistant Catalog Librarian (Assistant Professor).
B.A., Washington University, 1955; M.A., Illinois, 1957, M.S., 1963.

YASUHARU TIMOTHY HOSOI (1969)
Instructor in Religious Studies.
B.Th., Tokyo Bible Seminary, 1954; B.D., Christian Theological Seminary, Indianapolis, 1964; M.A., Butler University; M.A., Chicago, 1968.

EDWARD LEE HOUGHTON (1969)
Instructor in Secretarial Science.
B.S., Black Hills State, 1960; M.S., Southern Oregon College, 1968.

ROBERT JOHN HOUSTON (1966)
Assistant Professor of Health Education.
B.Ed., Oregon, 1950; M.Ed., University of Portland, 1958; M.P.H., California (Berkeley), 1964; Ed.D., Oregon, 1964.

LEONARD LEROY HOVEY (1970)
Instructor in Chemical Engineering.
B.S., Oregon State, 1958.

CLARENCE WARREN HOVLAND (1949)
Professor of Religious Studies, Chairman of Department.
B.A., Lawrence College, 1940; B.D., Yale, 1943, Ph.D., 1950.

ROBERT LEE HOWARD (1958)
Research Associate, Biochemistry and Biophysics.
B.S., Oregon State, 1958.

SHIRLEY JEAN HOWARD (1959)
Producer, KOAC-AM; Assistant Professor, Oregon Educational Broadcasting, Division of Continuing Education.
B.S., Oregon State, 1951; M.A., Michigan State, 1964.

HERBERT BADOLLET HOWELL (1921)
Professor Emeritus, John Jacob Astor Experiment Station.
B.S., Oregon State, 1916.

JAMES RUSSELL HUBER (1947)
Union County Extension Agent, 4-H and Youth (Associate Professor).
B.S., Utah State, 1946, M.S., 1947.

MILON GEORGE HUBER (1945)
Extension Agricultural Engineering Specialist (Associate Professor Emeritus).
B.S., (Agric.), Wisconsin, 1929, B.S., M.E., 1932.

ARTHUR DOUGLAS HUGHES (1938)
Professor of Mechanical Engineering.
B.S., Washington State, 1932, M.S., 1932, M.E., 1953.

KENNETH M. HUGHES (1964)
Assistant Professor of Entomology, Forestry Sciences Laboratory.
B.A., Willamette University, 1941.

LLOYD EUGENE HUGHES (1968)
Sergeant Major (USAIG), Instructor Military Science.

DONALD GLEN HUMPHREY (1954-55, 1957)
Professor of Biology, General Science; Assistant Dean of Faculty.
B.S., Iowa, 1949; M.S., Washington, 1950; Ph.D., Oregon State, 1956.

DONALD R. HUNT (1955)
Associate Librarian (Professor) Library.
B.A., Colorado, 1950, M.A., 1951; A.M. (Lib. Sc.), Michigan, 1954.

LARRY CLIFTON HUNTER (1968)
Professor of Statistics, Director Computer Center.
B.A., Montana State, 1952; M.A., Montana State, 1953; Ph.D., Oregon, 1957.

SARAH MARIE HUNTER (1967)
Instructor in Physical Education.
B.S., Wyoming, 1961; M.S., Utah, 1967.

FLORENCE LOUISE HUPPRICH (1937)
Associate Professor Emeritus of Physical Education.
B.S., Wisconsin, 1923, M.A., 1926; Ed.D., Oregon, 1949.

HARRY SAMUEL HUSTON, JR. (1968)
Chief Gunner's Mate, Instructor in Naval Science.

BURTON SEYMOUR HUTTON (1935-43, 1948)
State Leader, 4-H Youth Development (Professor).
B.S., Oregon State, 1926.

MICHAEL SHIGERU INOUE (1964)
Associate Professor of Industrial Engineering.
B.E.E., University of Dayton, 1959, M.S., 1964; Ph.D., Oregon State, 1967.

JOHN JERRY INSKEEP (1926-61)
County Extension Agent (Professor) Emeritus Clackamas County.
B.S. (Agr.), Purdue, 1921; M.S., Oregon State, 1943.

HELGE IRGENS-MOLLER (1957)
Associate Professor of Forest Genetics.
B.S., Royal Veterinary and Agricultural College, Denmark, 1949; Ph.D., Oregon State, 1958.

JEAN ANNABELL IRVIN (1967)
Instructor in Physical Education.
B.S., Slippery Rock State College, Pennsylvania, 1954; M.S., Ohio State, 1958.

RICHARD FREDRICK IRVIN (1967)
Assistant Professor of Physical Education.
B.S., Slippery Rock State College, 1954; M.S., Illinois State, 1959.

MAUD C. IRVINE (1934)
Crook County Extension Agent (Professor) Emeritus, Home Economics.
B.S., Oregon State, 1933.

THOMAS ROBERT IRWIN (1968)
Instructor in Physical Education.
Studied Ballet under Mr. & Mrs. Donald Dale and William F. Christensen, Portland, Olga Preobrazhenskaya, Paris, Mme. Sidovo, Monte Carlo, Anatole Vilzak, New York & Europe, Vincent Escudero, Monte Carlo, Adolf Bolm, San Francisco, Laurent Novikoff, Chicago, and Martha Graham & Ted Shawn of New York.

IRVIN ISENBERG (1965)
Professor of Biophysics, Department of Biochemistry & Biophysics.
A.B., Temple, 1944; Ph.D., Pennsylvania, 1950.

YUZABURO ISHIDA (1969)
Research Associate, Microbiology.
B.S., Kyoto University, 1959, M.S., 1961, Ph.D., 1969.

HAJIME ISHIKAWA (1968)
Research Associate, Biochemistry & Biophysics.
B.S., Tokyo, 1963, M.S., 1965, D.Sc., 1968.

ARLEIGH GENTRY ISLEY (1969)
Lake County Extension Chairman (Instructor).
B.S., Oregon State, 1969.

JAMES ANDREW JACKSON (1969)
Instructor in Military Science.

MARIE HULL JACKSON (1926-35, 1942)
Catalog Librarian (Associate Professor), Library.
B.A., Oregon, 1925; B.S. (Lib. Sc.), Washington, 1926.

RONALD SPENCER JACKSON (1970)
Research Associate in Botany and Plant Pathology.
B.S., Queens, 1964, M.S., 1967; Ph.D., Toronto, 1970.

STONEWALL ANDREW JACKSON (1939)
Benton County Extension Chairman (Professor).
B.S., Oregon State, 1937.

THOMAS LLOYD JACKSON (1952)
Professor of Soils.
B.S., Washington State, 1943, M.S., 1948, Ph.D., 1952.

GERALD B. JACOBSEN (1969)
Research Associate (Instructor), Agricultural Chemistry.
A.B., Whitman College, 1961; M.S., Purdue, 1966, Ph.D., 1969.

ROBERT WARREN JACOBSON (1967)
Marine Extension Agent (Instructor).
B.A., Oregon State, 1963.

ALEX JULIUS JAENICKE (1956)
Associate Professor Emeritus of Forest Management.
B.S., Pennsylvania State, 1912.

WESLEY P. JAMES (1965)
Research Associate in Civil Engineering.
B.S. in C.E., Montana State, 1957; M.S. in C.E., Purdue, 1961.

DEMETRIOS GEORGE JAMESON (1950)
Professor of Art.
B.F.A., Washington University, 1949; M.F.A., Illinois, 1950.

CLARA BIRCHAK JARMAN (1969)
Instructor in Geology.
B.S., Allegheny College, 1964.

ALBERT OTTO JARVI (1960)
Professor of General Engineering.
B.S. (Civil Engineering), Washington, 1938, M.S. (Civil Engineering), MIT, 1939.

DWIGHT SMITHSON JEFFERS (1957)
Professor Emeritus of Forest Management.
A.B., Illinois Wesleyan, 1906; M.F., Yale, 1911, Ph.D., 1935. Dean and Professor Emeritus, College of Forestry, Idaho.

DEAN PAGET JEFFRESS (1963)
Assistant Professor of English.
B.A., California, 1939.

HUGH FRANK JEFFREY, JR. (1950)
Business Manager Business Office (Associate Professor).
B.S., Oregon State, 1947.

GEORGE MEREDITH JEMISON (1969)
Professor of Forestry.
B.S., Idaho, 1931; M.F., Yale, 1936; Ph.D., Duke, 1942; D.Sc. (Hon.), Idaho, 1967.

WALTER JOHN JENDRZEJEWSKI (1938)
Klamath County Extension Chairman (Associate Professor).
B.S., Oregon State, 1938.

GEORGE HERRICK JENKINS (1927)
County Agent (Professor) Emeritus, Coos County.
B.S., Oregon State, 1926.

HAROLD DAVID JENKINS (1944)
Professor Emeritus of English.
B.A., Kansas, 1929, M.A., 1931; Ph.D., Yale, 1943.

WILLIAM CHARLES JENNE (1965)
Associate Professor of Sociology.
B.S., Illinois State University, 1953; A.M., Illinois, 1958, Ph.D., 1964.
On leave, 1969-70.

HAROLD JAMES JENSEN (1950)
Professor of Nematology (Botany and Plant Pathology).
B.S., California, 1947, Ph.D., 1950.

JAMES H. JENSEN (1961)
Professor of Botany (President, Oregon State University 1961-69).
B.S., Nebraska, 1928, M.A., 1930; Ph.D., Wisconsin, 1935; LL.D., Nebraska, (honorary), 1966; LL.D., North Carolina State, (honorary), 1966.
On leave 1969-71.

JOHN GRANVILLE JENSEN (1946)
Professor of Geography.
A.B., Western Washington, 1939; M.A., Clark, 1942, Ph.D., 1946.

LELAND CHRISTIAN JENSEN (1955)
Associate Professor of Electrical Engineering.
B.S., Oregon State, 1954; M.S., Illinois, 1963.

LOUISA A. JENSEN (1938)
Professor Emeritus of Agronomy.
B.S., Colorado State, 1933.

ARTHUR GUY JOHNSON (1966)
Instructor, General Science; Health Physicist, Radiation Center.
B.S. (Biology and Animal Sci.), Missouri, 1956, M.S. (Physiology), 1958.

CHARLES LEROY JOHNSON (1969)
Instructor in Physical Education.
B.S., Valley City State, 1952; M.S., North Dakota, 1967.

DUANE PAUL JOHNSON (1959)
Multnomah County Extension Agent, 4-H Club (Assistant Professor).
B.S., Iowa State, 1959.
On sabbatical leave 1969-70.

ELIZABETH COX JOHNSON (1959-60, 1965)
Assistant Professor of Foods and Nutrition.
B.S., Arizona, 1940, M.S., 1942; Ph.D., Oregon State, 1949.

JAMES BOYNTON JOHNSON (1968)
Instructor in Agricultural Economics.
B.S., Oregon State, 1964; M.S., Purdue, 1966.

JAMES WENDELL JOHNSON (1961)
Associate Professor of Forest Products.
B.S., Idaho, 1949; M.S., Oregon State, 1950.

JOHN GRANVILLE JOHNSON (1969)
Assistant Professor of Geology.
B.A., UCLA, 1957, M.A., 1959, Ph.D., 1964.

LINWOOD EUGENE JOHNSON (1959)
Associate Professor of Mechanical Engineering.
B.S., Oregon State, 1954, M.S., 1955.

MALCOLM JULIUS JOHNSON (1948)
Associate Professor of Agronomy, Superintendent, Central Oregon Experiment Station.
B.S., Oregon State, 1941, M.S., 1954; Ph.D., Purdue, 1961.

RICHARD ERIC JOHNSON (1964)
Assistant Professor of Pharmacy Administration.
B.S., Ohio Northern, 1952; M.S., Pittsburgh, 1961, Ph.D., 1964.

VICTOR WALDEMAR JOHNSON (1928)
Umatilla County Extension Agent (Professor), Emeritus.
B.S., Oregon State, 1928.

W. CURTIS JOHNSON (1968)
Assistant Professor of Biochemistry & Biophysics.
B.A., Yale, 1961; Ph.D., Washington, 1966.

ALBERTA BUIS JOHNSTON (1963).
Extension Home Management Specialist. (Associate Professor).
B.S., Nebraska, 1943; M.S., Kansas State, 1957.

LAREA DENNIS JOHNSTON (1959)
Instructor in Botany, Assistant Curator of Herbarium.
B.A., Willamette, 1957; M.A., Oregon State, 1959.

RICHARD STANLEY JOHNSTON (1966)
Assistant Professor of Agricultural Economics.
B.A., Washington State, 1960; M.S., Massachusetts, 1963.

OTMAR JONAS (1968)
Visiting Assistant Professor of Modern Languages.
Honors B.A., Utah, 1964; M.A., Oregon, 1965.

HILDA MEIUS JONES (1947)
Associate Professor of Secretarial Science and Business Education.
B.S., Oregon State, 1939; M.S., New York University, 1940.

LEO EDWARD JONES (1950)
Associate Professor of Botany.
A.B., Chico State, 1940; Ph.D., Oregon State, 1950.
On leave 1970-71.

ROBERT WELLS JONES (1962)
Assistant Professor of English.
A.B., Nebraska State Teachers, 1953; M.A., Stanford, 1959.

SIDNEY CARROLL JONES (1930)
Professor of Entomology.
B.S., Oregon State, 1926; M.S., Iowa State, 1928.

ERIK JORGENSEN (1964)
Visiting Assistant Professor of Mathematics.
Cand. Mag et Mag. Scient., Aarhus, 1961.

EARLE FRED JOSSY (1943)
Jackson County Extension Agent (Associate Professor).
B.S., Oregon State, 1938.

ETTA WESTENHOUSE JUDD (1955)
Head Reference Librarian (Associate Prosor), Library.
B.A., Willamette, 1932; B.S. (Lib. Sc.), Illinois, 1935.

ERLAND THEODORE JUNTUNEN (1966)
Instructor in Fisheries.
B.S., Oregon State, 1957.

VAN BEDRICH KADLEC (1969)
Instructor in Military Science.

RUDOLPH MARTIN KALLANDER (1961)
Assistant Dean, School of Forestry, Professor of Forest Management.
B.S., Oregon State, 1940, M.F., 1953.

JAMES ALBERT KAMM (1967)
Research Entomologist (Assistant Professor) USDA-ARS.
B.S., Wyoming, 1962, M.S., 1963; Ph.D., Oregon State, 1967.

PHILIP CHRISTIAN KANE (1969)
Major USA, Associate Professor Military Science.
B.S., Idaho State, 1961.

RUDOLPH KANGUR (1961)
Assistant Professor of Forest Management.
B.S., State University of Tartu (Estonia), 1930, M.S., 1934.

JOSEPH RALPH KANTOR (1965)
Surgical Consultant (Professor), Student Health Service.
B.Sc. in Med., M.D., Nebraska, 1958.

EDWARD LYNN KAPLAN (1961)
Professor of Mathematics.
B.S., Carnegie Institute of Tech., 1941; M.A., Princeton, 1950, Ph.D., 1951.
On leave 1970-71.

SHARON ELAINE KASHUBA (1969)
Instructor in Secretarial Science.
S.S.Dipl, Acadia University, 1960, B.A., 1961; Ed.M., Oregon State, 1969.

JOHN KAUFMES (1952)
Research Associate (Assistant Professor) Animal Science.
B.S., University of Roumania, Cluj, Roumania; M.Agr., Hohenheim University of Ag., 1922. Hohenheim, Germany; Ph.D., Innsbruck University, Innsbruck, Austria, 1946.

ROY SERVAIS KEENE (1947)
Professor Emeritus of Athletics. Director of Intercollegiate Athletics 1947-1964.
B.S., Oregon State, 1921.

DAVID BRUCE KEIR (1966)
Coos County Extension Agent (Instructor).
B.S. (Ag. Econ.), Oregon State, 1962, B.S. (B. and T.), 1962.

JOHN PAUL KELLEY (1966)
Associate Professor of Electrical Engineering; X-Ray Science and Engineering Laboratory.
B.S., Rensselaer Polytechnic Institute, 1947.

TIMOTHY G. KELLEY (1963)
Assistant Professor of Physics.
B.S. (Physics), Washington, 1955, Ph.D., 1966.

JOHN WILLIAM KELTNER (1963)
Professor of Speech Communication and Chairman of Department.
B.Ed., Illinois State Normal, 1940; M.A., Northwestern, 1943, Ph.D., 1947.

LORA IVES KELTS (1944)
Agriculture-Forestry Librarian (Associate Professor).
B.A., California (at Los Angeles), 1941; Certificate of Librarianship, California, 1942.

ROBERT FERNALD KENISTON (1946)
Professor of Forest Management.
B.A., Nebraska, 1929; B.S., California, 1937, M.S., 1941; D. For., Yale, 1962.

WILLIAM ANDREW KENNEDY (1967)
Assistant Professor of History.
B.A., Harvard, 1959; M.A., California, 1960.

WALTER HERBERT KENNICK (1959)
Associate Professor of Animal Science.
B.S., Clemson College, 1948; M.S., Oregon State, 1958, Ph.D., 1959.

RICHARD JAMES KENWORTHY (1966)
Assistant Professor of Naval Science.
B.B.A., St. Bonaventure University, 1956.

DAVID EMMET KERLEY (1969)
Assistant Professor of Zoology.
B.S., Oregon State, 1958, M.S., 1962, Ph.D., 1969.

CLYDE KERNEK (1955)
Surgical Consultant, Student Health Service (Professor).
B.S., Oklahoma, 1935, M.D., 1937.

HAROLD EDWARD KERR (1960)
Morrow County Extension Chairman (Assistant Professor).
B.S., Oregon State, 1957; M.Ed., Colorado State, 1968.

JOHN LORD KICE (1960)
Professor of Chemistry.
A.B., Harvard, 1950, M.A., 1953, Ph.D., 1954.

ROBERT D. KIEKEL (1966)
Assistant Professor of Spanish and French, Director, Language Laboratory.
B.A., Willamette, 1956; M.A., Washington, 1962.

JOHN A. KIESOW (1957)
Assistant State Leader 4-H Youth Development (Associate Professor).
B.S., Oregon State, 1954; M.Ed., Maryland, 1964.

JOHN ANDREW KIGER, JR. (1969)
Assistant Professor of Biochemistry and Biophysics.
B.S., California Institute of Technology, 1963, Ph.D., 1968.

KENNETH JAY KILLINGSWORTH (1969)
Wheeler County Extension Chairman (Assistant Professor).
B.A., Washington State, 1940; M.Agr., Oregon State, 1970.

DONALD JEROME KIMELDORF (1967)
Professor of Radiation Biology, General Science.
B.A., Reed College, 1942; M.A., Oregon, 1944; Ph.D., California (Los Angeles), 1947.

MICHAEL PAUL KINCH (1969)
Assistant Science-Technology Librarian.
B.S. (Biology), Portland State, 1968; M. of L., Washington, 1969.

ALBERT DUNNING KING (1968)
Assistant Professor of Family Life.
B.M., Houghton College, 1961; M.M., Illinois, M.A., 1969.

ARTHUR SOLOMON KING (1929)
Extension Conservation Specialist (Professor).
B.S., Oregon State, 1928, M.S., 1930.

DAVID BURNETT KING (1962)
Associate Professor of History.
B.A., Hamilton, 1951; M.A., Rutgers, 1955; Ph.D., Cornell, 1962.

JOHN PHILLIP KING (1967)
Instructor in Religious Studies.
B.A., Hardin-Simmons University, 1958; B.D., Southwestern Baptist Theological Seminary, 1961; M.A., Emory University, 1967.

ROGER EDWARD KING (1954)
Associate Professor of English Education.
A.B., Colorado State College, 1950, M.A., 1954.

JOHN ROLLAND KINNEY (1969)
Assistant Professor of Mechanical Engineering.
B.S.M.R., Colorado, 1959; M.S.M.E., New Mexico State, 1968.

DALE EARL KIRK (1942)
Professor of Agricultural Engineering. Acting Head of Department.
B.S., Oregon State, 1942; M.S., Michigan State, 1954.

LESTER ALLEN KIRKENDALL (1949)
Professor Emeritus of Family Life.
B.S., Kansas State, 1928; M.A., Columbia. 1931, Ph.D., 1937.

WILLIAM JOHN KIRKHAM (1929)
Professor Emeritus of Mathematics.
A.B., Indiana, 1927, A.M., 1928, Ph.D., 1935.

ERNEST JOHN KIRSCH (1946)
Union County Extension Chairman (Professor).
B.S., Oregon State, 1940; M.S., Purdue, 1942.

KARL TERRENCE KLEEMAN (1970)
Instructor in Microbiology.
B.S., Purdue, 1965.

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Assistant Professor of Microbiology.
B.S., Vermont, 1957, M.S., 1961; Ph.D., Pennsylvania State, 1966.

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Extension Specialist, Leadership Development (Associate Professor).
B.S., Oregon State, 1951; M.A., University of Maryland, 1962.

LEONARD MARTIN KLEIN (1939)
Associate Professor of Agricultural Engineering; Agricultural Engineer in Charge, Small Seed Harvesting and Processing Investigations, U. S. Department of Agriculture.
B.S., Oregon State, 1938.

PETER C. KLINGEMAN (1966)
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B.S., Northwestern, 1957, M.S., 1959; Ph.D., California (Berkeley), 1965.

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Associate Professor of Music.
B.S., Bradley University, 1952; M.M., Lewis and Clark College, 1961.

STUART EDWARD KNAPP (1959)
Director, University Honors Program, Professor of Veterinary Parasitology.
B.S., Pacific University, 1950, M.S., 1952; M.S., Idaho, 1953; Ph.D., Kansas State, 1958.

EDWARD THEODORE KNECHT (1965)
Assistant Professor, Assistant Football Coach, Intercollegiate Athletics.
B. of E., Toledo, 1950; M.S., Michigan, 1958.

LUKA ALEKSANDAR KNEZEVICH (1968)
Associate Scientist, Veterinary Pathologist, Oregon Regional Primate Research Center, Associate Professor of Veterinary Medicine.
Dipl. Vet., Belgrad, 1953, Dr. Med. Vet., College V.M., Vienna, 1961; M.S., Wisconsin, 1964.

JUDITH FRANCES KNOSHAUG (1968)
Instructor in Mathematics.
B.S., Dayton, 1966.

ELLIS GILBERT KNOX (1954)
Professor of Soils.
B.S., Illinois, 1949, M.S., 1950; Ph.D., Cornell, 1954.

JAMES GEORGE KNUDSEN (1949-52, 1953)
Assistant Dean, School of Engineering; in charge of Engineering Experiment Station; Professor of Chemical Engineering.
B.S., Alberta, 1943, M.S., 1944; Ph.D., Michigan, 1949.

PAUL ARTHUR KOEPSELL (1969)
Extension Service, Assistant Professor, Botany and Plant Pathology.
B.S., California (Davis), 1962, Ph.D., 1968.

MICHAEL TRACY KOLOSSEUS (1969)
Instructor in Business Administration.
B.S., New Hampshire, 1963; M.B.A., Oregon State, 1969.

AGNES KOLSHORN (1929)
Extension Nutrition Specialist (Professor Emeritus).
B.S., Oklahoma State, 1913; B.S., Columbia, 1918; M.A., Denver, 1919.

WILLIAM ARTHUR KOSKI (1950)
Professor of Hygiene and Health Education.
B.S., Oregon State, 1949; M.S., Michigan, 1950; Ed.D., Oregon State, 1954; M.P.H., California, 1959.

JOHN S. KOZIKOWSKI (1967)
Instructor in Engish.
B.A., New Mexico, 1961, M.A., 1966.

CHARLES JAMES KOZLIK (1961)
Assistant Professor of Forest Products.
B.A., Doane College, 1952; M.F., Duke, 1957.

WALTER CARL KRAFT (1950)
Professor of German and Linguistics; Chairman of Department of Modern Languages.
B.A., Oregon, 1938, M.A., 1941; Ph.D., California (Berkeley), 1950.

ROBERT LEE KRAHMER (1962)
Associate Professor of Forest Products.
B.S., Oregon State, 1958, M.S., 1960; Ph.D., New York State, 1962.

GERALD WILLIAM KRANTZ (1955)
Professor of Entomology.
B.S., Pittsburgh, 1951; Ph.D., Cornell, 1955.

CHARLES ERNST KREMER (1958)
Professor, Director Emeritus of Student Health Service.
M.D., Harvard Medical School, 1929.

WARREN ERVIND KRONSTAD (1959)
Associate Professor of Agronomy.
B.S., Washington State, 1957, M.S., 1959; Ph.D., Oregon State, 1963.

HUGO MARTIN KRUEGER (1948)
Professor of Physiology and Pharmacology, Fisheries and Wildlife and Zoology.
A.B., Denver, 1924, M.A., 1926; Ph.D., Michigan, 1930.

JAMES HARRY KRUEGER (1961)
Associate Professor of Chemistry.
B.S., Wisconsin, 1958; Ph.D., California, 1961.

JUDITH CROOKHAM KRUEGER (1966)
Instructor in Music.
B.A., Idaho, 1957; M.A., Oregon State, 1965.

PAUL HENRY KRUMPERMAN (1966)
Associate Professor of Food Science and Technology.
B.S., Brigham Young, 1949; M.S., Utah State, 1950; Ph.D., California, 1964.

JAMES THEODORE KRYGIER (1954)
Associate Professor of Forest Management.
B.S., Utah State, 1952, M.S., 1955.

LEE WALLACE KUHN (1946)
Professor of Wildlife Ecology.
B.S., Iowa State, 1940; M.S., Oregon State, 1942.

JOHN CLIFFORD KULA (1964)
Assistant Professor of Pharmaceutical Science; Pharmacist, Student Health Service.
B.S., Nebraska, 1948; B.S., Oregon State, 1960.

LaVERNE DUANE KULM (1964)
Associate Professor of Oceanography.
B.A., Monmouth College, 1959; Ph.D., Oregon State, 1965.

MARYANNE KUMMERER (1969)
Yamhill County Extension Agent, Home Economics, (Instructor).
B.S., St. Margaret-of-the-Woods College, 1966.

ROBERT HENRY KUNESH (1961)
Instructor in Forest Products.
B.S.F., Michigan, 1952, B.S. (W.T.), 1958. M.W.T., 1960.

EDITH CARTER KUNEY (1910-15, 1925)
Associate Professor Emeritus of Modern Languages.
A.B., Willamette, 1909; A.M., Stanford, 1925.

ERVIN FREDERICK KURTH (1945)
Professor Emeritus of Chemistry.
B.S., Wisconsin, 1927, M.S., 1929, Ph.D., 1933. Retired.

GEORGE BRADFORD LaBAUN (1958)
Associate Professor of Civil Engineering.
B.S., Oregon State, 1958, M.S., 1960.

HARRY BERT LAGERSTEDT (1957)
Associate Professor of Horticulture; Research Horticulturist, USDA.
B.S., Oregon State, 1954, M.S., 1957; Ph.D., Texas A & M, 1965.

ADELAIDE VALETA LAKE (1939)
Professor Emeritus of Journalism.
B.A., Oregon, 1920, M.A., Oregon State, 1942.

CHARLOTTE LaVERNE LAMBERT (1966)
Professor of Women's Physical Education, Head of Department.
B.A., Evansville College, 1944; M.A., Iowa, 1949, Ph.D., 1959.

ROSE MARIE LAMONTE (1969)
Head, Bibliographic Identification, Library.
B.S., University of Houston; M.S., Illinois, 1952.

CHARLES EVEN LAND (1968)
Assistant Professor of Statistics.
B.A., Oregon, 1959; M.A., Chicago, 1964, Ph.D., 1968.

JOHN HERBERT LANDERS, JR. (1950)
Extension Animal Scientist (Professor).
B.S., Missouri, 1942, M.S., 1950; Ph.D., Kansas State, 1966.

ANDREW S. LANDFORCE (1946)
Extension Wildlife Management Specialist (Associate Professor).
B.S., Oregon State, 1942.

WILLIAM MARTIN LANGAN (1935)
Head Adviser, School of Agriculture (Associate Professor).
B.S., Oregon State, 1945.

CHARLES CLINTON LANGFORD (1970)
Visiting Assistant Professor of Sociology.
B.A., Kansas State, 1963, M.A., 1965.

R. DONALD LANGMO (1948)
Associate Professor (Industrial Engineer) Agricultural Economics.
B.S., Oregon State, 1943, B.S., 1950; M.S., UCLA, 1959.

CLAIR VAN NORMAN LANGTON (1928)
Physical Education Director (Professor) Emeritus.
B.S., Michigan, 1923, M.S., 1925, Dr. P. H., 1928; Ed.D., Oregon, 1938; LL.D., Eastern Michigan, 1961.

RICHARD LEVERNE LANTZ (1966)
Instructor in Fisheries, Fishery Biologist, Research Division Oregon State Game Commission.
B.S., Oregon State, 1963.

JULES ALPHONSE LARRIVEE (1965)
Associate Professor of Mathematics.
S.B., MIT, 1930; M.A., George Washington, 1935; Ph.D., Catholic University, 1942.

LLOYD QUENDERBILT LARSE (1940)
Professor of Business Education and Secretarial Science.
B.S., Oklahoma State, 1928; Ed.M., Oklahoma, 1935; D.Ed., Oregon, 1954.

INGVAR LAUREN LARSEN (1962)
Research Associate Oceanography.
B.S., Portland State College, 1962.

KNUD SONDERHEDE LARSEN (1969)
Assistant Professor of Psychology.
B.A., California State College at Los Angeles, 1964, M.A., 1966; Ph.D., Brigham Young, 1969.

ALLAN DELANO LARSON (1963)
Assistant Professor of Business Education and Secretarial Science.
B.S., Mayville State College, 1955; M.S., North Dakota, 1963.

EDGAR MORRIS THEODORE LARSON (1965)
Assistant Professor, Varsity Golf Coach, Intercollegiate Athletics.
B.A., Pacific Lutheran University, 1957; B.D., Luther Theological Seminary, 1961.

MILTON BYRD LARSON (1952)
Professor of Mechanical Engineering.
B.S., Oregon State, 1950; M.Engr., Yale, 1951; M.S., Oregon State, 1955; Ph.D., Stanford, 1961.

ROBERT ELOF LARSON (1965)
Assistant Professor of Pharmacology.
B.S., Washington State, 1957, M.S., 1962; Ph.D., Iowa, 1964.

JOHN DANIEL LATTIN (1955)
Professor of Entomology; Assistant Dean School of Science.
B.S., Iowa State, 1950; M.A., Kansas, 1951; Ph.D., California, 1964.

HAROLD IVAN LAURSEN (1963)
Professor of Civil Engineering.
B.S., Oregon State, 1958, M.S., 1960; Ph.D., California (Berkeley), 1964.

JACK LAVENBURG (1968)
Assistant Professor of Educational Media.
B.S., New York, 1953; M.A., Columbia, 1963; Ed.D., Oregon, 1968.

DENIS PETER LAVENDER (1961)
Associate Professor of Forest Physiology, Forest Management.
B.S., Washington, 1949; M.S., Oregon State, 1958, Ph.D., 1962.

MURRAY LANE LAVER (1969)
Associate Professor, Forest Products Chemistry.
B.S.A., University of Toronto, 1955; Ph.D., Ohio State, 1959.

DUNCAN KENNETH LAW (1944)
Associate Professor of Food Science and Technology; Seafoods Laboratory, Astoria.
B.S., Oregon State, 1944.

FRANCIS JOSEPH LAWRENCE (1965)
Horticulturist United States Department of Agriculture, Assistant Professor of Horticulture.
B.S., Maryland, 1951, M.S., 1958, Ph.D., 1965.

MARGARET LUCILLE LAWRENCE (1945)
Assistant Professor of English.
M.A., Florida State, 1944.

DAVID CADDEN LAWSON (1969)
Assistant Professor of Health Education.
B.S., West Virginia, 1963, M.S., 1966, Ed.D., 1969.

CHARLES MORLEY LEACH (1950)
Professor of Plant Pathology.
B.S., Queens University (Belfast, Ireland), 1949, B.Agri., 1950; Ph.D., Oregon State, 1956.

GENE MAURICE LEAR (1939)
Associate Dean, School of Agriculture; Director, Cooperative Extension Service (Professor).
B.S., Oregon State, 1938; M.P.A., Harvard, 1951.

N. MARIE LEDBETTER (1946)
Associate Professor of Clothing, Textiles, and Related Arts.
B.A., Willamette, 1934; M.S., Oregon State, 1950.

EUGENE CARLTON LEE (1962)
Instructor in Pharmacognosy.
B.S., Minnesota, 1940; M.S., Oregon State, 1965.

DONALD JACK LEE (1965)
Research Associate (Assistant Professor) in Food Science and Technology.
B.S., Washington State, 1958, M.S., 1960; Ph.D., Illinois, 1965.

JOHN WALTER LEE (1969)
Assistant Professor of Mathematics.
B.S., Stanford, 1964, M.S., 1966, Ph.D., 1969.

JONG SUN LEE (1963)
Research Associate (Associate Professor) of Food Science and Technology.
A.B., California (Berkeley), 1958; M.S., Oregon State, 1962, Ph.D., 1963.

SYLVIA LEE (1952)
County Extension Agent Emeritus Home Economics (Assistant Professor), Curry County.
B.S., Washington State, 1927.

SYLVIA LUCILE LEE (1968)
Head, Home Economics Education Department, Associate Professor.
B.S., Oregon State, 1947; M.A., Teachers College, Columbia, 1959, Ed.D., 1966.

WILLIAM ORVID LEE (1956)
Assistant Professor of Agronomy; Research Agronomist, U. S. Department of Agriculture.
B.S., Utah State, 1950, M.S., 1954; Ph.D., Oregon State, 1965.

ALBERT LEWIS LEELAND (1954)
Professor of Elementary Education.
A.B., Colorado State College, 1947, M.A., 1949; Ed.D., Columbia, 1952.

JOHN ALVAN LEFFEL (1962)
Washington County Extension Agent (Assistant Professor).
B.S., Ag.Ed., Oregon State, 1955, M.S., Ag.Ed., 1967.

WILLIAM FREDRICK LEHMANN (1961)
Assistant Professor of Forest Products.
B.S., Washington State, 1958; M.S., North Carolina State, 1960.

JEROME LLOYD LE MASTER (1928)
Professor Emeritus of Business Law.
Jur.D., Illinois, 1923; Cert d'A en Droit Civile, Bordeaux, 1924; M.A., Colorado, 1925. Oregon State Bar 1930.

MORRIS LEE LeMAY (1964)
Associate Dean of Students; Associate Professor.
B.S., McMurry College, 1956; M.A., Colorado, 1961; D.Ed., Oregon, 1966.

BERLAN LEMON (1959)
Head Adviser, School of Education; Associate Professor of Education.
B.S. (Education), Oregon State, 1941; M.S. (Psychology), Oregon, 1948.

MARY-LOUISE (BILLIE) LeSUEUR (1965)
Klamath County Extension Agent, Home Economics (Assistant Professor).
B.S., Montana State, 1942.

J. DANIEL LeVAN (1965)
Assistant Professor of Russian.
B.A., Mexico City College, 1956; M.A., Wisconsin, 1959.

OCTAVE LEVENSPIEL (1968)
Professor of Chemical Engineering.
B.S., California (Berkeley), 1947; M.S., Oregon State, 1949, Ph.D., 1952.

GLORIA ALEDORT LEVINE (1960)
Associate Professor of Spanish.
B.A., Queen's College, 1945; M.A., New Mexico, 1946.

SHEPARD LEVINE (1954)
Professor of Art.
B.A., New Mexico, 1950, M.A., 1951.

CHARLES STEWART LEWIS (1966)
Instructor in Forest Management.
B.S.F., Oregon State, 1942.

MARY EUNICE LEWIS (1928)
Associate Professor Emeritus of Modern Languages.
B.S., George Fox, 1906; A.B., Penn College (Iowa), 1907; M.A., California, 1918; Ph.D., Washington, 1939.

LEONARD MORTON LIBBEY (1961)
Research Associate (Associate Professor) in Food Science and Technology.
B.V.A., Massachusetts, 1953; M.S., Wisconsin, 1954; Ph.D., Washington State, 1961.

WILLIAM CARLETON LIGHTFOOT (1958)
Assistant Professor of Wildlife Ecology; Game Biologist, Research Division, Oregon State Game Commission.
B.S., Oregon State, 1941.

WILLARD DEAN LIGHTY (1965)
Multnomah Extension Agent (Assistant Professor).
B.S., Illinois, 1957; M.S., Colorado State University, 1965.

JOHN FRANK LIGON, JR. (1946)
Professor of English; Curriculum Coordinator.
A.B., Vanderbilt, 1938; M.A., Peabody, 1940; Ph.D., Washington, 1961.

SAM TALBERT LIKENS (1951)
Associate Professor of Chemistry, Agricultural Chemistry. Chemist U. S. Department of Agriculture.
B.S., Oregon State, 1950.

RICHARD TSON-TE LIN (1966)
Assistant Professor Wood Physics.
B.S., Tai Wan Provincial College of Agriculture, 1956; M.S., New York State University, 1961; Ph.D., 1965.

FREDERICK THOMAS LINDSTROM (1966)
Assistant Professor of Agricultural Chemistry and Mathematics.
B.S., Oregon State, 1963, M.S., 1965, Ph.D., 1969.

RENIL LINÉR (1970)
Instructor, Residence Halls Program Office.
B.A., San Jose State, 1965; M.A., California State Polytechnic College, 1969.

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Assistant Professor of Philosophy.
B.A., Michigan State, 1961, M.A., 1964, Ph.D., 1969.

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Professor Emeritus of Food Science and Technology.
B.S., Kansas State, 1924, M.S., 1926; Ph.D., Oregon State, 1944.

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Professor of Speech Communication.
A.B., Illinois Wesleyan, 1936; M.A., Colorado, 1941; Ph.D., Southern California, 1961.

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Instructor in Pharmaceutical Chemistry.
B.S., Oregon State, 1963; M.S., British Columbia, 1966.

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Reserve Book Librarian (Senior Instructor).
B.A., National Tai Wan University, 1959; M.S., Kansas State Teachers College, 1962.

ALBERT VICTOR LOGAN (1946)
Professor Emeritus of Chemistry.
B.A., Willamette, 1924; M.S., Massachusetts Institute of Technology, 1928, Ph.D., 1938.

PORTER BRONSON LOMBARD (1963)
Associate Professor of Horticulture, Superintendent, Southern Oregon Experiment Station.
B.A., Pomona, 1952; M.S., Washington State, 1955; Ph.D., Michigan State, 1958.

DAVID ROBERT LONG (1947)
Professor of Agricultural Engineering.
B.S., Oregon State, 1947, M.S., 1951, B.S. (Agricultural Engineering), 1959.

JAMES WALDO LONG (1966)
Professor and Director, Division of Physical Education.
B.S., Missouri Valley College, 1937; M.A., Northwestern, 1939; M.P.H., North Carolina, 1955, Ph.D., 1953.

JAY BASS LONG (1940)
Professor of Wildlife Ecology.
B.S., Oregon State, 1939, M.S., 1948.

ARVID TURNER LONSETH (1948)
Professor of Mathematics.
A.B., Stanford, 1935; Ph.D., California, 1939.

WALTER DAVID LOOMIS (1953)
Professor of Biochemistry, Department of Biochemistry & Biophysics.
B.S., Iowa State, 1948; Ph.D., California, 1953.

JAMES CHESTER LOONEY (1957)
Associate Professor of Electrical Engineering.
B.S., Oregon State, 1954, M.S., 1960, E.E., 1963.

HERNAN VILLANUEVA LOPEZ (1963)
Instructor in Farm Crops.
B.S., State University of Chile, 1958; M.S., Oregon State, 1962.

WALTER DAVID LOVELAND (1967)
Assistant Professor of Chemistry, Radiation Center.
S.B., MIT, 1961; Ph.D., Washington, 1966.

WILLIAM PRESCOTT LOWRY (1961)
Associate Professor of Biometeorology.
A.B., University of Cincinnati, 1950; M.S., Wisconsin, 1955; Ph.D., Oregon State, 1962.

KUO CHIN LU (1963)
Associate Professor of Soil Microbiology; Principal Microbiologist and Pathologist, U.S. Forest Service Laboratory.
Ph.D., Oregon State, 1953.

SHIH-DZUNG C. LU (1961)
Research Associate, Assistant Professor, Agricultural Chemistry.
M.S., Purdue, 1948, Ph.D., 1951.

MARTIN JAMES LUDWIG (1949)
Assistant Professor of English.
B.A., Northeastern (Massachusetts), 1947; M.A., Boston, 1949.

MARGARET CATHERINE LUMPKIN (1948)
Associate Professor of Education.
B.S., Women's College of University of North Carolina, 1944; M.S., Wellesley, 1945; Ed.D., Oregon State, 1957.

WALTER THOMAS LUND (1937)
Senior Instructor Emeritus in Botany.
B.S., Oregon State, 1930; M.S., 1932.
Retired.

DOROTHY B. LUNDBOM (1966)
Baker County Extension Agent, Home Economics (Instructor).
B.S., Oregon State, 1966.

RALPH NICHOLAS LUNDE (1930)
Professor Emeritus of Agricultural Engineering.
B.S., Oregon State, 1926.

MARILYN JEANNE LUNNER (1968)
Multnomah County Extension Agent, Home Economist (Assistant Professor).
B.S., Nebraska, 1961.

WALTER I. LUSETTI (1967)
Associate Professor of Spanish and Education.
B.A., University of Pittsburgh, 1949, M.Litt., 1950; Ph.D., Oregon, 1967.

CAROLINE G. LYBECK (1962)
Education and Fine Arts Librarian. (Associate Professor).
B.A., Concordia College, 1932; B.S.L.S., University of Denver, 1941; M.A.L.S., Michigan, 1957.

JOHN H. LYFORD, JR. (1966)
Assistant Professor of Biology (General Science).
B.A., Carleton College, 1950; M.S., Oregon State, 1962, Ph.D., 1966.

HARRY DILTS MacCORMACK (1967)
Instructor in English.
B.A., Lewis & Clark College, 1964; M.F.A., Iowa, 1967.

DONALD LAURIE MacDONALD (1962)
Professor of Biochemistry, Department of Biochemistry & Biophysics.
B.A., Toronto, 1944, M.A., 1946, Ph.D., 1948.

JOHN HOWARD MacDONALD (1951)
Producer-Announcer, KOAC-AM-TV; Senior Instructor, Oregon Educational Broadcasting, Division of Continuing Education.
B.A., Oregon, 1948.

REGINALD ANSLOW MacHAFFIE (1961)
Assistant Physician (Professor) Student Health Service; Associate Professor Science Research Institute; Associate Professor Pharmaceutical Science.
B.S., City College of New York, 1933; M.A., Colorado, 1935; M.D., University of Colorado Medical School, 1948.

HARRY JOHN MACK (1955)
Professor of Horticulture.
B.S., Texas A & M, 1950, M.S., 1952; Ph.D., Oregon State, 1955.

MABEL CLAIR MACK (1928)
Assistant Director Emeritus, Federal Cooperative Extension Service (Professor).
B.S., Oregon State, 1928, M.S., 1940.

ANDREA C. MACKEY (1938)
Professor of Foods and Nutrition.
B.S., M.Sc., Nebraska, 1937; Ph.D., Iowa State, 1945.

DORIS GLASSER MACLEAN
Assistant Professor of French.
B.A., Miami, 1947; M.A., Wisconsin, 1950.
On sabbatical leave, winter & spring of 1970-71.

IAIN C. MacSWAN (1955)
Extension Plant Pathology Specialist (Professor).
B.S.A., British Columbia, 1942, M.S.A., 1961.

THEODORE MARTIN MADDEN (1959)
Associate Professor of Psychology.
B.A., Western Washington College of Education, 1946; M.A., Columbia, 1947; Ph.D., Arizona, 1959.

AUDREY HATCH MADDOX (1968)
Visiting Assistant Professor of Education.
A.B., Southwestern Louisiana University, 1942; M.Ed., Oregon State, 1966.

RUSSELL WEBBER MADDOX, JR. (1950)
Professor of Political Science.
B.A., Marshall College, 1946; M.P.A., Wayne, 1948; Ph.D., Illinois, 1953.

VICTOR ARVIEL MADSEN (1963)
Associate Professor of Physics.
B.S., Washington, 1953, Ph.D., 1961.

PHILIP COOPER MAGNUSSON (1946)
Professor of Electrical Engineering.
B.S., Washington, 1937; M.S., California, 1938; Sc.D., Massachusetts Institute of Technology, 1941; E.E., Washington, 1947.

THOMAS FINLEY MAHAN (1968)
Research Associate, Computer Center.
A.B., Stanford, 1958; M.A., California (Berkeley), 1963.

BOHDAN MAKSYMIUK (1965)
Principal Entomologist, Forestry Sciences Laboratory and Associate Professor of Entomology.
B.S.F., Michigan, 1953, M.F., 1955; Ph.D., Maryland, 1965.

JESSALEE AHRENS MALLALIEU (1948)
Extension Recreation Specialist (Associate Professor) Emeritus.
B.S., Missouri, 1933; M.S., Wisconsin, 1948.

THOMAS EDWARD MALONEY (1969)
Chief, Physiological Control Branch, National Eutrophication Research Program, FWPCA, USDI.
B.A., University of Buffalo, 1949, M.A., 1953.

SARA ELLEN MALUEG (1966)
Associate Professor of French.
B.A., Muskingum College, 1954; M.A., Wisconsin, 1957, Ph.D., 1965.

THOMAS JOSEPH MARESH (1967)
Assistant Professor of Geography.
B.A., Washington State, 1962; Ph.D., Illinois, 1968.

PETER MARION MARKGRAF (1967)
Baker County Extension Agent (Instructor).
B.S., Oregon State, 1963.

GEORGE ROBERT MARKHAM (1968)
Associate Professor of Health Education.
B.S., Idaho State College, 1949; M.S., Idaho, 1950; M.P.H., Tulane University, 1964, D.Sc.Hyg., 1967.

HAL MARKOWITZ (1968)
Assistant Professor of Psychology.
B.A., California State (Long Beach), 1959, M.A., 1960; Ph.D., Arizona State, 1968.

LESLIE JACK MARKS (1946)
County Extension Agent (Associate Professor).
B.S., Oregon State, 1946.
On leave 1967-70.

STEPHEN CHESTER MARKS (1956)
Extension Agricultural Economist (Associate Professor).
B.S., Wisconsin State (River Falls), 1948; M.S., Wisconsin, 1955.

KAY M. P. MARKSHEFFEL (1956)
Instructor in Secretarial Science.
B.Sc. Ed., USC, 1941; Ed.M., Oregon State, 1959.

NED DELAND MARKSHEFFEL (1955)
Professor of Education.
B.S., Utah State, 1933; M.E., Temple, 1953; Ed.D., Stanford, 1958.

WILLIAM R. MARRIOTT (1968)
Assistant Physician, Associate Professor, Student Health Service.
B.S., Cal Tech, 1940, M.S., 1942; M.D., University of Southern California Medical School, 1947.

ROBERT KENDALL MARSH (1956)
Clatsop County Extension Agent, 4-H Club (Assistant Professor).
B.S., Massachusetts, 1941.

DONALD JOSEPH MARTEL (1947)
Professor of Landscape Architecture; Chairman of Department.
B.S., Oregon, 1942.

MAURO EMILIO MARTIGNONI (1965)
Principal Microbiologist, Forestry Sciences Laboratory and Professor of Entomology.
Dipl. Ing., Swiss Federal Institute of Technology, 1950, Dr. rer. nat., 1956.

CHARLES HERBERT MARTIN (1946)
Professor Emeritus of Entomology.
B.A., M.A., Kansas, 1927; Ph.D., Cornell, 1939.

DON BRUCE MARTIN (1966)
Assistant Professor of Physical Education.
B.S., Oregon, 1949, M.S., 1950.

GEORGE ROBERT MARTIN (1967)
Associate Professor of Business Administration, Chairman, Department of Accounting and Management Science.
B.B.A., Washington, 1960; Ph.D., California (Berkeley), 1967. C.P.A., Washington, 1960, Oregon, 1968.

LLOYD WAYNE MARTIN (1967)
Small Fruits Extension Specialist (Assistant Professor).
B.S., Oklahoma State, 1958, M.S., 1961; Ph.D., Michigan State, 1967.

WALLACE HOPE MARTIN (1920)
Professor Emeritus of Mechanical Engineering.
M.E., Minnesota, 1910; M.S., Iowa State, 1930.

MATTHEW ANGELO MARTINELLI (1964)
Assistant Professor of English.
B.A., C.W. Post College, 1962, M.A., 1964.

NORMAN HARRY MARTINSON (1958)
Associate Professor of Physical Education.
B.S., Oregon State, 1948, M.S., 1949.

ELLIOT NELSON MARVELL (1948)
Professor of Chemistry.
B.S., Brown, 1943; Ph.D., Illinois, 1948.

G. JEANNETTE ANN MASILIONIS (1960)
Associate Professor of Physical Education.
B.S., Ohio, 1944, M.S., 1945.

RICHARD RANDOLPH MASON (1967)
Forest Insect Ecologist, Forestry Sciences Laboratory and Assistant Professor.
B.S.F., Michigan, 1952, M.F., 1956, Ph.D., 1966.

ROBERT GEORGE MASON (1953)
Professor of Sociology. Agricultural Experiment Station Editor.
B.S., Oregon State, 1951; M.S., Wisconsin, 1952; Ph.D., Stanford, 1962.

MARY MASSEY (1969)
Assistant Professor of Family Life.
B.S., Texas Technological College, 1958; M.S., Florida State, 1966, Ph.D., 1969.

JOHN WILLIAM MASSIE (1956)
Linn County Extension Agent (Assistant Professor).
B.S., Agr., Ohio State, 1951; M.Ag.Ed., Arizona, 1968.

WALTER WENTWORTH MASSIE (1966)
Instructor in Civil Engineering.
B.S. Civil Engineering, Worcester Polytechnic Institute, 1964, M.S. Mechanical Engineering, 1966; D.H.E., Delft, 1969.

DAVID D. MATSON (1966)
Instructor in Speech Communication, Adviser KBVR.
B.A., American University, 1962; M.A., Temple, 1965.

WALTER EDWARD MATSON (1965)
Extension Agricultural Engineer (Professor).
B.S., Washington State, 1947, M.S., 1953, B.S. Electrical Engineering, 1957.

DONALD EUGENE MATTSON (1965)
Associate Professor of Veterinary Medicine.
B.S., California, Davis, 1957, D.V.M., 1959; Ph.D., Washington State, 1966.

DARRELL CLIFFORD MAXWELL (1952-60, 1963)
Umatilla County Extension Agent (Associate Professor).
B.S., Oregon State, 1952.
On sabbatical leave, October 1969-June 1970.

JAMES JOSEPH McALISTER (1954)
Regional Extension Management Information Systems Specialist (Associate Professor).
B.S., Oregon State, 1942.

LAURA McALLESTER (1926)
Assistant Professor Emeritus of Physical Education.
Diploma, Boston Normal School of Gymnastics, 1906; B.S., Oregon State, 1932.

JAMES ANDREW BELL McARTHUR (1956)
Professor of Range Management and Animal Science, Superintendent, Eastern Oregon Experiment Station.
B.Sc., University of Alberta, 1948; M.Sc., Texas A and M, 1950, Ph.D., 1951.

ROBERT F. McCAIN (1969)
Head Adviser School of Business and Technology; Associate Professor of Business Administration.
B.S., Wisconsin, 1949, M.S., 1952, Ph.D., 1954. Certified Psychologist, Oregon, 1968.

BERNARD LAWRENCE McCARTHY (1959)
Assistant Professor of Sociology.
A.S.T.P. Diploma, Oregon State, 1944; M.A., Chicago, 1949.

JOSEPH EDWARD McCARTHY (1964)
Instructor in General Science.
B.S., St. Francis College, 1964; M.S., Oregon State, 1965.

GAIL LEROY McCARTY (1963)
Morrow County Extension Agent (Assistant Professor).
B.S., Oregon State, 1963.

RAYMOND GERALD McCARTY (1953)
Clackamas County Extension Agent (Associate Professor).
B.S., Nebraska, 1936; M.S., Missouri, 1938.

JAMES ELIAS McCAULEY (1956-60, 1961)
Associate Professor of Oceanography.
B.S. in Zool., Washington, 1946, M.S., 1949; Ph.D., Oregon State, 1954.

THOMAS JOHN McCLELLAN (1945-46, 1948)
Professor of Civil Engineering.
B.S., Oregon State, 1945; M.Engr., Yale, 1948.

WILLIAM ANDREW McCLENAGHAN (1949)
Professor of Political Science.
B.A., Washington, 1948.

THOMAS COSHOW McCLINTOCK (1959)
Associate Professor of History.
B.A., Stanford, 1949; M.A., Columbia, 1950; Ph.D., Washington, 1959.

JOHN ARTHUR McCOMB (1967)
Assistant Professor of Metallurgical Engineering.
B.S. (Met.Engr.), Michigan Technological Univ., 1962; Ph.D. (Mats. Sci.), Northwestern, 1970.

MARLIN R. McCOMB (1968)
Instructor in Anthropology.
B.S., Mankato State, 1959; M.A., Oregon State, 1967.

CHARLES KENNETH McCORMACK (1967)
Instructor in English.
B.A., New Mexico, 1961, M.A., 1964.

PAUL WILLIAM McCORMICK (1965)
Deschutes County Extension Agent (Instructor).
B.S., Oregon State, 1965.

WALTER FRASER McCULLOCH (1937)
Professor Emeritus of Forestry Education.
B.A., British Columbia, 1925; M.S., Syracuse (New York State College of Forestry), 1936; Ed.D., Oregon, 1947.

WILLIAM JOHN McCULLOCH (1967)
Extension Health Study Agent (Instructor).
B.S., Jamestown College, 1960.

JACK THOMAS McDERMID (1945)
Assistant Professor of Agronomy; Superintendent, Sherman Experiment Station.
B.S., Oregon State, 1942.

JERRY RALPH McDONALD (1969)
Instructor in Art.
B.S., Oregon, 1966, M.F.A., 1968.

MARGUERITA McDONALD (1962)
Engineering Librarian (Associate Professor).
B.A., British Columbia, 1925; M.S., Montana State, 1960.

HELEN MAY McDOWALL (1950)
Clackamas County Extension Agent, Home Economics (Associate Professor).
B.S., Nebraska, 1934; M.S., Oregon State, 1952.

FLOYD BRANT McFARLAND (1963)
Associate Professor of Economics.
B.A., Texas, 1957, M.A., 1959, Ph.D., 1964.

DALE DONALD McFARLANE (1965)
Associate Professor of Business Administration.
B.A., Washington, 1960, M.B.A., 1961; D.B.A., Indiana, 1966.

LOIS ANN McGILL (1945-48, 1952)
Associate Professor of Food Science and Technology.
B.S., Oregon State, 1945.

EDWARD GORHAM McGRATH (1965)
Associate Professor of Political Science.
A.B. with Honors, California, 1939, M.A., 1948; Ph.D., Syracuse, 1961.

WILLIAM SAXON McGUIRE (1956)
Professor of Agronomy.
B.S., Arkansas, 1947; M.S., University of New Zealand, 1951; Ph.D., Washington State, 1952.

HELEN F. McHUGH (1969)
Associate Professor of Home Management and Head of Department.
B.S., Missouri, 1958, M.S., 1959; Ph.D., Iowa State, 1965.

DON EDWARD McILVENNA (1965)
Assistant Professor of History.
A.B., Sacramento State College, 1952; M.A., California (Berkeley), 1956; Ph.D., Stanford, 1966.

CHARLES DAVID McINTIRE (1964)
Associate Professor of Botany.
B.B.A., Southern Methodist, 1954; B.S., Oregon State, 1958, M.S., 1960, Ph.D., 1964.

JOHN DEMARIS McINTYRE (1964)
Assistant Professor of Fisheries.
B.A., Colorado State College, 1964; M.S., Oregon State, 1967, Ph.D., 1969.

WILLIAM WARD McKALIP (1937-42, 1953)
Associate Professor of Physical Education.
B.S., Oregon State, 1931, M.S., 1952.

DONALD S. McKENZIE (1966)
Assistant Professor of Biology (General Science).
B.S., Oregon College of Education, 1955; M.S., Oregon State, 1959; Ph.D., 1969.

MILFORD D. McKIMMY (1953)
Associate Professor of Forest Products.
B.S., Michigan State, 1949; M.S., Oregon State, 1951; Ph.D., New York State College of Forestry, 1955.

EARLE KENNETH McLAREN (1963)
Instructor in Forest Engineering.
B.S., United States Naval Academy, 1934; B.S., Oregon State, 1963.

JOHN WALTER McLOUGHLIN (1960)
Josephine County Extension Chairman (Associate Professor).
B.S., Rutgers, 1957; M.S., Oregon State, 1969.

ROBERT ORMOND McMAHON (1966)
Associate Professor of Forest Economics, Extension Forest Products Marketing Specialist.
B.S., Idaho, 1951, M.F., 1953; Ph.D., California, 1962.

WILLIAM D. McMULLEN (1964)
Associate Professor of Metallurgical Engineering.
B.S., Utah, 1955; M.S., Iowa State, 1961; M.S., Lehigh, 1962; Ph.D., Denver, 1964.

CHARLES McNEIL (1965)
Assistant Professor of Physical Education and Assistant Track Coach.
B.A., San Jose State, 1959; M.Ed., Oregon State, 1965.

WILLIAM JOHN McNEIL (1966)
Head, Pacific Fisheries Laboratory, Marine Science Center; Associate Professor of Fisheries.
B.S., Oregon State, 1952, M.S., 1956; Ph.D., Washington, 1962.

RAY ARTHUR McNEILAN (1958)
Multnomah Extension Agent (Associate Professor).
B.S., New Mexico A and M, 1957; M.S., Oregon State, 1958.

ISABELLA FRANKLIN McQUESTEN (1948)
Professor of Home Economics Education.
B.S., Arizona, 1932; M.S., Oregon State, 1940.

FRANK PADEN McWHORTER (1930)
Professor Emeritus of Plant Pathology; Plant Pathologist, U.S. Department of Agriculture.
B.S., Vanderbilt, 1917; M.S., Chicago, 1920; Ph.D., Cornell, 1928.

THOMAS RICHARD MEEHAN (1962)
Professor of History.
A.B., Rutgers, 1949, M.A., 1951; Ph.D., Wisconsin, 1960.

ANNA RUTH MEEKS (1965)
Professor of Education.
A.B., Goucher College, 1926; Ed.M., Maryland, 1947; Ed.D., The George Washington University, 1958.

DONALD MANUELL MEGALE (1958)
Assistant Professor of Physical Education.
B.S., Oregon State; 1952, M.Ed., 1958.

JOSEPH ALLEN MEGY (1967)
Chemist (Instructor), National Council for Air and Stream Improvement.
B.S., Oregon State, 1967.

JOSEPH PARKE MEHLIG (1920)
Professor Emeritus of Chemistry.
B.S., Purdue, 1908, M.S., 1910, Ph.D., 1931.

WALTER M. MELLENTHIN (1950)
Professor of Horticulture, Superintendent, Mid-Columbia Experiment Station.
B.S., Oregon State, 1950, M.S., 1952.

JOHN LEROY MELLOTT (1969)
Multnomah County Extension Agent, 4-H and Youth (Instructor).
B.A., Dickinson College, 1962; M.S., Delaware, 1964; Ph.D., Oregon State, 1969.

ROBERT EUGENE MEREDITH (1959)
Associate Professor of Chemical Engineering.
B.S., California, 1956, Ph.D., 1959.

FRED MERRYFIELD (1927)
Professor Emeritus of Civil Engineering.
B.S., Oregon State, 1923; M.S., North Carolina, 1930.

RODERICK SMIT MESECAR (1963)
Assistant Professor of Oceanography.
B.S., Oregon State, 1956, M.S., 1958, E.E., 1964, Ph.D., 1967.

ROBERT J. METZGER (1954)
Associate Professor of Cytogenetics; Wheat Geneticist, U. S. Department of Agriculture.
B.S., Illinois, 1948, M.S., 1949, Ph.D., 1953.

STUART MILES METZGER (1962)
Associate Professor of Architecture, University Architect.
B.Arch., Washington, 1961.

EDWIN DAVID MEYER (1925)
Associate Professor Emeritus of Industrial Arts.
B.S., Stout Institute, 1927; M.S., Oregon State, 1940.

GEORGE HENRY MEYERS (1968)
Instructor in Animal Science.
B.S., Oregon State, 1968.

SAMUEL LEE MEYLE (1966)
Clackamas County Extension Agent (Instructor).
B.S. Horticulture, Oregon State, 1966.

DAVID FRANCIS MEZERA (1968)
Assistant Professor of Civil Engineering.
B.S., Wisconsin, 1964, M.S., 1966.

ROBERT EMERSON MICHAEL (1968)
Instructor Physical Education, Assistant Intramural Director.
B.S., North Central College, 1962; M.S., Northern Illinois University, 1966.

ROBERT RAY MICHAEL (1947)
Associate Professor of Electrical Engineering.
B.S., Oregon State, 1940, M.S., 1947.

OSCAR EDWIN MIKESELL (1934)
Linn County Extension Chairman (Professor).
B.S., Oregon State, 1934.

JOHN A. MILBRATH (1937)
Professor Emeritus of Plant Pathology.
B.S., Washington State, 1934; Ph.D., Oregon State, 1938. Retired.

STANLEY DONOVAN MILES (1966)
Extension Farm Management Technologist (Instructor).
B.S., North Dakota State, 1965.

RAYMOND EAGAN MILLEMANN (1963)
Professor of Fisheries.
A.B., Dartmouth, 1948; M.A., California (Los Angeles), 1951, Ph.D., 1954.

CHARLES B. MILLER (1970)
Assistant Professor of Oceanography.
B.A., Carleton College, 1963; Ph.D., California, 1969.

DONALD JAMES MILLER (1961)
Assistant Professor of Forest Products.
B.S., Connecticut, 1951; M.F., Yale, 1954.

FRED D. MILLER (1967)
Assistant Professor of Economics.
B.S., Portland State, 1964; M.A., Michigan State, 1966, Ph.D., 1967.

JAMES CARLTON MILLER (1958)
Professor Emeritus of Animal Science.
B.S., Missouri, 1928, M.S., 1929, Ph.D., 1937.

LORRAINE THERESA MILLER (1966)
Associate Professor of Foods and Nutrition.
B.S., Wisconsin, 1953, M.S., 1958, Ph.D., 1967.

MELVIN D. MILLER (1968)
Assistant Professor, Assistant to Division Director, Division of Vocational, Adult, and Community College Education.
B.S., Oregon State 1953, Ed.M., 1961.

PAUL WILLIAM MILLER (1930)
Professor Emeritus of Plant Pathology; Research Plant Pathologist, U. S. Department of Agriculture.
B.S., Kentucky, 1923, M.S., 1924; Ph.D., Wisconsin, 1929. Retired.

ROBERT ELDON MILLER, JR. (1968)
Harney County Extension Agent (Instructor).
B.S., Oregon State, 1963.

STANLEY FRANK MILLER (1965-66, 1968)
Associate Professor of Agricultural Economics.
B.S., Brigham Young, 1960; M.S., Utah State, 1962; Ph.D., Oregon State, 1965.

HOWARD P. MILLEVILLE (1969)
Extension Food Technology Specialist, Marketing (Associate Professor).
B.S., Illinois Institute of Technology, 1936.

MARGARET MILLIKEN (1947)
Associate Professor of Physical Education.
B.S., Oregon State, 1942, M.S., 1947.
On sabbatical leave 1969-70.

WILLIAM WILLIS MILLS (1954)
Professor of Psychology.
A.B., St. Louis, 1939; Ph.D., Minnesota, 1954.

DAVID HALL MILNE (1967)
Assistant Professor of Biology, General Science.
B.A., Dartmouth, 1961; Ph.D., Purdue, 1968.

WILLIAM EDMUND MILNE (1932)
Professor Emeritus of Mathematics.
A.B., Whitman, 1912; A.M., Harvard, 1913, Ph.D., 1915; D.Sc., Whitman, 1942.

JOHN GLENN MINGLE (1960)
Professor of Mechanical Engineering.
B.S.M.E., Purdue, 1942; M.S., Oregon State, 1949.

KENNETH CLAYTON MINNICK (1944)
Benton County Extension Agent, 4-H Club (Assistant Professor).
B.S., Oregon State, 1939, M.Agr., 1954.

MIRIAM SHARP MINNICK (1957)
Inter-Library Loan Librarian (Associate Professor).
B.A., Western Reserve, 1934, M.S. in L.S., 1951.

DON MINORE (1966)
Plant Ecologist Forestry Sciences Laboratory, U. S. Forest Service.
B.S., Minnesota, 1953; Ph.D., California (Berkeley), 1966.

MARILYN JEAN MITCHELL (1969)
Assistant Catalog Librarian.
B.A., Occidental College, 1961; M.L.S., Texas at Austin, 1966.

RUSSEL GENE MITCHELL (1969)
Insect Ecologist, Assistant Professor, Forestry Sciences Laboratory, U. S. Forest Service.
B.S., Oregon State, 1956; M.S., Syracuse, 1957; Ph.D., Oregon State, 1960.

VELMA ROBERTA MITCHELL (1958)
Lane County Extension Agent, Home Economics (Assistant Professor).
B.S., Oregon State, 1945.

RONALD T. MOBLEY (1968)
Wheeler County Extension Agent, 4-H and Youth, (Instructor).
B.S., Oregon State, 1967.

HAROLD WILLIAM MOE (1935-42, 1949)
Associate Professor of Physical Education.
B.S., Oregon State, 1935, M.S., 1952.

KARL HERMAN MOLTMANN (1956)
Associate Professor of Music.
B.A., Buena Vista College, 1937; M.M., Colorado, 1946.

JOSEPH GERARD MONKS (1967)
Assistant Professor of Business Administration.
B.S., Gonzaga, 1955; M.B.A., Washington, 1965, B.S., 1967, D.B.A., 1967, Registered Mechanical and Industrial Engineer, Washington, 1966; Oregon, 1968.

CAL GRAHAM MONROE (1942)
Extension Specialist, 4-H Youth Development (Professor).
B.S., Oregon State, 1939; M.S., Cornell, 1952; A.G.S., Maryland, 1963.

MORRIS W. MONTGOMERY (1961)
Associate Professor of Food Science and Technology.
B.S., North Dakota State, 1951, M.S., 1957; Ph.D., Washington State, 1961.

HELEN STERLING MOOR (1926-28, 1954-1966)
Dean of Women Emeritus.
A.B., Smith, 1925; M.A., Stanford, 1935.

BILLY MERLE MOORE (1969)
Assistant Professor of Mechanical and Nuclear Engineering.
B.S., Colorado, 1961; M.S., New Mexico, 1965, Ph.D., 1969.

DAVID P. MOORE (1960)
Associate Professor of Soils.
B.S., North Carolina State, 1953, M.S., 1955; Ph.D., California, 1960.

DUANE GREY MOORE (1965)
Soil Scientist-Chemist (Associate Professor), United States Forest Service.
B.S., Wisconsin, 1953, M.S., 1955, Ph.D., 1960.

LARRY WALLACE MOORE (1969)
Assistant Professor of Plant Pathology.
B.S., Idaho, 1962, M.S., 1964.

SYLVIA LEE MOORE (1966)
Instructor in Physical Education.
B.A., Washington, 1963; M.S., Oregon, 1966.

THEODORE CARLTON MOORE, JR (1968)
Assistant Professor of Oceanography.
B.S., North Carolina; Ph.D., UCSD (Scripps Institute of Oceanography), 1968.

THOMAS CARROL MOORE (1963)
Associate Professor of Botany.
B.A. (Biology), North Texas State, 1956; M.A. (Botany), Colorado, 1958; Ph.D. (Botany), 1961.

JAMES EDWARD MORAN, JR. (1968)
Instructor in Statistics.
B.S., Montana State, 1960; M.S., Utah State, 1966.

MAX EUGENE MORGAN (1969)
Professor of Food Science and Technology.
B.S., Washington State, 1939; M.S., Pennsylvania State, 1942; Ph.D., Iowa State, 1948.

RONNIE LEE MORGAN (1969)
Instructor in Statistics.
B.S., Southwest Missouri State, 1964, M.A., 1966; Ph.D., Missouri, 1970.

RICHARD Y. MORITA (1962)
Professor of Microbiology and Oceanography.
B.S., Nebraska, 1947; M.S., USC, 1949; Ph.D., California, Scripps Institution of Oceanography, 1954.

MARJORIE KUH MORRAY (1968)
Assistant Professor of English.
A.B., Chicago, 1940; M.A., California, 1964.

CHARLES OTIS MORRIS (1966)
Associate Professor of Mechanical Engineering.
B.S., Oregon State, 1953.

JAMES MADISON MORRIS (1928)
Professor of Education; Managing Editor, Publications, Division of Continuing Education.
B.S. (E. Eng.), Oregon State, 1928, Ed.D., 1956.

JOHN EDWARD MORRIS (1968)
Assistant Professor of Zoology.
B.A., Stanford, 1958; M.S., Hawaii, 1960; Ph.D., U.C.L.A., 1966.

LESLEY FRANCES MOORE MORRIS (1969)
Instructor in Family Life.
B.S., Oregon State, 1961, M.S., 1969.

ROBERT JAMES MORRIS, JR. (1965)
Assistant Professor of History of Science (General Science) and History.
B.S., United States Military Academy, West Point, 1954; M.G.E. (Geological), Oklahoma, 1961; Ph.D., 1965.

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Assistant Professor of Chemistry, Agricultural Chemistry.
B.Sc., London, 1955, Ph.D., 1959.

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B.S., Oregon State, 1951.

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Associate Professor of Clothing, Textiles, and Related Arts.
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DON CARLOS MOTE (1923)
Professor Emeritus of Entomology.
B.S., Ohio State, 1911, M.S., 1912, Ph.D., 1928.

ROBERT VERNON MRAZEK (1960)
Professor of Chemical Engineering.
B.S. (Ch.E.), Purdue, 1957; Ph.D. (Ch.E.), Rensselaer Polytechnic Institute, 1960.

KEITH W. MUCKLESTON (1963)
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B.A., Washington, 1960; M.A., 1963.

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B.S., Colorado, 1959, M.S., 1961; Ph.D., California, 1966.

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Assistant Professor of Statistics.
B.S., St. Francis College, 1959; M.S., Michigan State, 1961; Ph.D., Catholic University of America, 1966.

DWIGHT CURTIS MUMFORD (1938)
Professor of Agricultural Economics.
B.S., Illinois, 1923; M.S., Cornell, 1925.

ROBERT CHARLES MUNDT (1968)
Program Manager, (Assistant Professor) KOAC Radio Educational Broadcasting.
M.S., Southern California, 1962.

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B.S., Oregon State, 1934; Ed.D., Stanford, 1948.

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B.A., George Peabody College, 1952; M.F.A., Wichita, 1956.

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B.A., American University, 1950, Ph.D., 1960.

THOMAS A. MURPHY (1963-1966, 1968)
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B.S., Utah, 1957; M.S., Auburn University, 1966.

OTTO HERBERT MUTH (1929)
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Professor Emeritus of Geography.
B.A., Washington, 1947, M.A., 1950; Ph.D., Clark, 1958.

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B.S., Oregon State, 1949; M.S., Michigan State, 1960.

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Associate Professor of Radiation Biology, General Science.
B.A., Washington, 1951; M.A., Texas, 1956; Ph.D., Stanford, 1961.

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Associate Professor of Entomology.
B.S., New York State College of Forestry, 1953, M.S., 1957; Ph.D., Cornell, 1962.

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Instructor in Family Life.
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B.S., California State Polytechnic College; M.S., Arizona, 1963, Ph.D., 1966.

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Professor of Mathematics.
B.S., University of Mysore, M.S., 1951; Ph.D., Indian Institute of Technology, Kharagpur, 1958.

VICTOR THOMAS NEAL (1964 Winter, Fall, 1966)
Assistant Professor of Oceanography.
B.S., Notre Dame, 1948; M.Ed., North Dakota, 1954; Ph.D., Oregon State, 1965.

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Assistant Professor of Industrial Engineering.
B.S., Oregon State, 1968, M.S., 1970.

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Extension Farm Management Specialist; (Assistant Professor of Agricultural Economics).
B.S., Western Illinois University, 1964; M.S., Purdue, 1967; Ph.D., Purdue, 1969.

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B.S., Oregon State, 1957, Ph.D., 1962.

ERNEST LELAND NELSON (1967)
Assistant Physician, Associate Professor, Student Health Service.
B.S., Utah State, 1930; M.A., California, 1933; M.D., School of Medicine Creighton, 1946.

HERBERT BENJAMIN NELSON (1927)
Professor Emeritus of English.
A.B., Colorado, 1926, M.A., 1927; Ph.D., Washington, 1944.

MILTON NELS NELSON (1926)
Professor Emeritus of Economics.
A.B., Illinois, 1915, M.A., 1917, Ph.D., 1921.

ORAN MILTON NELSON (1913)
Professor Emeritus of Animal Science.
B.S., Wisconsin, 1913, M.S., 1930.

PAUL BURGERT NELSON (1959)
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B.S., Oregon State, 1963.

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B.S., Texas, 1949, M.S., 1954; Ph.D., Texas A&M, 1965.

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Research Associate Science Research Institute, Biochemistry and Biophysics.
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ROBERT WARREN NEWBURGH (1953)
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B.S., Iowa, 1949; M.S., Wisconsin, 1951, Ph.D., 1953.

STUART MARSHALL NEWBERGER (1969)
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B.E.E., City College of New York, 1960; Ph.D., MIT, 1964.

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Marion County Extension Chairman (Professor).
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BYRON LOUIS NEWTON (1947-48, 1949)
Professor of Business Administration.
B.S., Northwestern (Oklahoma), 1935; M.S., Oklahoma State, 1939, Ed.D., 1946.

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B.S., Vermont, 1954; B.S., Oregon State, 1959, M.S., 1960, Ph.D., 1964.

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Union County Extension Agent, Home Economics, (Instructor).
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Assistant Professor of Chemistry.
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B.S., Oregon State, 1963, M.B.A., 1968.

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B.S., Oregon State, 1938; M.Ed., Maryland, 1962.

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Director of Programing, Division of Continuing Education; Associate Professor of Education.
B.A., Wyoming, 1961; M.S., Oregon, 1962; Ed.D., Wyoming, 1966.

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Professor of Physics, Dean of Faculty.
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Instructor in English.
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JOHN CLAIR NOLAND (1968)
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B.S., Oregon State, 1961, M.S., 1964; Ph.D., 1970.

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B.S., Oregon State, 1953, M.S., 1954; Ph.D., Northwestern, 1960.

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KALERVO OBERG (1968)
Professor of Anthropology.
B.A., University of British Columbia, 1928; M.A., Pittsburg, 1930; Ph.D., Chicago, 1933.

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Professor of Mathematics.
Staatsexamen, Breslau, 1936; Ph.D., Berlin, 1942; Ph.D., (habil), Mainz, 1945.

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Instructor in Botany.
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JAMES EDMUND OLDFIELD (1949)
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JOHN ELMER O'LEARY (1949)
Professor of Forest Engineering.
B.S.F., Michigan, 1942; M.F., Oregon State, 1947.

KEITH FLOYD OLES (1961)
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B.S., Washington, 1943, M.S., 1951, Ph.D., 1956.

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Associate Professor Emeritus of Animal Science.
B.S., Oregon State, 1918; M.S., Wisconsin, 1928.

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Instructor in English.
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ROGER DEAN OLLEMAN (1959)
Professor of Metallurgical Engineering, Acting Department Head.
B.S. (Mech. Engr.), Washington, 1948; M.S. (Met.E.), Carnegie Tech, 1950; Ph.D., Pittsburgh, 1955.

GUHLI JOHANNA OLSON (1959)
Associate Professor, Prenursing.
B.S., Battle Creek, 1936; R.N., Ohio, 1936; M.S., Western Reserve, 1947.

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Assistant Professor Naval Science.
B.A., Pacific Lutheran College, 1959.

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Assistant Professor of Atmospheric Sciences.
M.S., Royal Institute of Technology (Sweden), 1962, M.S., 1966; Ph.D., Michigan, 1969.

PAUL WILSON OMAN (1967)
Professor of Entomology.
B.A., Kansas, 1930, M.A., 1935; Ph.D., George Washington University, 1941.

JOHN PHILIP O'NEILL (1966)
Professor of Family Life; Head of Department.
M.S., Oregon State, 1961; Ph.D., Florida State, 1963.

PRESTON EUGENE ONSTAD (1956)
Assistant Professor of English.
B.A., University of Puget Sound, 1942, M.A., 1947.

HENDRIK JACOB OORTHUYS (1941-44, 1957)
Associate Professor of Electrical Engineering.
B.S., Oregon State, 1934, M.S., 1936.

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Professor Emeritus of English.
A.B., Washington and Lee, 1920, M.A., 1922; Ph.D., Maryland, 1927.

LOUISE JACKMAN ORNER (1936)
Assistant Professor Emeritus of Secretarial Science.
B.S., Oregon State, 1922, M.S., 1940.

MIRIAM WEITZ ORZECH (1965)
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B.A., California (Berkeley), 1953; M.A., Oregon State, 1965.

ZE'EV B. ORZECH (1957)
Associate Professor of Economics.
B.S., California (Berkeley), 1950.

KATHERINE HUGHES OSBORN (1929)
Science-Technology Librarian (Associate Professor).
B.S. (Lib.Sc.), Washington, 1928; M.A., Oregon State, 1939.

THOMAS WARD OSBORN (1968)
Instructor in Chemistry.
A.S., Mesa College, 1965; B.S., Colorado State University, 1967; M.S., Oregon State, 1968.

CAROLYN LOUISE O'SHEA (1962)
Instructor in Physical Education for Women.
B.A., Ohio, 1959.

JOHN PATRICK O'SHEA (1962)
Assistant Professor of Physical Education.
B.A., Michigan State, 1960, M.A., 1962.

MARGARET JO OSLER (1968)
Assistant Professor of the History of Science, General Science.
A.B., Swarthmore, 1963; M.A., Indiana, 1966, Ph.D., 1968.

CHARLES LAMAR OSTERBERG (1962)
Professor of Oceanography.
B.S., Arizona State, 1948, M.A., 1949; M.S., Oregon State, 1960, Ph.D., 1963.
On leave of absence April 1967-August 1970.

GEORGE HOLLIS OTTAWAY (1941-42; 1946-50, 1950)
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JAMES LAFAYETTE OVERHOLSER (1961)
Assistant Professor, Forestry Publications.
B.S., Oregon State, 1950, M.F., 1968.

JEAN SATTERLEE OVERHOLSER (1955)
Assistant Professor of Mathematics.
B.A., California (at Los Angeles), 1936; M.A., Redlands, 1940.

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Professor of Statistics and Forest Management.
B.S., Virginia Polytechnic Institute, 1948, M.S., 1950; Ph.D., North Carolina State, 1964.

MERRILL MAHONRI OVESON (1929)
Professor Emeritus, Pendleton Experiment Station.
B.S., Brigham Young, 1927; M.S., Oregon State, 1930.
On U. S. AID appointment in Jordan.

ALFRED OWCZARZAK (1955)
Associate Professor of Zoology.
B.S., Cornell, 1944; Ph.D., Wisconsin, 1953.

BETTY J. OWEN (1963)
Associate Professor of Physical Education.
B.S., Illinois, 1947; M.S., 1950.

EBEN LOWELL OWENS (1958)
Development Engineer, National Council for Air and Stream Improvement (Assistant Professor), Engineering Experiment Station.
B.S., Idaho, 1952.

LEIF OWREN (1969)
Research Associate in Atmospheric Sciences.
B.S., Oslo, 1943, M.S., 1948; Ph.D., Cornell, 1954.

PEYTON WOOD OWSTON (1969)
Plant Physiologist, Assistant Professor, Forestry Sciences Laboratory, U. S. Forest Service.
B.S., Michigan, 1960, M.F., 1962, Ph.D., 1966.

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Professor of Metallurgical Engineering.
B.S., Illinois, 1943; M.S., Illinois Institute of Technology, 1955.

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Professor Emeritus of Geology.
A.B., Washington, 1911, M.A., 1912; Ph.D., California, 1915.

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Assistant Professor of Elementary Education.
B.A., Central Washington State College, 1956, M.A., 1960; Ed.D., Indiana, 1968.

GLEN ELLIS PAGE (1949)
Associate Professor of Agricultural Engineering.
B.S.A., Wisconsin, 1940; B.S., (M.E.), Purdue, 1942, M.S. (M.E.), 1949.

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Director of Financial Aid (Associate Professor).
B.S.C., Iowa, 1950, M.A., 1954.

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Associate Professor of Forest Management.
B.S., Oregon State, 1953, M.S., 1958; Ph.D., Washington, 1965.

HASONG PAK (1969)
Research Associate in Oceanography.
B.S., Naval Academy, R. O. Korean Navy, 1956; M.S., USNPG School, 1961; Ph.D., Oregon State, 1970.

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Tillamook County Extension Agent (Assistant Professor).
B.S., Iowa State, 1952.

CONSTANCE M. PALMER (1968)
Instructor in Secretarial Science.
B.S., Kansas State Teachers College, 1959; M.S., U.S.C., 1963.

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County Extension Agent for Klamath and Lake Counties, 4-H and Youth (Instructor).
B.S., Linfield College, 1964, M.Ed., 1967.

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Extension Oceanographer, Sea Grant (Instructor).
A.B., Cornell, 1960; M.S., Oregon State, 1966.

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Professor of Mathematics.
B.Sc. (Hon), Manchester, 1951; Grad Diploma, Edinburgh, 1952; Ph.D., Manchester, 1955.

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Assistant Professor of Business Administration.
B.A., Walla Walla College, 1959; J. D., Chicago, 1962. Oregon State Bar 1964.

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Associate Professor of Agricultural Engineering; Agricultural Engineer USDA.
B.S. (Agr. Engr.), Missouri, 1937; M.S. (Agr. Engr.), Minnesota, 1940.

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Associate Professor of Oceanography.
B.S., Pusan Fisheries College, 1953; M.S., Texas A&M, 1957, Ph.D., 1961.

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Assistant Professor of Electrical Engineering.
B.S., Seoul National University, 1951; M.S., Minnesota, 1962, Ph.D., 1968.

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Associate Professor of Forest Recreation.
B.S.F., Oregon State, 1933.

CLARENCE ROY PARKER (1967)
Extension Community Development Specialist (Assistant Professor).
B.A., Western Washington State College, 1959.

JAMES ROLAND PARKER (1926)
Douglas County Extension Agent (Associate Professor) Emeritus.
B.S., Oregon State, 1922, M.S., 1924.

JESSE ELMER PARKER (1946)
Professor of Poultry Science.
B.S., Tennessee, 1934; A.M., Missouri, 1936, Ph.D., 1940.

RAYMOND PHILLIP PARKER (1968)
Instructor, Sanitarian, Student Health Service.
B.S., Wisconsin, 1965.

HAROLD NEVINS PARKINSON (1947)
Assistant Professor Emeritus of General Engineering.
B.S., Purdue, 1918.

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Assistant Professor of Microbiology.
A.B., Haverford College, 1965; Ph.D., CIT, 1969.

FRANK LOVERN PARKS (1949)
Professor Emeritus of Sociology; Head Counselor and Placement Officer of The School of Humanities and Social Sciences (1949-69).
B.A., B.E., Colorado, 1929, M.A., 1931; Ph.D., Washington, 1949.

LEO W. PARKS (1958)
Professor of Microbiology.
B.S., Illinois, 1952; A.M., Indiana, 1953; Ph.D., Washington, 1956.

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Clackamas County Extension Agent (Associate Professor).
B.S., West Virginia, 1957; M.S., Maryland, 1962.

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Instructor in Mathematics.
A.A., Modesto Jr. College, 1959; B.A., California at Santa Barbara, 1962; M.A., San Jose State College, 1969.

ROGER BRUCE PARSONS (1962)
Associate Professor of Soils; Research Soil Scientist, U.S.D.A. Soil Conservation Service.
B.S., Iowa State, 1955; M.S., Tennessee, 1957; Ph.D., Iowa State, 1960.

THERAN DUANE PARSONS (1955)
Professor of Chemistry and Assistant Dean, School of Science.
B.S., Washington, 1949, Ph.D., 1953.

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S.B., University of Chicago, 1962, M.B.A., 1964.

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Professor Emeritus of Forest Engineering.
B.S. (C.E.), Oregon, 1909.

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Professor Emeritus of Clothing, Textiles, and Related Arts.
B.Arch., Oregon, 1931; M.F.A., Cranbrook Academy of Art, 1950.

KENNETH DENTON PATTERSON (1958)
Associate Dean, School of Humanities & Social Sciences; Professor of Economics.
B.S., Iowa State, 1951; M.A., Nebraska, 1956, Ph.D., 1961.

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Professor of Oceanography.
B.S., Chicago, 1948; M.S., Scripps Institution of Oceanography, 1950, Ph.D., 1957.

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Professor Emeritus of Mechanical Engineering.
B.S., Oregon State, 1924, M.S., 1934.

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B.S., Southern Oregon College, 1961; Ph.D., Oregon State, 1965.

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B.S., Iowa State, 1951, M.S., 1952; Ph.D., Yale, 1960.

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Instructor in General Science.
B.A., North Park College, 1964, M.S., Oregon State, 1969.

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B.A., Linfield College, 1967; M.L.S., California, 1968.

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Director of Department of Printing (Assistant Professor).
B.S., California State Polytechnic College, 1958.

HARLEY ALMON PERKINS, JR. (1966)
Associate Professor of Electrical and Electronics Engineering.
B.S., Physics and Engineering, University of Pittsburgh, 1950, M.S.E.E., 1958.

WILLIAM McGUIRE PERRY (1945)
Yamhill County Extension Agent, 4-H Club (Assistant Professor). (Retired.)
B.S., Oregon State, 1922.

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Assistant Professor of Foods and Nutrition.
B.H.E., University of British Columbia, 1950; M.S., Oregon State, 1964.

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Assistant Professor of Mathematics.
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B.S., Idaho, 1935; M.S., Oregon State, 1962.

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Professor of Statistics.
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B.S., Oregon, 1949, M.S., 1955.

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B.S., South Dakota State, 1951; M.S., Illinois, 1959; Ph.D., Wisconsin, 1964.

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Ph.B., Chicago, 1931, A.M., 1934; Ph.D., 1954.

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Professor of Business Administration.
A.B., Dartmouth, 1927; M.A., Chicago, 1931, Ph.D., 1939.

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B.S., Oregon College of Education, 1956; M.S., Oregon, 1959; M.P.H., California, 1962, Ed.D., 1964.

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B.S., Alaska, 1957; M.S., Stanford, 1958.

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Chief Storekeeper, Instructor in Naval Science.

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B.S., Washington, 1933, Ph.D., 1939.

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Instructor in Wood Engineering.
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HELEN M. POLENSEK (1970)
Instructor in German.
B.A., Hougton College, 1960; M.A., Michigan, 1963.

DAN WILLIAMS POLING (1937)
Associate Dean of Students and Director of New Student Programs (Professor).
B.S., Oregon State, 1928, M.S., 1938; D.Ed., Oregon, 1956.

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Assistant Professor of Physical Education.
B.S., Oregon State, 1956, Ed.M., 1963.

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Senior Instructor Emeritus in Physical Education.
B.S., Oregon State, 1956.

PEGGY JO POLING (1965)
Instructor in Speech Communication.
B.A., Oregon, 1956; M.A., Oklahoma, 1963.

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Assistant Professor of Oceanography.
B.Sc. (Hon), British Columbia, 1962, Ph.D., 1965.

ALLEN RAYMOND PONTHIEUX (1969)
Chief Yeoman, Instructor in Naval Science.

ALBERT ROBERTS POOLE (1946)
Professor of Mathematics.
B.A., British Columbia, 1929, M.A., 1931; Ph.D., California Institute of Technology, 1935.

MARY B. POOLE (1965 Winter Term)
Assistant Professor of Family Life.
B.A., Oberlin, 1931; M.A., Columbia, 1940.

MILOSH POPOVICH (1945, 1947)
Dean of Administration; Professor of Mechanical Engineering.
B.S., Oregon State, 1939, M.S., 1941.

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Research Associate, Computer Center.
B.S., Texas, 1962; M.A., University of Houston, 1966.

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Instructor in Business Administration.
B.S., Oregon State, 1960; M.B.A., California (Berkeley), 1961.

ERMINE LAWRENCE POTTER (1908)
Professor Emeritus of Agricultural Economics.
B.S., Montana State, 1906; B.S.A., Iowa State, 1908, M.S., 1920.

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Producer-Director, KOAC-TV; Assistant Professor, Oregon Educational Broadcasting, Division of Continuing Education.
B.A., Dakota Wesleyan, 1956; M.S., Syracuse, 1958.

WILLARD CHARLES POTTS (1959)
Associate Professor of English.
B.A., Washington, 1952, M.A., 1956, Ph.D., 1969.

CHARLES EDGAR POULTON (1949)
Professor of Range Ecology.
B.S., Idaho, 1939, M.S., 1948; Ph.D., Washington State, 1955.

CHARLES CARLETON POWELL, JR. (1969)
Assistant Professor of Botany.
B.S., Ohio State, 1964; Ph.D., California, 1969.

ROBERT LORAN POWELSON (1956)
Associate Professor of Plant Pathology.
B.S., Utah State, 1951, M.S., 1956; Ph.D., Oregon State, 1959.

WILBUR LOUIS POWERS (1909)
Professor Emeritus of Soils.
B.S., New Mexico State, 1908, M.S., 1909; Ph.D., California, 1926.

IVAN PRATT (1946)
Professor of Zoology.
B.A., Emporia, 1932; M.S., Kansas State, 1935; Ph.D., Wisconsin, 1938.

LOIS ARDELL PREISZ (1962)
Marion County Extension Agent (Associate Professor).
B.S., Oregon State, 1945.

SARA WATT PRENTISS (1917)
Professor Emeritus of Child Development.
B.S., Oregon State, 1917; M.A., California, 1929.

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B.S., Kansas State Teachers College, 1927.

FREDERICK EARL PRICE (1922)
Dean (Professor) Emeritus, School of Agriculture; Director Emeritus, Agricultural Experiment Station; Director Emeritus, Federal Cooperative Extension.
B.S., Oregon State, 1922.

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Professor of Zoology.
A.B., Stanford, 1948, M.A., 1949; Ph.D., Hawaii, 1953.
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Associate Professor of Agronomy, Eastern Oregon Experiment Station.
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Director, Instructional Resources and Materials Center (Assistant Professor).
B.S., Oregon State, 1960; M.S., Oregon State, 1966; Ph.D., Syracuse, 1969.

LOIS PYE (1960)
Assistant Professor of Physical Education.
Diploma in Education (Physical Education), Whitelands College, London, 1949; B.S., Oregon State, 1966, M.Ed., 1968.

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Associate Professor of Oceanography.
B.S., Louisiana State, 1953; Ph.D., California, 1957.

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A.B., Colgate, 1962; M.S., Ohio, 1964; Ph.D., Yale, 1968.

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Research Associate Oceanography.
A.B., Colgate, 1940; A.M., Missouri, 1942; M.S., UCLA, 1950; Ph.D., Oregon State, 1967.

SALVATORE RACHELE (1966)
Instructor in Mathematics.
B.S., Utah, 1961; M.S., Oregon State, 1965.

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Associate Professor of Animal Nutrition, Squaw Butte Experiment Station.
B.S., Montana State, 1952; M.S., Utah State, 1954, Ph.D., 1959.

ALLEN THURMAN RALSTON (1960)
Professor of Animal Nutrition.
B.S., Montana State, 1942; M.S., Washington State, 1958, Ph.D., 1960.

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B.S., Nebraska, 1943; M.S., Washington State, 1948; Ph.D., Nebraska, 1960.

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B.S., Utah State, 1928; M.S., Oregon State, 1933.

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B.A., Oregon, 1961; M.S., Iowa State, 1963, Ph.D., 1964.

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Marion County Extension Agent (Professor).
B.S., Washington State, 1937; M.S., Oregon State, 1942.

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Associate Professor of Naval Science.
B.S. Naval Science, USNA, 1945.

PAUL MEREDITH RAUEN (1959)
Yamhill County Extension Agent, 4-H and Youth, (Assistant Professor).
A.A., Minnesota, 1949; B.S., South Dakota State, 1958; M.S. (Education), Portland State, 1969.

CECIL OTIS RAWLINGS (1946)
Extension Horticulture Specialist (Associate Professor). (Retired.)
B.S., Illinois, 1925; M.S., New Hampshire, 1946. Retired.

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Jackson County Extension Agent (Instructor).
B.A., Oregon State, 1967, B.S., 1969.

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Professor of Fisheries, Chief, Research Division, Oregon State Game Commission.
B.S., California, 1935, M.S., 1936; Ph.D., Cornell, 1941.

PAUL DANIEL READ, AIA (1954)
Assistant Professor of Architecture.
B.S. in Arch., University of Cincinnatti, 1953; Architect, 1957.

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Extension Specialist, 4-H Youth Development. (Associate Professor).
B.S., Missouri, 1953; M.S., Maryland, 1959.

RICHARD GEORGE REDMOND (1964)
Research Associate (Senior Instructor), Oceanography.
B.S., Kent State, 1940.

DONALD JAMES REED (1962)
Associate Professor of Biochemistry, Department of Biochemistry & Biophysics.
B.S., College of Idaho, 1953; M.S., Oregon State, 1955, Ph.D., 1957.

CLINTON B. REEDER (1966)
Extension Marketing Management Specialist; Assistant Professor of Agricultural Economics.
B.S., Oregon State, 1961, M.S., 1963; Ph.D., Purdue, 1966.

RUTH LUCILLE REES (1955)
Professor of Education.
B.S., Oregon, 1950, M.Ed., 1955; D.Ed., Oregon, 1965.

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Associate Professor of Chemistry.
B.A., Brigham Young, 1940; Ph.D., Iowa State, 1947.

CHARLES CALHOUN REGER (1964)
Professor; Assistant Physician Student Health Service.
B.A., Colorado, 1939, M.D., 1942.

ROBERT RAY REICHART (1926-32, 1934)
Professor of Forestry Education.
B.S., Oregon State, 1917, M.S., 1937; D.Ed., Oregon, 1941.

WILLIAM CURTIS REID (1937)
Professor of Audiovisual Instruction; Head Audiovisual Instruction, Division of Continuing Education, Extension Specialist in Visual Instruction.
B.A., Willamette, 1929; M.S., New York, 1932; Ph.D., Oregon State, 1941.

PATRICK L. REILLY (1968)
Coordinator, District 4, Continuing Education. (Assistant Professor) OSSHE.
B.S. Social Science, OCE, 1964, M.A.T. in Geography, 1967.

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B.S., Michigan State, 1903; M.S., Florida, 1905.

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Assistant Professor of Oceanography.
B.A., Texas, 1951, M.A., 1958; Ph.D., Oregon State, 1967.

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B.S., Evansville College, 1949; M.A., San Diego State College, 1956; Ph.D., UCLA, 1962.

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Assistant Professor of Agricultural Economics.
B.A., Montana, 1962; M.A., Northwestern, 1964; Ph.D., Washington, 1969.

JOHN L. RETZER (1969-June 30, 1970)
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B.S., Illinois, 1934; M.S., Iowa State, 1940; Ph.D., Wisconsin, 1950.

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Extension Animal Health Specialist (Associate Professor).
B.S., Washington State, 1950, D.V.M., 1950.

ODETTE CADART RICARD (1965)
Assistant Professor of French and Education.
B.A., University of Paris, 1943, LL.B., 1945; B.A., Dominican College, 1947; M.A., Sacramento State College, 1958.

GEORGE ARTHUR RICHARDSON (1947)
Professor Emeritus of Food Science and Technology and of Dairy Chemistry.
B.Sc. (Agr.), Toronto, 1920; M.S., Minnesota, 1925, Ph.D., 1927.

ANTON STUART RICHERT (1969)
Associate Professor of Physics.
B.S., Cal Tech, 1957; Ph.D., Cornell, 1962.

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Professor of French; Vice Chairman of Department of Modern Languages.
B.A., Minnesota, 1940; M.A., Oregon, 1947.

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Associate Professor of Manufacturing Engineering Technology.
B.S. in M.E., Oregon State, 1957, M.S., 1960.

JAMES LEAR RIGGS (1958)
Professor and Head, Industrial Engineering Department.
B.S., Oregon State, 1951; M.S., 1958, Ph.D., 1963.

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B.A., Idaho, 1952.

ERNEST ALBERT RIMERMAN (1969)
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B.S., UCLA, 1961; Ph.D., California (Berkeley), 1967.

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Associate Professor of Nuclear Engineering.
B.S., Case Institute of Technology, 1957, M.S., 1959; Ph.D., California, 1964.

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Professor of Entomology, Chairman of Department.
A.B., Illinois, 1931, A.M., 1932; Ph.D., Wisconsin, 1935.

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Associate Professor of Oceanography; Marine Superintendent.
B.S., United States Naval Academy, 1934; M.B.A., Ohio State, 1952.

LARRY RONALD RITTENHOUSE (1969)
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B.S., Utah State, 1966; Ph.D., Nebraska, 1969.

MARGARET JO ROACH (1952-55, 1967)
Foreign Study Adviser, Assistant Professor.
B.S., Oregon State, 1941, Ed.M., 1948.

ALFRED NATHAN ROBERTS (1940)
Professor of Horticulture.
B.S., Oregon State, 1939, M.S., 1941; Ph.D., Michigan State, 1953.

PAUL ALFRED ROBERTS (1966)
Associate Professor of Zoology.
B.S., Illinois, 1953, M.D., 1957; Ph.D., Chicago, 1962.

RADCLYFFE BURNARD ROBERTS (1968)
Research Associate in Entomology.
A.B., Cornell, 1961, M.A., 1965; Ph.D., Kansas, 1968.

STEVE ROBERTS (1966)
Assistant Professor of Soils.
B.S., Nebraska State College, 1951; B.S., Nebraska, 1956, M.S., 1957; Ph.D., Washington State, 1966.

THOMAS EDWARD ROBERTS (1948)
Professor of Music.
B.A., Iowa Wesleyan, 1942; M.M., Chicago Musical College, 1949.

WARREN WAYNE ROBERTS (1950-52, 1954)
Yamhill County Extension Agent (Associate Professor).
B.S., Oregon State, 1950.

GEORGE MORRIS ROBERTSON (1946)
Director of Business Affairs (Professor).
B.S., Oregon State, 1941; M.S., New York University, 1942.

WILLIAM BARR ROBERTSON (1946)
Athletic Trainer (Assistant Professor), Intercollegiate Athletics.
B.S., Oregon State, 1948.

WILLIAM JAMES ROBERTSON (1965)
Associate Professor of Speech Communication.
B.F.A., School of Drama, Art Institute of Chicago, 1949, M.F.A., 1951; Ph.D., Wisconsin, 1963.

ALAN HADLEY ROBINSON (1966)
Associate Professor of Nuclear Engineering.
B.S., Swarthmore College, 1956; M.S., Stanford, 1961, Ph.D., 1965.

DAN D. ROBINSON (1944)
Professor of Forest Management.
B.S., Oregon State, 1940; M. F., Syracuse, 1942.

ROBERT ROBINSON, JR. (1968)
Assistant Professor of Business Administration.
B.S., Northern Arizona, 1964; M.S., Arizona, 1965.

ASA AUSTIN ROBLEY (1938-42, 1947)
Associate Professor of Manufacturing Engineering Technology.
B.S., Oregon State, 1939; M.S., Iowa State, 1957.

JOHN HENRY ROCK (1958)
Professor of Art.
B.S.Ed. (Ind. Arts), Oregon State, 1951; M.F.A. (Graphic Art), California College of Arts and Crafts, 1957.

JEFFERSON BELTON RODGERS (1946)
Professor Emeritus of Agricultural Engineering.
B.S., Idaho, 1929, M.S., 1935, A.E., 1939.

GORDON K. W. ROEDER (1969)
Instructor in English.
B.A., Wisconsin, 1960, M.A., 1963.

CHARLES RAYMOND ROHDE (1952)
Professor of Agronomy, Superintendent, Pendleton Experiment Station.
B.S., Montana State, 1947; Ph.D., Minnesota, 1953.

KERMIT JULIUS ROHDE (1956)
Professor of Psychology.
B.S., Iowa State, 1943; M.A., Nebraska, 1949; Ph.D., Northwestern, 1951.

ROMAN ROMUALD ROMANOWSKI (1967)
Associate Professor, Farm Crops.
B.S., Wisconsin, 1953, M.S., 1957; Ph.D., Cornell, 1961.

SALLY D. RONDEAU (1966)
Instructor in Secretarial Science.
B.S., Oregon State, 1952, Ed.M., 1968.

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Producer-Director (Instructor) CCTV.
B.A., Kansas State, 1966.

GEORGE DAVID ROSE (1967)
Assistant to Director, Manager of Systems Programming Computer Center.
B.A., Bard College, 1963.

ROBERT GEORGE ROSENSTIEL (1946)
Associate Professor of Entomology.
B.S., Oregon State, 1937, M.S., 1939; Ph.D., California, 1950.

CHARLES ROBERT ROSS (1946)
Extension Forestry Specialist (Associate Professor). Emeritus.
B.S.F., Georgia, 1931; M.S.F., Washington, 1932.

JACKSON ROSS (1951)
Assistant Director, Federal Cooperative Extension Service (Professor).
B.S., Oregon State, 1951; M.S., Wisconsin, 1960.

JAMES FRANKLIN ROSS (1966)
Extension Community Development Agent (Assistant Professor).
B.S., Oregon, 1965.

PETER GEORG ROSSBACHER (1968)
Associate Professor of Modern Languages.
Ph.D., University of Kiel, 1959.

LEWIS FRANKLIN ROTH (1940)
Professor of Botany.
B.A., Miami (Ohio), 1936; Ph.D., Wisconsin, 1940.

JACK STEVENS ROTHACHER (1961)
Associate Professor of Forest Management, Research Forester, Forestry Sciences Laboratory, U.S. Forest Service.
B.S.F., Michigan, 1939; M.F., California, 1947.

GERALD H. ROWE (1969)
Captain, Infantry, Assistant Professor of Military Science.
B.A., Western Michigan University, 1963.

KENNETH EUGENE ROWE (1964)
Assistant Professor of Statistics.
B.S., Colorado State University, 1957; M.S., North Carolina State, 1960; Ph.D., Iowa State, 1966.
On leave 9-1-69 to 8-31-70.

HAROLD ARMOND ROWLEY (1938)
Chief Accountant, Oregon State System of Higher Education (Professor).
B.S., Oregon State, 1925.
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DORRIS MARY ROY (1952)
Clatsop County Extension Agent, Home Economics (Associate Professor).
B.S., Oregon State, 1934; M.S., Wisconsin, 1962.

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Jefferson County Extension Chairman (Professor).
B.S., Utah State, 1951, M.S., 1963.

ROBERT DEAN RUDD (1957)
Professor of Geography.
B.S., Indiana State, 1947; M.S., Wisconsin, 1949; Ph.D., Northwestern, 1953.

JULIUS ALEXANDER RUDINSKY (1955)
Professor of Forest Entomology.
Diplom Engineer in Forestry, Slovak University in Bratislava, 1944; Absolutorium in Economics, Göttingen, 1949; Ph.D., Ohio State, 1953.

CHARLES BUDDY RUMBURG (1958)
Associate Professor of Agronomy, Squaw Butte Experiment Station.
B.S., Colorado State University, 1954; M.S., Rutgers, 1956, Ph.D., 1958.

ROBERT HARVEY RUTH (1954)
Associate Professor of Forest Management, Principal Silviculturist, Forestry Sciences Laboratory, U.S. Forest Service.
B.S., Oregon State, 1943, M.F., 1950, Ph.D., 1967.

PAUL MELTON RUTLAND (1952)
Instructor in Animal Science (Horsemanship).

ROGER BAKER RYAN (1961)
Assistant Professor of Entomology; Research Entomologist, U. S. Forest Service.
B.S., New York State College of Forestry, 1953; M.S., Oregon State, 1959, Ph.D., 1961.

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Assistant Professor of Agronomy, Pendleton Experiment Station.
B.S., Idaho, 1953, M.S., 1958.

MARLYN C. RYUM (1967)
Producer-Announcer KOAC Radio, Instructor Oregon Educational Broadcasting, Division of Continuing Education.
B.S. (Business Ad.), Linfield, 1962.

AZALEA LINFIELD SAGER (1932)
State Leader Home Economics Extension. (Retired.)
B.S., Montana State, 1919; M.A., Columbia, 1921.

ROBERT W. SAGER (1961)
Professor of Pharmaceutical Science, Head of Department.
B.S., Washington, 1944, M.S., 1945, Ph.D., 1949.

RALPH WILLIAM SALISBURY (1949)
Extension Publications Specialist (Associate Professor).
B.S., Kansas State, 1949.

CLIFFORD ELROY SAMUELS (1947)
Professor of Food Science and Technology.
B.S., California, 1941; M.S., Michigan State, 1954, Ph.D., 1960.

GARY H. SANDER (1955)
Extension Forestry Specialist (Assistant Professor).
B.S., Missouri, 1951.

RAYMOND S. SANDERS (1967)
Clinical Psychologist, Student Health Service; Assistant Professor Psychology.
A.A., Shasta College, 1958; A.B., Chico State, 1960; M.A., Michigan State, 1965, Ph.D., 1967.

CHARLES HENDRICKS SANDERSON (1967)
Assistant Editor and Assistant Professor, Agricultural Experiment Station.
B.A., California (Berkeley), 1960.

DONALD R. SANDERSON (1968)
Manager of Student Activities.
B.S., Ohio Northern University, 1958; M.Ed., Bowling Green State University, 1965; M.A., Toledo University, 1966.

ERNEST NELSON SANDGREN (1948)
Professor of Art.
B.A., Oregon, 1943, M.F.A., 1948.

WILLIAM EWALD SANDINE (1958)
Professor of Microbiology.
B.S., Iowa State, 1950; M.S., North Carolina State, 1955; Ph.D., Oregon State, 1958.

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Malheur County Extension Chairman (Professor).
B.S., Oregon State, 1938.

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B.S., California, 1961; M.S., Idaho, 1966.

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Assistant Professor of Psychology.
B.A., California, 1964; Ph.D., Washington, 1969.

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B.S. Modern Languages, Montana State College, 1958; M.A. German, Kent State University, 1963; M.L.S., Hawaii, 1966.

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Associate Professor of Electrical Engineering.
B.S.E.E., Washington, 1955, M.S.E.E., 1958, Ph.D., 1964.

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Umatilla County Extension Agent, Home Economics (Associate Professor).
B.S., Washington, 1941, B.S. in Home Economics, 1942; M.S., Cornell, 1953.

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Assistant Professor of Sociology.
B.S., Utah State, 1962, M.S., 1964; Ph.D., Minnesota, 1969.

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Associate Professor of Mathematics.
A.B., Whitman, 1933; M.A., Minnesota, 1940, Ph.D., 1946.

WILLIAM ARTHUR SAWYER (1934)
Professor Emeritus of Animal and Range Science.
B.S., Oregon State, 1931.

MURLE SCALES (1947)
Assistant State Leader, Extension Home Economics (Professor).
B.S., Trinity (Texas), 1932; M.S., Iowa State, 1947.

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Assistant Professor of Food Science and Technology.
B.S., Cornell, 1960, M.S., 1962; Ph.D., Oregon State, 1968.

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B.S., Wisconsin, 1959, M.S., 1966.

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B.A., California, 1922.

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B.S.C.E., Arizona State, 1961; M.S.C.E, Purdue, 1964, Ph.D., 1966.

LARRY SCHECTER (1955)
Professor of Physics.
A.B., California, 1948, M.A., 1951, Ph.D., 1953.

JEAN WILLARD SCHEEL (1946)
Assistant Director, Federal Cooperative Extension Service (Professor).
B.S., Kansas State, 1934; M.A., Chicago 1954.

THEODORE COMSTOCK SCHEFFER (1969)
Research Associate, Forest Products.
B.S., Washington, 1922; M.S. For., 1929; Ph.D., Wisconsin, 1935; Post Doctorate, Johns Hopkins.

HENRY LYNN SCHEURMAN (1964)
Research Associate in Statistics and Computer Center.
B.S., Oregon State, 1963, M.S., 1968.

FRED HERMAN SCHMIDT (1962)
Entomologist United States Forest Service; Assistant Professor of Forest Entomology.
B.S., Illinois, 1957, M.S., 1959.

LOTHAR SCHMIDT (1963)
Associate Professor of German.
Abschlussprüfung für Schauspieler, Braunschweig, 1948; Genossenschaft Deutscher Bühnen-Angehörigen, Hamburg, Regisseur 1952; Lehrer, 1959; Director, German Study Center, Stuttgart, 1969-71.

PAULA LENCHNER SCHMIDT (1963)
Associate Professor of Music.
Diploma in Voice, Cincinnati College of Music, 1945; Diploma for Teaching: GDBA, Hamburg, 1958; Member Metropolitan Opera, New York, Stuttgart Opera, Bayreuth Festival.

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Cluster Task Force Chairman (Instructor).
B.S., Idaho, 1956; M.S., Oregon State, 1959.

ROMAN A. SCHMITT (1966)
Professor of Chemistry.
M.S., Chicago, 1950, Ph.D., 1953.

GARY LEE SCHNEIDER (1964)
Jackson County Extension Agent (Assistant Professor).
B.S., Oregon State, 1962.

GEORGE RUDOLPH SCHNEITER (1955)
Jefferson County Extension Agent (Assistant Professor).
B.S., Idaho, 1932, M.S., 1933.

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Research Associate, Computer Center.
B.S., Bradley University, 1959.

RONALD D. SCHOESLER (1967)
Instructor in Secretarial Science.
B.A., Whitworth College, 1956, M.A., 1963.

HARRY AUGUST SCHOTH (1914)
Professor Emeritus of Agronomy.
B.S., Oregon State, 1914, M.S., 1917.

HELMUT GEORGE SCHREIMA (1959)
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B.A., Willamette, 1953, J.D., 1955.

ELVER AUGUST SCHROEDER (1946)
Professor of English.
A.B., Elmhurst College, 1934; M.A., Illinois, 1937; Ph.D., Michigan, 1950.

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B.S. in Home Economics, Kansas State, 1949.

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B.S., Oregon State, 1949; M.S., Wisconsin, 1957.

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Assistant Professor of Civil Engineering.
B.S.C.E., Washington State, 1962, M.S.C.E., 1963; Ph.D., Colorado, 1967.

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Professor of Food Science and Technology, Head of Department.
B.A., Colorado College, 1933; M.S., Iowa, 1935, Ph.D., 1937.

HARRY WAYNE SCHULTZ (1959)
Associate Professor of Pharmaceutical Chemistry.
B.S., Iowa, 1952, M.S., 1957, Ph.D., 1959.

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Research Associate (Assistant Professor) in Anthropology.
B.A., Montana, 1965.

ROBERT JAMES SCHULTZ (1962)
Associate Professor of Civil Engineering.
B.S. in Civil Eng., Worcester Polytechnic Institute, 1955, M.S., 1960.

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Producer-Director, KOAC TV; Assistant Professor, Oregon Educational Broadcasting, Division of Continuing Education.
B.A., Harvard, 1931; M.A., Stanford, 1962.

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B.S., Illinois, 1957; M.S., Iowa State, 1963, Ph.D., 1965.

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Instructor in Clothing, Textiles, and Related Arts.
B.S., Wisconsin, 1966; M.S., Iowa State, 1969.

ALLEN BREWSTER SCOTT (1941)
Professor of Chemistry; Assistant Director, Science Research Institute.
B.S., Oregon State, 1937; Ph.D., Washington, 1941.

PETER CARLTON SCOTT (1967)
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RONALD WALTER SCOTT (1965)
Lane County Extension Agent (Assistant Professor).
B.S. Ag., Washington State, 1950, B.A. Ed., 1951.

THOMAS GEORGE SCOTT (1963)
Professor of Wildlife Ecology; Head of Department of Fisheries and Wildlife; Associate Director of Marine Science Center.
B.S., Iowa State, 1935; M.S., 1937; Ph.D., 1942.

HERMAN AUSTIN SCULLEN (1920)
Professor Emeritus of Entomology.
B.A., Oregon, 1910, M.A., 1927; Ph.D., Iowa State, 1934.

JOHN SEADERS (1961)
Associate Professor of Civil Engineering.
B.S., Oregon State, 1959, M.S., 1963.

VELMA MAXWELL SEAT (1959)
Extension Food Marketing Specialist (Associate Professor).
B.S., Washington State, 1935; M.A., Columbia, 1966.

STUART BRUCE SEATON (1950)
Professor of Business Administration.
B.S., Central State (Oklahoma). 1933; M.S., Oklahoma State, 1941.

JUSTUS FRANDSEN SEELY (1969)
Assistant Professor of Statistics.
B.S., Utah State, 1963, M.S., 1965; Ph.D., Iowa State, 1969.

EVA MARIE SEEN (1935)
Professor Emeritus of Physical Education.
B.S., Knox College, 1922; M.A., Wisconsin, 1926; Ed.D., New York, 1937.

VIRGINIA LEE SEERY (1968)
Research Associate, Biochemistry and Biophysics.
A.B., Seton Hill College, 1956; M.A., Duke University, 1958; Ph.D., University of Washington, 1968.

GARY LEONARD SEEVERS (1968)
Assistant Professor of Agricultural Economics.
B.S., Michigan State, 1959, M.S., 1966, Ph.D., 1968.

JEAN CARYL SEVEREIDE (1957)
Associate Professor of Education.
B.A., Grinnell, 1948; M.Ed., Oregon, 1956.

EDFRED LOREN SHANNON (1945)
Portland City Agent, Emeritus, 4-H Club (Associate Professor).
B.S., Oklahoma, 1922, M.S., 1932; Ph.D., Cornell, 1941.

WILLIAM L. SHAPEERO (1969)
Instructor in General Science.
A.A., Los Angeles City College, 1951; B.S., Los Angeles State College, 1953; M.S., Washington, 1960.

BRAHAMA D. SHARMA (1965)
Assistant Professor of Chemistry.
B.Sc. (Hons.), University of Delhi, 1949, M.Sc., 1951; Ph.D., U.S.C., 1961.

MILLICENT MARY SHARMA (1966)
Instructor in English.
B.A., UCLA, 1954, M.A., 1961.

ELIZABETH ELEANOR SHARP (1967)
Assistant Instructor in Pharmacy, Student Health Service.
B.S., B. Pharm., Washington State, 1958.

WILLIAM THOMAS SHARP (1966)
Instructor in Pharmacy.
B. of Pharm., Washington State, 1957; M.S. Phar., Wisconsin, 1964.

CLAYTON ALBERT SHAW (1950-53, 1966)
Assistant Registrar, (Assistant Professor), Oregon State.
B.S.S., Oregon State, 1942.

FRANCIS HARDING SHAW (1955)
Professor of History
B.A., Reed, 1948; M.A., California, 1951; Ph.D., Harvard, 1957.

JAMES NIVEN SHAW (1919-21, 1926)
Professor Emeritus of Veterinary Medicine.
B.S., Oregon State, 1915; B.S., D.V.M., Washington State, 1917.

ROBERT E. SHAW (1968)
Cluster Task Force (Instructor).
B.A., Western Washington State College, 1957, Ed.M., 1959.

J. RALPH SHAY (1966)
Chairman of Department of Botany and Plant Pathology (Professor).
B.S., Arkansas, 1939; M.S., Wisconsin, 1941, Ph.D., 1943.

KEITH RAYMOND SHEA (1967)
Professor of Botany and Plant Pathology, Project Leader, Principal Plant Pathologist, Forestry Sciences Laboratory, U. S. Forest Service.
B.S., Minnesota, 1950; Ph.D., Wisconsin, 1954.

LAVINA JANE SHEARER (1967)
Curry County Extension Agent, Home Economics (Instructor), 4-H.
B.S., Oregon State, 1967.

MARVIN NOBEL SHEARER (1950)
Extension Irrigation Specialist, (Professor).
B.S., Oregon State, 1948; M.S., Michigan State, 1961.

MILTON CONWELL SHEELY (1939)
Professor of Manufacturing Engineering Technology, Head of Department.
B.S. in M.E., Oregon State, 1939.

WILLIS ARDEN SHEETS (1959)
Senior Instructor in Horticulture, North Willamette Experiment Station.
B.S., Kansas State, 1952; M.S., Oregon State, 1967.

NATALIA E. SHELDON (1967)
Assistant Professor of Modern Languages.
B.A., Minnesota, 1958, B.S., 1959; M.A., Indiana, 1960.

JOHN LEWIS SHELTON (1969)
Counselor, Counseling Center; Assistant Professor.
B.A., Montana, 1964, M.A., 1966; Ph.D., Utah, 1969.

LONNIE BLAIR SHEPARD (1968)
Instructor in Agricultural Economics.
B.S., Oregon State, 1963, M.S., 1967.

JAMES W. SHERBURNE (1938)
Professor of Community Education.
A.B., Greenville College, 1927; M.A., Michigan, 1928; Ph.D., Ohio State, 1938.

GLORIA MAXINE SHIBLEY (1965)
Benton County Extension Agent (Assistant Professor).
B.S., North Dakota State, 1957.

FRED MERLE SHIDELER (1929)
Assistant to the President; Director University Relations; Professor of Journalism.
B.S., Kansas State, 1927; M.S., Oregon State, 1941.

DELBERT W. SHIRLEY (1969)
Associate Professor of Agricultural Education.
B.S., Oregon State, 1959, M.S., 1963; Ph.D., Michigan State, 1968.

ROBERT EDWIN SHIRLEY (1967)
Associate Professor Business Administration.
B.A., Iowa, 1943; M.B.A., Harvard, 1948; Ph.D., Utah, 1965; C.P.A., Oregon, 1968.

STANLEY EDWARD SHIVELY (1968)
Associate Professor of Sociology.
B.A., University of Colorado, 1955, M.A., 1957; Ph.D., Pittsburgh, 1966.

ROBERT ALLEN SHORT (1966)
Professor of Electrical Engineering.
B.S., Oregon State, 1949, B.A., 1952; M.S., Stevens Institute of Technology, 1956; Ph.D., Stanford, 1961.

STEPHENS T. SHOU (1952)
Social Sciences & Business Librarian (Associate Professor), Library.
B.A., Yenching University (China), 1946; M.A. (Pol. Sci.), Washington, 1950, B.A. (Librarianship), 1952.

WAYNE AUBREY SHULL (1969)
Linn County Extension Agent, 4-H and Youth (Instructor).
B.S., Oregon State, 1968.

DEAN LEE SHUMWAY (1960)
Associate Professor of Fisheries.
B.S., Oregon State, 1956, M.S., 1960.

THEODORE HENRY SIDOR (1952)
Extension Community Resource Development Specialist (Professor).
B.S., Oregon State, 1950; M.S., Michigan State, 1961.

ROY RAGNAR SILEN (1954)
Professor of Forest Genetics, Forestry Sciences Laboratory, U. S. Forest Service.
B.S., Oregon State, 1943; M.S.F., Yale, 1948; Ph.D., Oregon State, 1960.

CLARA LOUISE SIMERVILLE (1950-51, 1955)
Associate Professor, Foreign Student Counselor 1955-1970.
A.B., Willamette, 1928; M.A., Oregon, 1930; Ed.D., Oregon State, 1953. Retired.

DALE DAVID SIMMONS (1959-1963, 1966)
Associate Professor of Psychology.
B.A., University of Puget Sound, 1954; M.A., Oregon, 1958, Ph.D., 1961.

RAYMOND CHARLES SIMON (1966)
Professor of Fisheries, Leader, Oregon Cooperative Fishery Unit, Bureau Sport Fisheries and Wildlife.
B.S., Washington, 1957, M.S., 1960, Ph.D., 1964.

WILLIAM HADDOCK SIMONS (1966)
Professor of Mathematics.
B.A., University of British Columbia, 1935, M.A., 1937; Ph.D., California, 1947.

GERALD H. SIMONSON (1961)
Associate Professor of Soils.
B.S., Minnesota, 1951, M.S., 1953; Ph.D., Iowa State, 1960.

BARBARA C. SIMPSON (1968)
Program Consultant and Social Adviser, Student Activities.
B.Mus., Oregon, 1963; M.A., University of Denver, 1965.

HARRIET KING SINNARD (1934-36, 1940-42, 1963)
Assistant Professor of Home Management.
B.S., Iowa State, 1929; M.S., Oregon State, 1942.

HERBERT REEVES SINNARD, AIA (1929-32, 1934)
Professor of Architecture and Agricultural Engineering. Architect.
B.S., Iowa State, 1927, M.S., 1929. Architect, 1933.

RUSSELL OTTO SINNHUBER (1939)
Professor of Food Science and Technology.
B.S., Michigan State, 1939; M.S., Oregon State, 1941.

HARRIET ELEANOR SISSON (1946)
Associate Professor of Pharmaceutical Science.
B.S., Minnesota, 1937, M.S., 1939.

GORDON RUSSELL SITTON (1955)
Director of International Education; Professor of Agricultural Economics.
B.S., Oregon State, 1940; Ph.D., Stanford, 1954.

CHRISTINE OERTEL SJOGREN (1960)
Professor of German.
B.A., Mills College, 1945; Ph.D., Johns Hopkins, 1950.

LORRINE BARBARA SKAFF (1969)
Instructor in Secretarial Science.
B.S., Colorado State College, 1959, M.A., 1963.

FRANCIS ASBURY SKINNER (1946)
Klamath County Extension Agent, 4-H and Youth (Associate Professor).
B.S., Oklahoma State, 1941.

WENDELL HARTMAN SLABAUGH (1953)
Associate Dean of Graduate School, Professor of Chemistry.
B.A., North Central, 1936; M.S., North Dakota State, 1938; Ph.D., Washington State, 1950.

LOUIS SLEGEL (1945)
Professor of Mechanical Engineering.
B.S. (M.E.) Purdue, 1931, M.S. (M.E.), 1932, Ph.D., 1945.

EDWARD J. SLEZAK (1961)
Professor of Physical Education.
A.B., Michigan, 1938, M.A., 1952.

LARRY STEWART SLOTTA (1962)
Associate Professor of Civil Engineering.
B.S., Wyoming, 1956, M.S., 1959; Ph.D., Wisconsin, 1962.
On sabbatical leave until September 19, 1969.

LAWRENCE FREDERICK SMALL (1961)
Associate Professor of Oceanography.
A.B., Missouri, 1955; M.S., Iowa State, 1959, Ph.D., 1961.

CATHERINE BENNETT SMITH (1967)
Instructor in Family Life.
B.S., Oregon State, 1944, M.S., 1960.

CATHERINE T. SMITH (1967)
Instructor in Family Life.
B.S., Oregon State, 1944, M.S., 1961.

CHARLES EDWARD SMITH (1961)
Associate Professor of Mechanical Engineering.
B.S. (M.E.), Oregon State, 1955; M.S. (M.E.), Rensselaer Polytechnic Institute, 1958; Ph.D. (Eng. Mechanics), Stanford, 1962.

CHARLES WESLEY SMITH (1927)
Assistant Director (Professor) Emeritus Federal Cooperative Extension Service.
B.S., Washington State, 1921.

CLIFFORD LOVEJOY SMITH (1931-34, 1941)
Extension Training Leader (Professor Emeritus). Federal Cooperative Extension.
B.S., Oregon State, 1929; M.S., Kansas State, 1930; Ph.D., Wisconsin, 1959.

COURTLAND L. SMITH (1969)
Assistant Professor of Anthropology.
B.M.E., Rensselaer Polytechnic Institute, 1961; Ph.D., Arizona, 1968.

DEAN HARLEY SMITH (1956)
Professor of Veterinary Medicine.
B.S., Washington State, 1944, D.V.M., 1949; M.S., Oregon State, 1959.

DOUGLAS LAWRENCE SMITH (1967)
Assistant Professor of Elementary Education.
B.S., Oregon State, 1957, Ed.M., 1963.

EARL EUGENE SMITH (1957)
Professor of Industrial Education.
B.S., Oregon State, 1950; M.A., Colorado State College, 1951; Ed.D., Oregon, 1965.

EDWARD DOYLE SMITH (1946, 1947)
Professor of English.
B.S.S., Oregon State, 1940; M.A., Oregon, 1951; Ph.D., Washington, 1966.

FRANK HERSCHEL SMITH (1936)
Professor of Botany.
B.S., Arkansas, 1929; M.S., Washington State, 1930; Ph.D., Wisconsin, 1932.

FREDERICK JOHN SMITH (1964)
Extension Marine Economist; Assistant Professor of Agricultural Economics.
B.S., Cornell, 1958; M.S., Oklahoma State, 1962; Ph.D., North Carolina State, 1965.

HOWARD GEORGE SMITH (1935)
Tillamook County Extension Chairman (Professor).
B.S., Oregon State, 1935; M.S., 1967.

JOHN WOLFGANG SMITH (1964)
Professor of Mathematics.
B.A., Cornell, 1948; M.S., Purdue, 1950; Ph.D., Columbia, 1957.
On sabbatical leave W and S 1970-71.

KATHRYN HASKIN SMITH (1951-52, 1955)
Director of Teacher Placement (Associate Professor Emeritus).
B.S., Oregon, 1949; Ed.M., Oregon State, 1952.

KENNAN TAYLER SMITH (1968)
Professor of Mathematics.
B.A., Bowling Green, 1947; M.A., Harvard, 1948; B.A., Wisconsin, 1951.

RICHARD LORN SMITH (1968)
Administrative Assistant, Dean of Education.
B.S., Southern Oregon College, 1960, M.S., 1966.

ROBERT LESTER SMITH (1956)
Washington County Extension Agent (Associate Professor).
B.S., Oklahoma State, 1949; M.S., California, 1964.

ROBERT LLOYD SMITH (1961)
Associate Professor of Oceanography.
B.A., Reed, 1957; M.A., Oregon, 1959; Ph.D., Oregon State, 1964.

ROBERT WAYNE SMITH (1943)
Professor Emeritus of History.
B.A., Kansas, 1924; M.A., Idaho, 1932; Ph.D., California, 1937.

ROWLAND PEMBERTON SMITH (1968)
Assistant Football Coach Oregon State.
B.A., Washington, 1948, M.S., 1960.

ROYCE LEE SMITH (1969)
Assistant Professor of Business Administration.
B.S., Nebraska, 1957, M.A., 1964.

RUFUS ALBERT SMITH JR. (1967)
Assistant Professor of Horticulture.
B.S., Louisiana State, 1956, M.S., 1958; Ph.D., Washington State, 1967.

WESLEY WARREN SMITH (1947-48, 1956)
Professor of Mechanical Engineering.
B.Sc., Montana State, 1934, M.Eng., 1947.

WILLIAM CHARLES SMITH (1951)
Producer, KOAC-AM-TV; Associate Professor, Agricultural Extension and Oregon Educational Broadcasting, Division of Continuing Education.
B.S., Nebraska, 1942.

FORREST ARLO SNEVA (1952)
Assistant Professor of Range Management; Range Scientist, U. S. Department of Agriculture; Squaw Butte Experiment Station.
B.S., Utah State, 1952.

CHARLES DALE SNOW (1966)
Assistant Professor of Fisheries, Project Leader for Shellfish Investigations, Fish Commission of Oregon.
B.A., Linfield College, 1951; M.S., Wyoming, 1952.

MICHAEL RIDGMAN SODERQUIST (1966)
Instructor in Food Science and Technology.
B.S., Washington, 1964, M.S., 1967.

INGVALD BEN SOLBERG (1947)
Associate Professor Emeritus of Landscape Architecture.
B.L.A., Cornell, 1924.

PHILL SOLOMON (1968)
Assistant Professor of Business Administration.
B.S., Oregon, 1966; M.B.A., 1968.

FRANK CURTIS SORENSEN (1964)
Associate Plant Geneticist Forestry Sciences Laboratory, U.S. Forest Service.
B.S., Montana, 1958; M.S., Florida, 1960; Ph.D., Oregon State, 1964.

GARY WARREN SORENSON (1968)
Assistant Professor of Economics.
B.A., Fresno State College, 1961; M.A., Claremont Graduate School, 1966, Ph.D., 1968.

B. LINN SOULE (1967)
Associate Professor of Business Administration.
B.S. E.E., Michigan, 1951; M.B.A., Ohio State, 1963; Ph.D., Michigan State, 1967. Registered Professional Electrical Engineer, Ohio, 1961; Michigan, 1963; Oregon, 1968.

MARY ANN SOUTHAM (1966)
Assistant Director (Assistant Professor) Residence Hall Program.
B.S., UCLA, 1962, M.S., 1963.

GEORGENE DERSHON SOUTHWELL (1965)
Clackamas County Extension Agent (Instructor).
B.S., Oregon State, 1965.

JAMES BROOKES SPENCER (1963)
Assistant Professor of History of Science, General Science.
B.S., Lawrence College, 1948; M.S., Wisconsin, 1956, Ph.D., 1964.
Leave of absence 1970-1971.

LEE ADEN SPENCER (1967)
Instructor in Pharmaceutical Chemistry.
B.A. & B.S., Oregon State, 1958, M.S., 1967.

BERTRAND THOMAS SPERLING (1965)
Assistant Professor, Consultant, IRAM Center.
B.S., St. Lawrence University, 1948; B.S., MTR, USNPGS, Monterey, 1962.

FRANCES GAGE SPIGAI (1967)
Information Analyst, Library.
B.S., College of City of New York, 1960.

MARK RITTER SPONENBURGH (1961)
Professor of Art.
Diploma, Cranbrook Academy, 1940; Cert d'Etudes, Ecole des Beaux Arts (Paris), 1946; A.M., Cairo, 1953; M.A., London, 1957.

JOHN FREMONT SPROWLS (1952)
Multnomah County Extension Chairman (Associate Professor).
B.S., Oklahoma State, 1942; M.S., Wisconsin, 1959.

CYRIL VELDE STADSVOLD, AIA (1963)
Associate Professor of Architecture.
Jr. College Degree, State School of Science, North Dakota, 1952; B.Arch., North Dakota State, 1955. Architect, 1962.

ROBERT DELMER STALLEY (1956)
Professor of Mathematics.
B.S., Oregon State, 1946, M.A., 1948; Ph.D., Oregon, 1953.

WARREN SPENCER STATON (1958)
Associate Professor of General Engineering.
B.A., B.S., Civil Engineering, Oregon State, 1950, M.S., Civil Engineering, 1951.

FREDERICK LEE STAVER (1957)
Associate Professor of English.
B.A., California, 1949, M.A., 1951, Ph.D., 1963.

ROBERT LLOYD STEBBINS (1962)
Extension Horticulture Specialist (Associate Professor).
B.S., Colorado State University, 1955; M.S., California, 1959.
On sabbatical leave 1968-1970.

JAMES FRANKLIN STEENBERGEN (1968)
Assistant Professor of Microbiology.
A.A., Lindsey Wilson Jr. College, 1959; B.S., Western Kentucky State, 1962; M.A., Indiana, 1965, Ph.D., 1968.

WILLIAM PERSHING STEPHAN (1968)
Assistant Physician, Associate Professor, Student Health Service.
A.A., Sacramento Junior College, 1938; B.A., California, 1943; M.D., Medical School, California, 1945.

WILLIAM PROCURONOFF STEPHEN (1953)
Professor of Entomology.
B.S.A., Manitoba, 1948; Ph.D., Kansas, 1952.

CHARLES T. STEPHENS (1968)
Instructor in Civil Engineering.
B.S.C.E., New Mexico, 1957; M.S.E., Arizona State, 1962; Engineer, Stanford, 1966.

LULA MARY STEPHENSON (1941)
Curator, Horner Museum (Instructor).

ROSCOE ELMO STEPHENSON (1923)
Professor Emeritus of Soils.
B.S., Purdue, 1915; M.S., Illinois, 1917; Ph.D., Iowa State, 1920.

ROBERT HOWARD STERLING (1940-42, 1956)
Deschutes County Extension Chairman (Professor).
B.S., Oregon State, 1935, M.S., 1962.

ROBERT HUGH STEVELY (1954)
Columbia County Extension Agent, 4-H Club (Assistant Professor).
B.S., Cornell, 1941.

ANN STEVENS (1964)
Columbia County Extension Agent, Home Economics (Assistant Professor).
B.S., Oregon State, 1964.

GEORGE F. STEVENS (1963)
Director Memorial Union and Student Activities (Professor).
B.A., Iowa, 1950; Ed.M., Oregon State, 1968.

JAMES ORVAL STEVENS (1962)
Assistant Professor of Veterinary Medicine.
D.V.M., Washington State, 1962; M.S., Oregon State, 1967.

JOE BRUCE STEVENS (1966)
Assistant Professor of Agricultural Economics.
B.S., Colorado State, 1958; M.S., Purdue, 1963; Ph.D., Oregon State, 1965.

ELMER CLARK STEVENSON (1967)
Director of Resident Instruction, Associate Dean of Agriculture (Professor).
B.S., Maryland, 1937; Ph.D., Wisconsin, 1942.

THOMAS EDWARD STITZEL (1966)
Associate Professor of Business Administration.
B.S., Washington State, 1957; M.B.A., Oregon, 1964, D.B.A., 1966. Registered Professional Engineer, Oklahoma, 1961.

HERBERT HORST STOEVENER (1962)
Associate Professor of Agricultural Economics.
B.S., Cornell, 1958; M.S., Illinois, 1962, Ph.D., 1963.

CARL HENRY STOLTENBERG (1966)
Dean of School of Forestry, Director of Forest Research Laboratory, Professor of Forest Management.
B.S., California, 1948, M.F., 1949; Ph.D., Minnesota, 1952.

LOUIS NELSON STONE (1947)
Professor of Electrical Engineering, Head of Department.
B.S., Oregon State, 1939.

SOLON ALLEN STONE (1956)
Assistant to the Dean of the School of Engineering; Professor of Electrical Engineering.
B.S., Oregon State, 1952.

WILLIAM MATTHEWSON STONE (1947)
Professor of Mathematics.
B.A., Willamette, 1938; M.A., Oregon State, 1940; Ph.D., Iowa State, 1947.

ARTHUR IRA STONEHILL (1966)
Associate Professor of Business Administration.
B.A., Yale, 1953; M.B.A., Harvard, 1957; Ph.D., California (Berkeley), 1965.

ROBERT MacLEOD STORM (1948)
Professor of Zoology.
B.E., Northern Illinois State Teachers, 1939; M.S., Oregon State, 1941, Ph.D., 1948.

FREDRICK STORMSHAK (1968)
Assistant Professor of Animal Science.
B.S., Washington State, 1959, M.S., 1960; Ph.D., Wisconsin, 1965.

CLARA A. STORVICK (1945)
Professor of Foods and Nutrition; Chairman of Home Economics Research, Agricultural Experiment Station; Director, Nutrition Research Institute.
A.B., St. Olaf College, 1929; M.S., Iowa State, 1933; Ph.D., Cornell, 1941.

FLOYD MADISON STOUT (1959)
Associate Professor of Animal Nutrition.
B.S., Colorado State, 1953; M.S., Oregon State, 1959, Ph.D., 1960.

AUGUST LEROY STRAND (1942)
President Emeritus of Oregon State University.
B.S., Montana State, 1917; M.S., Minnesota, 1925, Ph.D., 1928; LL.D. (honorary), Montana State, 1957.

BERNICE STRAWN (1959)
Extension Specialist in Home Management (Professor).
B.S., Iowa State, 1927, M.S., 1931.

LARRY LEE STREEBY (1970)
Assistant Professor of Forest Management.
B.S., Iowa State, 1963, M.S., 1965.

HORST ERIC STREITBERGER (1965)
Assistant Director AYI.
B.A., State College of Iowa, 1958; M.S., Oregon State, 1963.

LESTER BRADEN STRICKLER (1954)
Professor of Business Administration.
B.A., Pennsylvania State, 1948, M.A., 1949; D.B.A., Indiana, 1954.

CRAIG MARVIN STROH (1968)
Instructor in Economics.
A.B., Sacramento State College, 1964; A.M., Oregon, 1967.

ELIZABETH STRONG (1960)
Assistant Professor of Oceanography.
B.A., State University of New York (Albany), 1937.

EDWIN DAVID STROWBRIDGE, JR. (1964)
Associate Professor of Education.
B.S., Oregon State, 1950; M.Ed., Lewis & Clark College, 1956, D.Ed., Oregon, 1967.

BERTHA WHILLOCK STUTZ (1918)
Associate Professor Emeritus of Secretarial Science.
B.Ped., Missouri State Teachers, 1910; B.S., Oregon State, 1918, M.S., 1927.

LLOYD CONRAD SUNDSTROM (1969)
Instructor, Industrial Education, Assistant Coordinator Vocational Education, Division of Continuing Education.
B.S., Oregon State, 1964, Ed.M., 1965.

CHARLES FEARN SUTHERLAND, JR. (1959)
Associate Professor of Forest Economics.
B.S., Idaho, 1948, M.F., 1954; Ph.D., Michigan, 1961.
On sabbatical leave September 1, 1969 to August 31, 1970.

SANDRA J. SUTTIE (1969)
Assistant Professor of Physical Education for Women.
B.S., Colorado, 1960; M.S., Oregon, 1962; Ph.D., Southern California, 1969.

GRANT ALEXANDER SWAN (1926)
Associate Professor Emeritus of Physical Education.
B.S., Oregon State, 1922; M.S., Washington, 1951.

STANLEY LEONARD SWANSON (1963)
Instructor in Agronomy.
B.S., in Soils Science, California State Polytechnic College, 1953.

STANLEY STEWART SWANSON (1962)
Senior Cataloger (Assistant Professor), Library.
B.A., Colorado, 1949, M.Ed., 1953; M.A.L.S., Michigan, 1956.

MICHAEL LINCOLN SWEENEY (1968)
Assistant Professor of Naval Science.
B.A. History, Southeastern State College, Oklahoma, 1960.

KNUD GEORGE SWENSON (1954)
Professor of Entomology.
B.S., South Dakota State, 1948; Ph.D., California, 1951.

L. WAYNE SWENSON (1968)
Associate Professor of Physics.
B.S., M.I.T., 1954, Ph.D., 1960.

KLINE RUTHVEN SWYGARD (1947)
Professor of Political Science.
B.A., Washington, 1935, Ph.D., 1950.

BUDD N. TAMLER (1967)
Associate Professor of Social Science Education.
B.A., Brooklyn College, 1949; M.A., New York University, 1951; M.A.T., Yale, 1960.

GERTRUDE TANK (1953)
Associate Professor Emeritus of Nutrition Research.
D.D.S., Temple, 1916.

RICHARD THOMAS TANNER (1968)
Assistant Professor of Science Education.
B.S., Oregon College of Education, 1958; M.S., Oregon State, 1962; Ph.D., Stanford, 1968.

GENE N. TANSELLI (1962)
Associate Professor; Varsity Baseball Coach.
B.S., Oregon State, 1951, M.Ed., 1960.

ROBERT FRANK TARRANT (1965)
Professor; Supervisory Soil Scientist (Research) United States Forest Service.
B.S., Oregon State, 1941.

ESTHER ADELIA TASKERUD (1947)
Assistant Director Emeritus Federal Cooperative Extension Service (Professor).
B.S., South Dakota State, 1933; M.A., Columbia, 1947; Sc.D., South Dakota State, 1962.

JOHN FLETCHER TATOM (1961)
Associate Professor Emeritus of Physics.
B.S., U.S. Naval Academy, 1930; M.S., Cal Tech., 1939.

WILLIAM HARRIS TAUBENECK (1951)
Professor of Geology.
B.S., Oregon State, 1949, M.S., 1950; Ph.D., Columbia, 1955.

LISA WAITE TAUBMAN (1956)
Senior Instructor in Psychology.
B.A., Washington, 1948; M.Ed., Mills College, 1952.

EDWARD MORGAN TAYLOR (1966)
Assistant Professor of Geology.
B.S., Oregon State, 1957, M.S., 1960; Ph.D., Washington, 1967.

JAMES LOUIS TAYLOR (1969)
Assistant Professor of Naval Science.
B.S., Oregon State, 1965.

JENNIE LEE TAYLOR (1969)
Counselor, Counseling Center; Instructor.
B.A., Eastern Washington State College, 1955; M.A., Oregon State, 1969.

LYALL FREDERICK TAYLOR (1969)
Research Associate (Instructor), Farm Crops.
B.S., Iowa State, 1948; M.S., Wisconsin, 1949, Ph.D., 1951.

NORTON OSCAR TAYLOR (1946-48, 1949)
Umatilla County Extension Agent (Associate Professor).
B.S., Oregon State, 1942.

WAYNE PENDLETON TAYSOM (1953)
Professor of Art.
B.F.A., Utah, 1948; M.A., Columbia, 1950.

RAY HOLT TEAL (1950)
Extension International Seed & Grain Marketing Specialist (Associate Professor).
B.S., Illinois, 1935, M.S., 1937.

HENRY ARNOLD TEN PAS (1948)
Director, Division of Vocational Adult and Community College Education.
B.S., Wisconsin, 1940; M.S., Oregon State, 1949; Ed.D., Washington State, 1954.

LEON C. TERRIERE (1950)
Professor of Biochemistry and Insect Toxicology, Agricultural Chemistry and Entomology.
B.S., Idaho, 1943; Ph.D., Oregon State, 1950.

MARK HOWARD TERREL (1969)
Professor of Military Science.
B.S., West Point USMA, 1942, M.S., Nuclear Physics, 1948.

JOSEPH THORPE THALER (1967)
Instructor in Mechanical Engineering.
B.S.M.E., Oregon State, 1965.

LINDA ANNE THIEL (1967)
Instructor in Clothing, Textiles, and Related Arts.
B.S., Oregon State, 1957; M.S., 1967.

JOHN RALPH THIENES (1952)
Wasco County Extension Agent (Associate Professor).
B.S., Oregon State, 1949; M.S., Michigan State, 1968.

RICHARD WILLIAM THIES (1968)
Assistant Professor of Chemistry.
B.S., Michigan, 1963; Ph.D., Wisconsin, 1967.

MARTIN BERNHARDT THINGVOLD (1954)
Benton County Extension Agent (Assistant Professor).
B.S., Oregon State, 1953.

HARVEY THOENNES (1966)
Instructor, Computer Center.
B.S., Portland University, 1964.

CHARLES EDWIN THOMAS (1918)
Professor Emeritus of Mechanics and Materials.
M.E., Cornell, 1913, M.M.E., 1931.

DALE OREN THOMAS (1956)
Associate Professor of Physical Education; Wrestling Coach.
B.A., Cornell College, 1947; M.P.E., Purdue, 1948; Ph.D., Iowa, 1956.

DAVID REGINALD THOMAS (1967)
Assistant Professor of Statistics.
B.S., Oregon State, 1960, M.S., 1962; Ph.D., Iowa State, 1965.

HOWARD R. THOMAS (1967)
Agricultural Economist U.S.D.A., (Instructor).
B.S., Utah State, 1966, M.S., 1968.

MARION DAWS THOMAS (1937-45, 1947)
Public Policy Education Specialist (Professor).
B.S., Oregon State, 1937.

BENJAMIN GARRISON THOMPSON (1924)
Professor Emeritus of Entomology.
B.S., Oregon State, 1918; M.S., 1924; Ph.D., Washington, 1939.

BETTY LYND THOMPSON (1927)
Associate Professor of Physical Education.
A.B., Illinois Wesleyan, 1923; M.A., Wisconsin, 1926.

CLARENCE GARRISON THOMPSON (1960)
Entomologist (Professor) United States Forest Service.
B.S., Oregon State, 1940; M.S., California, 1947, Ph.D., 1950.

JOHN GRAY THOMPSON (1948)
Portland City Extension Agent, 4-H and Youth (Associate Professor).
B.S., Oregon State, 1948.

MAXINE MARIE THOMPSON (1964)
Assistant Professor of Horticulture.
B.S., California, 1948, M.S., 1951, Ph.D., 1960.

RORY THOMPSON (1969)
Assistant Professor of Atmospheric Science.
A.B., San Diego State College, 1962, M.S., 1964; Ph.D., MIT, 1968.

THOMAS WILLIAM THOMPSON (1949)
Wasco County Extension Chairman (Associate Professor).
B.S., Oregon State, 1949.

DAVID JOHN THOMSEN (1967)
Instructor, Assistant Crew Coach, Intercollegiate Athletics.
B.A., Washington, 1967.

GEORGE EARL THORNBURGH (1952)
Director of Planning and Institutional Research; Professor of Mechanical Engineering.
B.S., Nebraska, 1944; M.S., Iowa State, 1950.

ROBERT LEWIS TICKNOR (1959)
Professor of Horticulture, North Willamettte Experiment Station.
B.S., Oregon State, 1950; M.S., Michigan State, 1951, Ph.D., 1953.

GEORGE WAYNE TIGER (1966)
Extension Certification Assistant (Instructor).
B.S. Farm Crops, Oregon State, 1966.

E. DORIS TILLES (1968)
Gifts and Exchange Librarian.
A.B., California (Berkeley), 1956, M.L.S., 1957.

THOMAS NORMAN TILLMAN (1969)
Assistant Professor of Physical Education.
B.S., Michigan, 1951; M.A., Michigan State, 1964, Ph.D., 1970.

GERTRUDE BERNICE TINGELSTAD (1964)
Assistant Catalog Librarian (Assistant Professor).
A.B., Luther College, 1941; A.B.L.S., Michigan, 1942; M.A., Minnesota, 1959.

IAN JAMES TINSLEY (1957)
Associate Professor of Chemistry, Agricultural Chemistry.
B.Sc., Sydney University (Australia), 1950; M.S., Oregon State, 1955, Ph.D., 1958.

HOPE L. TOCCHINI (1953-58, 1969-70)
Jackson County Extension Agent (4-H and Youth).
B.S., Oregon State, 1953.

ARTHUR LEROY TOLLEFSON (1966)
Professor of Education; Coordinator of Graduate Program in College Student Personnel Administration.
B.A., Concordia College, 1948; M.A., Minnesota, 1953, Ph.D., 1956.

PIA AGNETA TOLLO (1969)
Assistant Reference Librarian.
A.A., Foothill College, 1965; B.A., California at Santa Barbara, 1967; M.S., Washington, 1969.

PALMER STANLEY TORVEND (1939)
Washington County Extension Chairman (Professor).
B.S., Oregon State, 1938; M.S., Columbia, 1953.

RICHARD EDWARD TOWEY (1962)
Associate Professor of Economics.
B.S., University of San Francisco, 1954; M.A., California (Berkeley), 1957; Ph.D., 1967. On leave.

JAMES MARTIN TRAPPE (1965)
Assistant Professor of Plant Pathology, Forest Research Laboratory, Principal Mycologist, United States Forest Service.
B.S., Washington, 1953; M.F., S.U.N.Y. Syracuse, 1955, Ph.D., Washington, 1962.

CARLA C. TRAUTMAN (1968)
Assistant Science-Technology Librarian.
B.A., South Dakota State, 1968; M.A., University of Denver, 1968.

BESSIE GWYNETH TRESSLER (1946)
Acquisitions Librarian (Associate Professor Emeritus), Library.
A.B., Emporia, 1926; B.S. (Lib.Sc.), Illinois, 1930.

JOHN EDWIN TRIERWEILER (1969)
Assistant Professor of Agricultural Economics.
B.S., South Dakota State, 1963, M.S., 1964; Ph.D., Nebraska, 1969.

EDWARD JOHN TRIONE (1959)
Associate Professor of Botany and Plant Pathology; Biochemist, U. S. Department of Agriculture.
B.A., Chico State, 1950; Ph.D., Oregon State, 1957.

EDRIE DALE TROUT (1962)
Professor of Radiological Physics, X-Ray Science & Engineering, General Science, Director, X-Ray Science and Engineering Laboratory.
B.S., Franklin College, 1922, D.Sc. (Honorary), 1952.

CLIFFORD WAYNE TROW (1965)
Assistant Professor of History.
A.B., Kansas Wesleyan University, 1951; M.A., Colorado, 1958; Ph.D., 1966.

JO ANNE J. TROW (1965)
Associate Dean of Students, Professor.
B.A., Denison University, 1953; M.A., Indiana, 1956; Ph.D., Michigan State, 1965.

WILLIAM BENJAMIN TUCKER (1921)
Jackson County Extension Agent (Professor) Emeritus.

D. GRAHAM TWEEDY (1969)
Research Associate in Entomology.
B.S.A., UBS, 1959; M.S., Oregon State, 1967, Ph.D., 1969.

PETER A. TYERMAN (1967)
OB/GYN Consultant, Professor, Student Health Service.
B.A., Oregon, 1957; M.D., George Washington University School of Medicine, 1961.

PAUL BARTHOLOMEW VALENTI (1949)
Varsity Basketball Coach (Professor).
B.S., Oregon State, 1947, M.S., 1957.

MILTON ALBERT VALENTINE (1964)
Professor of Speech Communication.
A.B., Stanford, 1945, M.A., 1950, Ph.D., 1957.

TJEERD HENDRIK van ANDEL (1968)
Professor of Oceanography.
B.S., University of Groningen, 1946, M.S., 1948, Ph.D., 1950.

NELLIE JOAN VAN CALCAR (1965)
Linn County Extension Agent, 4-H and Youth, (Instructor).
B.S., Oregon State, 1964.

NORBERT JOSEPH VANDEHEY (1959)
Lane County Extension Agent, 4-H and Youth (Associate Professor).
B.S., Oregon State, 1949; M.Ed., Linfield College, 1955.

HENRY VAN DYKE (1963)
Associate Professor of Biology, General Science.
B.S., Western Reserve, 1947; M.A., Michigan, 1949, Ph.D., 1955.
On sabbatical leave 1969-70.

KENSAL EDWARD VAN HOLDE (1967)
Professor of Biophysics, Department of Biochemistry & Biophysics.
B.S., Wisconsin, 1949, Ph.D., 1952.

EDNA MARJORIE VAN HORN (1939-40, 1942, 1944)
Professor Emeritus of Home Administration.
B.A., Colorado College, 1923; M.A., Columbia, 1932, Ph.D., 1953.

JAMES KENNETH VAN LEUVEN (1967)
Assistant Professor of Journalism; News Editor, Department of Information.
B.S., Oregon, 1964, M.S., 1966.

LILLIAN VAN LOAN (1947-61, 1969)
Head, Programing Office, Division of Continuing Education.
B.S., Oregon College of Education, 1949; M.S., Oregon State, 1951, Ed.D., 1954.

ANTONE CORNELIS VAN VLIET (1955)
Associate Professor of Forest Products, Extension Wood Technologist.
B.S., Oregon State, 1952, M.S., 1958.

FREDA TEITZEL VARS (1965)
Assistant Professor of Home Management.
B.S., Washington State, 1962; M.S., Oregon State, 1966.

RAYMOND CHARLES VARS, JR. (1966)
Assistant Professor of Economics.
B.S.B.A., Denver, 1958, M.B.A., 1960; M.A., California (Berkeley), 1965, Ph.D., 1969.

GEORGE WALLACE VARSEVELD (1963)
Assistant Professor of Food Science and Technology.
B.S., University of Alberta, 1947; M.S., Oregon State, 1953.

EDWARD KEMP VAUGHAN (1947)
Professor of Plant Pathology.
B.S., New Mexico State, 1929; M.S., Oregon State, 1932; Ph.D., Minnesota, 1942.

WILLIAM HARRY VENEMA (1967)
Counselor, Counseling Center, Assistant Professor.
B.S., Washington State, 1958, M.A., 1964, Ed.D., 1968.

B. J. VERTS (1965)
Associate Professor of Wildlife Ecology.
B.S., Missouri, 1954; M.S., Southern Illinois, 1956, Ph.D., 1965.

RAY A. VERZASCONI (1967)
Associate Professor of Spanish.
B.A., California (Berkeley), 1960; M.A., Washington, 1962, Ph.D., 1965.

MARLOW VESTERBY (1967)
Agricultural Economist (Economic Research Service, U.S.D.A.) (Instructor).
B.S., Montana State, 1961, M.S., 1965.

CVANCARA A. VICTOR (1968)
Assistant Professor of Zoology.
B.S., Minot State College, 1959; M.S., South Dakota, 1964, Ph.D., 1968.

ALDA BRUMBACH VINSON (1968)
Instructor in Art.
B.A., Oregon, 1967, M.A., 1968.

HAROLD ROTH VINYARD (1938)
Associate Professor Emeritus of Physics.
B.S. (E.Eng.), Oregon State, 1924, M.S., 1928; Ph.D., Pennsylvania State, 1938.

CHARLES ANTHONY VISGATIS (1969)
Coordinator of Art Education, (Instructor).
B.A.E., Art Institute of Chicago, 1957; M.A., Northwestern, 1963.

PAUL ANTHONY VOHS, JR. (1968)
Associate Professor of Wildlife Ecology.
B.S., Kansas, 1955; M.A., Southern Illinois, 1958; Ph.D., Iowa State, 1964.

VERIL VAN VOLK (1966)
Assistant Professor of Soils.
B.Sc., Ohio State, 1960, M.S., 1961; Ph.D., Wisconsin, 1965.

JAMES ARTHUR VOMOCIL (1967)
Extension Soils Specialist (Associate Professor).
B.S., Arizona, 1950; M.S., Michigan State, 1951; Ph.D., Rutgers, 1956.

FRANK VON BORSTEL, JR. (1948)
Marion County Extension Agent, 4-H and Youth (Associate Professor).
B.S., Oregon State, 1948; M.Agr.Sc., University of New Zealand, 1952.

DAVID RICHARD VOTH (1969)
Instructor in Zoology.
B.S., North Dakota, 1963, M.S., 1965.

STANLEY ELLIOTT WADSWORTH (1946)
Associate Professor of Floriculture.
B.S., Cornell, 1935.

JOSEPH MARK WAGENER (1969)
Assistant Professor, Clinical Psychologist, Student Health Service.
A.B., Ohio, 1962; M.A., Kent State University, 1964; Ph.D., Purdue, 1969.

CARL BERNARD WAGNER (1965)
Associate Professor, Varsity Track and Cross Country Coach, Intercollegiate Athletics.
A.B., Stanford, 1948, M.A., 1949.

HARRY HENRY WAGNER (1959)
Instructor in Fisheries; Fishery Biologist, Research Division, Oregon State Game Commission.
B.S., Humboldt State, 1955; M.S., Oregon State, 1959.

SHELDON LEON WAGNER (1963)
Medical Consultant, Student Health Service (Professor).
B.S., Wisconsin, 1954, M.D., 1957.

RODNEY KING WALDRON (1954)
Director of Libraries (Professor).
B.A., Denver, 1950, M.A., 1950.

JOSEPH HOWE WALES (1959)
Associate Professor of Food Science and Technology.
B.A., Stanford, 1930, M.A., 1931.

LESTER EUGENE WALKER (1967)
Instructor in Zoology.
B.S., Southwest Texas State College, 1961, M.A., 1965.

ALEXANDER ST. CLAIR WALLACE, JR. (1965)
Assistant Professor of Speech Communication.
B.A., Kansas State Teachers College, 1960; M.A., Kent State, 1961.

ALICE LOCKWOOD INGALLS WALLACE (1954)
Assistant Professor of Speech Communication.
B.S., Oregon State, 1932; M.A., Northwestern, 1938.

MARY SUSANNE WALLACE (1958)
Assistant Professor of Foods and Nutrition.
B.S., New York State University Teacher's College (Plattsburgh), 1955; M.S., Rhode Island, 1957.

ROBERT BOEN WALLS (1947)
Professor of Music.
B.E., Minnesota State Teachers (Moorhead), 1932; M.S., North Dakota, 1936.
On sabbatical leave January 5 to June 15, 1970.

DON COIN WALROD (1948)
Columbia County Extension Chairman (Associate Professor).
B.S., Colorado State University, 1942; M.S., Michigan State, 1960.

AUSTIN FREDERIC WALTER (1950)
Professor of Political Science.
B.A., Carleton, 1940; M.A., Fletcher School of Law and Diplomacy, 1942; Ph.D., Michigan, 1954.

JESSE SEBURN WALTON (1945)
Professor Emeritus of Chemical Engineering.
B.S., Iowa, 1928.

CHIEN-YI WANG (1969)
Research Associate, Mid-Columbia Experiment Station.
B.S., National Taiwan University, 1964; Ph.D., Oregon State, 1969.

CHIH HSING WANG (1950)
Professor of Chemistry; Professor (Chemistry), Science Research Institute; Director, Radiation Center, Director, Institute of Nuclear Science and Engineering.
B.S., University of Shantung, China, 1937; M.S., Oregon State, 1947, Ph.D., 1950.

SHIOW-YING WANG (1969)
Assistant in Horticulture, Mid-Columbia Experiment Station.
B.S., National Taiwan University, 1964; M.S., California (Davis), 1966; Ph.D., Oregon State, 1969.

JOHN MATHER WARD (1966)
Dean, School of Science, Professor of Botany.
B.S., Rutgers, 1949; Ph.D., Pennsylvania, 1954.

DAVID H. WARDSWORTH (1968)
Master Sergeant, USAF, Instructor in Aerospace Studies.

MARGARET CHRISTIAN WARE (1945)
Assistant Professor Emeritus of Foods and Nutrition.
B.S., Oregon State, 1941, M.S., 1944.

RICHARD HARVEY WARING (1963)
Assistant Professor of Forest Management.
B.S., Minnesota, 1957, M.S., 1959; Ph.D., California, 1963.
On sabbatical leave September 15, 1969-September 14, 1970.

CHARLES F. WARNATH (1961)
Director of Counseling Center; Professor of Psychology.
A.B., Princeton, 1949; M.A., Teacher's College, Columbia, 1951; Ph.D., Columbia, 1954.

HARRIET JANET WARNER (1930)
Assistant Reference Librarian Emeritus (Assistant Professor), Library.
A.B., California, 1919; Certificate of Librarianship, 1930.

CHARLES EDWARD WARREN (1953)
Professor of Fisheries.
B.S., Oregon State, 1949, M.S., 1951; Ph.D., California, 1961.

KENNETH LEE WARREN (1961)
Head, Instructional Materials & Equipment Services, Associate Professor, Division of Continuing Education.
B.S., Oregon, 1953; M.A., Fresno State, 1961.
On sabbatical leave 1969-70.

REX WARREN (1934-45, 1947)
Extension Farm Crops Specialist (Professor).
B.S., Utah State, 1931; M.S., Oregon State, 1933.

DIANE SUSAN WASSER (1969)
Instructor in English.
B.A., Cornell, 1966; M.A., Columbia, 1969.

ALLEN LOWELL WASSERMAN (1965)
Associate Professor of Physics.
B.S., Carnegie Institute of Technology, 1956; Ph.D., Iowa State, 1963.

JOSEPHINE WASSON (1943)
Associate Professor of Art and Architecture Emeritus.
B.A., Washington State, 1925; M.A., Columbia, 1933. Retired.

WILFRED C. WASSON (1968)
Coordinator, Special Services Program, Office of Dean of Students.
B.A., Oregon, 1962.

JOHN LOWE WATSON (1947)
Comptroller, Oregon State Board of Higher Education (Professor).
B.A., Washington, 1939; C.P.A., Washington, 1939; Oregon, 1952.

FRANCES MARGARET WATTS (1958)
Coos County Extension Agent (Home Economics) (Assistant Professor).
B.S., Minnesota, 1949.

DAROLD DUANE WAX (1962)
Associate Professor of History.
B.A., Washington State, 1956; M.A., Washington 1959, Ph.D., 1962.
On sabbatical leave 1968-69.

KENNETH EARL WEAVER (1968)
Instructor in X-Ray Science, General Science.
B.S., California State (Los Angeles), 1966; M.S., Oregon State, 1968.

ROGER K. WEAVER (1962)
Assistant Professor of English.
B.A., Oregon, 1957; M.A., Washington, 1962; M.F.A., Oregon, 1967.

HANS H. WEBER (1966)
Head, Business Records Department, Library (Assistant Professor).
B.A., Montana, 1958; M.L.S., Washington, 1964.

LAVERN JOHN WEBER (1969)
Associate Professor of Pharmacology and Fisheries.
A.A.S., Everett Commercial College, 1956; B.A., Pacific Lutheran University, 1958; M.S., Washington, 1962, Ph.D., 1964.

LEONARD JOSEPH WEBER (1954)
Professor of Electrical Engineering.
B.S., Oregon State, 1952; M.S., Washington, 1962.
On leave 1969-70.

EMMA LOUISE WEBSTER (1953)
Multnomah County Extension Agent, Home Economics (Associate Professor).
B.S., Washington State, 1930. Retired.

JEROME CONRAD WEILER (1969)
Assistant Professor of Business Administration.
B.B.A., Michigan, 1948; C.P.A., Colorado, 1951; M.B.A., Air Force Institute of Technology, 1959.

RICHARD J. WEINMAN (1967)
Associate Professor of Speech Communication (Broadcast Media Communication).
A.B., Indiana, 1955; M.A., Columbia, 1956; Ph.D., Indiana, 1965.

ERMA MARION WEIR (1945)
Professor of Physical Education.
B.E., Minnesota State Teachers (Bemidji), 1936; M.S., Washington, 1941.

JESSE DAVIS WELLONS III (1970)
Associate Professor of Forest Products Chemistry.
B.S., Duke, 1960, M.F., 1963, Ph.D., 1966.

EARL WILLIAM WELLS (1921)
Professor Emeritus of Speech Communication.
A.B., Iowa, 1921; M.A., Wisconsin, 1927; J.D., Iowa, 1928.

VERA LUCILE WELLS (1948)
Assistant Professor of Clothing, Textiles, and Related Arts.
B.S., Oregon State, 1948, M.S., 1953.

JAMES RICHARD WELTY (1958)
Professor of Mechanical Engineering.
B.S. (M.E.), Oregon State, 1954, M.S. (M.E.), 1959, Ph.D. (Chem. E.), 1962.

DELBERT A. WERSEBE (1968)
Instructor (Chief Quartermaster, USN), Naval Science.

HAROLD ELDON WERTH (1949-51, 1956)
Benton County Extension Agent (Associate Professor).
B.S., Oregon State, 1948; M.S., Michigan State, 1966.

WILLIAM IRVIN WEST (1946)
Professor of Forest Products.
B.S.F., Washington, 1939, M.F., 1941.

HAZEL KELSEY WESTCOTT (1919-21, 1926)
Administrative Assistant (Assistant Professor), President's Office. (Retired.)
B.S., Oregon State, 1920.

PETER HUGHES WESTIGARD (1962)
Associate Professor of Entomology, Southern Oregon Experiment Station.
A.B., San Jose State, 1956; Ph.D., California, 1961.

MELVIN NEIL WESTWOOD (1960)
Professor of Horticulture.
B.S., Utah State, 1952; Ph.D., Washington State, 1956.

PAUL HENRY WESWIG (1941)
Professor of Chemistry, Agricultural Chemistry.
B.A., St. Olaf College, 1935; M.S., Minnesota, 1939, Ph.D., 1941.

PHILIP DANIEL WHANGER (1966)
Assistant Professor of Agricultural Chemistry.
B.S., Berry College, 1959; M.S., West Virginia, 1961; Ph.D., North Carolina State, 1965.

WILLIAM PERRY WHEELER (1949)
Professor of Forest Management; Head Adviser and Placement Officer, School of Forestry.
B.S., Minnesota, 1948, M.F., 1949; Ph.D., Syracuse (New York State College of Forestry), 1967.

HAROLD H. WHITE (1931)
Professor Emeritus of Agronomy, Southern Oregon Experiment Station.
B.S., Oregon State, 1920, M.S., 1937.

MARJORIE JOANN WHITE (1963)
Associate Professor of Education.
B.Ed., San Jose State, 1952; M.Ed., Oregon, 1957; Ed.D., Wayne State, 1963.

SIDNEY DOUGLAS WHITE (1958)
Professor of Art.
B.A., New Mexico, 1951; M.S., Wisconsin, 1952.

WILLIAM HUMES WHITE (1968)
Assistant Professor of Civil Engineering.
B.S. (C.E.), Idaho, 1963; M.S. (C.E.), 1966.

VERNON EUGENE WIARD (1965)
Director of Food Service, Residence Halls, Assistant Professor of Institution Management.
B.S.B.A., Denver, 1953.

WILLIAM QUENTIN WICK (1960)
Marine Advisory Program Leader, Marine Science Center (Professor).
B.S., Oregon State, 1950, M.S., 1952.

BOYD ELLIS WICKMAN (1967)
Associate Professor, Supervisory Research Entomologist, Forestry Sciences Laboratory.
B.S., California (Berkeley), 1958, M.S., 1966.

PATRICIA COWLEY WICKMAN (1969)
Instructor in Institution Management.
B.S., California, 1958.

CHARLES EDWARD WICKS (1954)
Professor of Chemical Engineering; Acting Head of Department.
B.S., Oregon State, 1950; M.S., Carnegie Institute of Technology, 1952, Ph.D., 1954.

WILBUR WILSON WIDICUS, JR. (1964)
Associate Professor of Business Administration, Chairman, Department of Marketing, Finance, and Production.
B.S., Southern Illinois University, 1958; M.B.A., Indiana, 1959; Ph.D., Columbia, 1964.

ERNEST HERMAN WIEGAND (1919)
Professor Emeritus of Food Technology.
B.S.A., Missouri, 1914.

JOHN ANTHONY WIENS (1966)
Associate Professor of Zoology.
B.S., Oklahoma, 1961; M.S., Wisconsin, 1963, Ph.D., 1966.

HOWARD MORGAN WIGHT (1964)
Professor of Wildlife Ecology.
B.S., Oregon State, 1948; M.S., Pennsylvania State, 1950.

BERT GUY WILCOX (1962)
Klamath County Extension Agent (Assistant Professor).
B.S., Utah State, 1957; M.S., Oregon State, 1961.

ROBERT LEE WILDER (1968)
Extension Outdoor Recreation Specialist (Instructor).
B.S., Oregon, 1959, M.S., 1960.

ROBERT ALLAN WILDES (1969)
Research Associate in Botany.
B.Ag.Sci., Melbourne, 1965, Ph.D., 1969.

BILLY HUGHEL WILKINS (1961)
Professor of Economics.
B.B.A., Texas A & I University, 1956, M.S., 1957; Ph.D., Texas, 1962.

DALE HERBERT WILLEY (1959)
Assistant Professor of English.
B.A., Linfield, 1950; M.A., Washington State, 1952.

DAVID BRUCE WILLIAMS (1966)
Assistant Professor of Naval Science.
B.A., California, Berkeley, 1962, M.A., 1963.

JOHN BRUCE WILLIAMS (1969)
Medical Consultant, Professor, Student Health Service.
B.S., Kentucky, 1956; M.D., University of Louisville, 1961, M.S., 1968.

MAX BULLOCK WILLIAMS (1941)
Professor of Chemistry.
B.S., Utah, 1936, M.S., 1938; Ph.D., Cornell, 1941.

P. CATHERINE WILLIAMS (1967)
Instructor in Physical Education.
B.S., Wisconsin State College, La Crosse, 1951; M.A., Iowa State, 1955.

WILLIAM APPLEMAN WILLIAMS (1968)
Professor of History.
B.S., U.S. Naval Academy, 1944; M.A., Wisconsin, 1948, Ph.D., 1950.

KENNETH J. WILLIAMSON (1970)
Instructor in Civil Engineering.
B.S., Oregon State, 1968, M.S., 1970.

STANLEY ELLSWORTH WILLIAMSON (1946)
Professor of Science Education; Chairman of Department.
B.A., Nebraska Wesleyan, 1931; M.A., Columbia, 1936; Ed.D., Oregon, 1956.

DAVID LEE WILLIS (1962)
Associate Professor of Biology, General Science; Chairman of Department.
B.Th., Biola College, 1949, B.A., 1951; B.S., Wheaton College. 1952; M.A., Long Beach State College, 1954; Ph.D., Oregon State, 1963.

CLAYTON STANLEY WILLS (1959)
Clackamas County Extension Agent (Associate Professor).
B.S., Oregon State, 1950, M.Ed., 1957.

CHARLES OWENS WILSON (1959)
Dean of the School of Pharmacy, Professor of Pharmaceutical Chemistry.
Ph.C., Washington, 1932, B.S., 1934, M.S., 1935, Ph.D., 1938.

HOWARD LEROY WILSON (1964)
Associate Professor of Mathematics and Science Education.
B.A., Willamette, 1954; M.S., Illinois, 1960; Ph.D., 1966.

MAUD MATHES WILSON (1925)
Professor Emeritus of Home Economics Research.
B.S., Nebraska, 1913; A.M., Chicago, 1931.

NORMAN WILLIAM WILSON (1947)
Associate Professor Emeritus of English.
A.B., Linfield, 1930; M.A., Oregon, 1940.

ODELIA JUNGERS WILSON (1958)
Associate Professor of Music.
A.B., College of St. Teresa, 1930; M.S., Oregon, 1954.

ROBERT CLAUDE WILSON (1949)
Assistant Professor of Manufacturing and Engineering Technology.
B.S., Oregon State, 1949, Ed.M., 1955.

ROBERT ELLIOT WILSON (1957)
Associate Professor of Mechanical Engineering.
B.S., Oregon State, 1955; M.S., Illinois, 1956; Ph.D., Oregon State, 1963.

ROBERT LEE WILSON (1952)
Associate Professor of Forest Engineering.
B.A., Iowa, 1942; M.F., Colorado State University, 1947.

SARAH JACKMAN WILSON (1966)
Archivist, Instructor.
B.A., Colorado, 1949.

SHERWOOD ANN WILSON (1959)
Senior Instructor in Psychology.
B.S. (Ed.), Kansas, 1954, M.A., 1956.
On leave 1967-70.

GUSTAV HANS WILSTER (1929)
Professor Emeritus of Dairy Technology.
B.S., Iowa State, 1920, M.S., 1921, Ph.D., 1928.

CARLYN REO WINGER (1938)
Professor of Speech Communication.
B.A., Washington State, 1928, M.A., Wisconsin, 1932.

FRED EVERETT WINGER (1947)
Professor of Business Education and Secretarial Science.
B.S., Nebraska, 1934; M.A., Iowa, 1938; D.Ed., Oregon, 1951.

WILLIAM WINKLER (1957)
Associate Professor of Physical Education; Varsity Swimming Coach.
B.S. (Ed.), Michigan, 1955, M.S. (Ed.), 1960.

EUGENE PHILIP WINTERS (1954)
Morrow County Extension Chairman (Associate Professor).
B.S., Oregon State, 1950; M.Ed. (Agric.), California, 1963.
Assigned to AID (Jordan) Contract 1968-70.

RONALD HOWARD WINTERS (1968)
Assistant Professor of Pharmacology.
B.A., San Fernando State, 1963; Ph.D., Oregon State, 1969.

THEODORE FRANKLIN WIPRUD (1964)
Assistant Professor of Art.
B.A., Washington, 1958; M.E., Central Washington State, 1962; M.F.A., Claremont Graduate School, 1964.

MATTHEW NORTON WISE (1969)
Assistant Professor of Physics.
B.S., Pacific Lutheran University; Ph.D., Washington State, 1968.

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M.S., 1958, Oregon State

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B.S., 1968, Oregon State.

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Assistant in Statistics.
B.A., Alaska, 1966.

Oregon State System of Higher Education

THE OREGON STATE SYSTEM OF HIGHER EDUCATION, organized in 1932, provides educational opportunities to young people and adults throughout the State of Oregon. Member institutions are elements of an articulated system, parts of an integrated whole.

Opportunities for general education are distributed as widely as possible throughout the state, while specialized, professional, and technical programs are centered at specific institutions.

Members of the Oregon State System of Higher Education are:

Oregon State University	Corvallis
University of Oregon	Eugene
Portland State University	Portland
Oregon College of Education	Monmouth
Southern Oregon College	Ashland
Eastern Oregon College	LaGrande
Oregon Technical Institute	Klamath Falls

The University of Oregon Medical School and the University of Oregon Dental School are located in Portland. The Division of Continuing Education represents all the institutions in making college-level courses and special programs available to all citizens. The Division has offices in Salem and Roseburg as well as on most OSSHE campuses.

An interinstitutional booklet, "Your Education," lists fields of study at all State System institutions, and gives other important information for prospective students. For a free copy, write "Your Education," State Board of Higher Education, P. O. Box 3175, Eugene, Oregon 97403.

*State Board of Higher Education**

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Office of the State Board of Higher Education
Post Office Box 3175
Eugene, Oregon 97403

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

Summary of Enrollment

Enrollment by Curriculum and Class, Regular Session 1968-69

Curriculum	Freshman year	Sophomore year	Junior year	Senior year	Graduate	Special	Subtotal	Total
Liberal Arts and Sciences								
School of Humanities and Social Sciences	795	721	489	388	.....	56	2,449	.....
School of Science	687	599	498	496	888	17	3,185	.....
Total, Liberal Arts and Sciences, (excluding duplicates)	1,482	1,320	987	884	888	73	.....	5,634
Professional Curricula								
School of Agriculture	235	240	242	235	331	4	1,287	.....
School of Business and Technology	506	418	346	367	103	25	1,765	.....
School of Education	512	583	547	548	240	21	2,451	.....
School of Engineering	602	550	463	429	187	10	2,241	.....
School of Forestry	128	119	119	82	60	.....	508	.....
School of Home Economics	296	267	192	205	73	2	1,035	.....
School of Pharmacy	84	109	96	173	16	.....	478	.....
Unclassified	.....	.....	.....	.....	355	37	392	.....
Total, Professional Schools	2,363	2,286	2,005	2,039	1,365	99	.....	10,157
Totals, (excluding duplicates)	3,845	3,606	2,992	2,923	2,253	172	.....	15,791
Total Students, Regular Session								15,791

Enrollment by Sex, All Sessions, 1968-69

Session	Men	Women	Total
Summer Term, 1968	3,059	1,849	4,908
Fall Term, 1968-69	9,224	5,300	14,524
Winter Term, 1968-69	8,865	5,052	13,917
Spring Term, 1968-69	8,436	4,806	13,242
Net Total, Regular Sessions	9,990	5,801	15,791
Net Total, All Sessions	13,049	7,650	20,699

Enrollment in Summer Term, 1968

	Men	Women	Total
Summer Term	3,059	1,849	4,908
4-H Club Short Course	423	1,266	1,689
Totals	3,482	3,115	6,597

Enrollment in the Division of Continuing Education 1968-1969

Classes	Total
Division Classes	
Credit	40,825
Noncredit	20,168
Total Classes	60,993
Correspondence Study	3,283
Total	64,276

Summary of Degrees Conferred 1968-69

Advanced Degrees	
Doctor of Philosophy	150
Doctor of Education	9
Master of Arts	38
Master of Science	361
Master of Agriculture	7
Master of Business Administration	23
Master of Education	190
Master of Engineering	2
Master of Forestry	9
Master of Home Economics	7
Master of Pharmacy	1
Total Advanced Degrees	797
Bachelor's Degrees	
Bachelor of Arts	
Humanities and Social Sciences	120
Science	24
Business and Technology	4
Education	56
Engineering	1
Home Economics	3
Bachelor of Science	
Humanities and Social Sciences	245
Science	451
Agriculture	172
Business and Technology	328
Education	420
Engineering	346
Forestry	71
Home Economics	175
Pharmacy	57
Total Bachelor's Degrees	2,473
Total Degrees Conferred 1968-69	3,270

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Directory of Offices, Schools, and Departments

GENERAL ADMINISTRATION

Position and Officer Building and Room Campus Telephone

President Robert W. MacVicar, Bexell Hall 101 1133
Dean of Administration, Milosh Popovich, Bexell 101 1133
Dean of Faculty, D. B. Nicodemus, Bexell Hall 127 2111
Dean of Research, R. A. Young, Dearborn Hall 221 3437
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Assoc Dean D. W. Poling, Bexell Hall 111 2431
Assoc Dean Jo Anne J. Trow, Bexell Hall 114 3541
Assoc Dean J. P. Duncan, Weatherford 1 1401
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Student Publications, I. C. Harris, Mangr, MU Actv Cntr 2101
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SCHOOLS AND DEPARTMENTS

Graduate School, H. P. Hansen, Dean, Benton Hall 100 .. 1881

School of Humanities and Social Sciences, G. W. Gilkey, Dean, Social Science Hall 205 2511
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Architecture, W. R. Glass, Gilmore Hall 232 1281
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School of Engineering, G. W. Gleeson, Dean, Covell 201 1525
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Industrial Engineering, J. L. Riggs, Rogers Hall 216.... 3317
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Mech, Nuclr Engineering, Louis Slegel, Rogers 206.. 3441
Metallurgical Engineering, R. D. Olleman, Graf 207 2654

School of Forestry, C. H. Stoltenberg, Dean, Forestry 203 2221
Forest Engineering, W. A. Davies, Forestry 305 2315
Forest Management, J. R. Dilworth, Forestry 212 2396
Forest Products, E. L. Ellis, Forestry 202 1101

School of Home Economics, Betty E. Hawthorne, Dean, Home Economics 112 3551
Clothing, Tex, Rel Arts, Florence E. Petzel, HE 226 1275
Family Life, J. P. O'Neill, Home Economics 314..... 1481
Foods and Nutrition, Helen F. McHugh, HE 323A.... 1201
Home Economics Education, Sylvia L. Lee, HE 20.... 3101
Home Management, Margy J. Woodburn, HE 323A.. 1201
Institution Management, Virginia F. Harger, HE 15 3561

School of Pharmacy, C. O. Wilson, Dean, Pharmacy 203 3191
Pharmaceutical Chemistry, R. F. Doerge, Pharmacy 121 2248
Pharmaceutical Science, R. W. Sager, Pharmacy 223 .. 3535
Pharmacology, G. B. Fink, Pharmacy 409 2137
Pharmacognosy, G. H. Constanine, Jr., Pharmacy 327 2077
Pharmacy Administration, H. F. Forslund, Phar 207 3283

Division of Physical Education, J. W. Long, Director, Men's Gymnasium 216 2643
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Military Science, Colonel M. H. Terrel, Armory 200 3511
Naval Science, Captain J. H. Hitchcock, Nav Armory 2605

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