

Forest ecosystems are important to societies worldwide, providing inspiration, a quality environment, and a variety of goods and services. Nowhere are they more important than in Oregon, where forests and forest-related activities play a key role in the economic and social life of the state.

The College of Forestry at Oregon State University is one of the world's premier education, research, and outreach institutions that focuses on broad areas related to forest resources.

We prepare graduates to understand the complexity of forests and the economic and social systems that depend upon them; to work with nature to keep land healthy for future generations; to know the science, technology and business associated with understanding, managing, and using forests and related resources; and to work effectively with others in a culturally diverse, global society.

The OSU College of Forestry has educated professionals for over 100 years. We offer a breadth of undergraduate and graduate programs that prepare students for a wide variety of careers in the public and private sectors. Our programs are ranked among the very best in North America. Our world-class faculty and modern facilities, combined with remarkable access to local forests and private industry, make us the educational program of choice for the best students.

DEPARTMENTS AND DEGREES

Through three of its departments the college offers Bachelor of Science (BS) degrees in forest engineering, forest management, forest recreation resources, wood science and technology, outdoor recreation leadership and tourism, and natural resources. Students can also pursue a dual degree program in forest engineering/civil engineering. The Department of Forest Science offers graduate programs only (MF, MS, MAIS, and PhD). Graduate programs in other departments include the MF, MS, MAIS, and PhD.

The college also offers forestry specializations within the BS in Environmental Sciences and BS in Bioresource Research degrees.

Most undergraduate forestry programs of the College of Forestry are accredited by either the Society of American Foresters or the Society of Wood Science and Technology. The Forest Engineering and Forest Engineering/Civil Engineering degrees are accredited by the Engineering Accrediting Committee of the Accreditation Board for Engineering and Technology (ABET). Select MF programs in forest resources and silviculture also are accredited by the Society of American Foresters.

INTERNATIONAL DEGREE

Undergraduates with majors in the College of Forestry can earn a second degree in international studies. See the International Education section of this catalog.

MINORS

The college offers minors in forest management, forest products, forest recreation resources, and natural resources and participates in the Earth Information Systems Technology interdisciplinary minor.

HIGH SCHOOL PREPARATION

Students planning a major within the College of Forestry should include the following subjects in their high school programs: English, 4 units; mathematics, 3 units; physics, chemistry, and biology, 1 unit each; computer science, 1 unit; social studies, 3 units; and foreign language, 2 units.

TRANSFER STUDENTS

Because of the technical and professional nature of the college's curricula, the college reserves the right to determine whether courses taken at another institution satisfy the college's curricular requirements. In general, equivalent college-level courses successfully completed at an accredited college or university are accepted.

ADVISING

The College of Forestry is committed to helping students succeed. Students meet with a faculty adviser each term. Faculty advisers are valuable sources of information about program options and choices, mentoring and other special opportunities in line with students' interests. Advising personnel in the College Student Services office are also available to help with university rules and regulations, job placement, exchange programs, and referrals to cross-campus programs and services. Students are encouraged to take an active role in their program planning, and use their time at OSU to develop themselves both academically and professionally.

The college works with the OSU Career Services Center to provide up-to-date information for both seasonal and permanent work and offers a full array of career services to prepare undergraduates and graduates for jobs.

EDUCATION FACILITIES

Peavy and Richardson Halls contain modern classroom, laboratory, and study facilities that support teaching and research.

Classes use the nearby college forests for field instruction daily. In addition to the 11,500 acres in the McDonald and Dunn Forests, the college manages other forests in Oregon for education and research.

The college also makes extensive use of various public and private programs and facilities for student benefit. Numerous field trips to forests, wood processing and manufacturing operations, recreation facilities, and research areas enable students to observe contemporary problems and practices.

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Corvallis is one of the largest forestry and wood science research centers in America. An aggressive research program is conducted by the college through its Forest Research Laboratory and by the campus-based Forest Sciences Laboratory of the U.S. Forest Service. These organizations offer state-of-the-art facilities for educational and employment opportunities for superior students.

A Forest Products Collection contains approximately 2,500 species of wood, primarily from North and South America, Southeast Asia, and Africa.

STUDENT ACTIVITIES

Numerous opportunities exist for students to get involved in social and academic forestry activities. Clubs and student chapters of several professional societies are active in the college, as well as Xi Sigma Pi and Alpha Zeta, two national honorary societies to which College of Forestry students may belong. These clubs offer students the chance to develop leadership and team-building skills.

SCHOLARSHIPS

The College of Forestry offers scholarships for well-qualified students. Most are merit-based and range in value from \$500 to \$5,000. An application form is available from the college and is due March 1. Scholarships are awarded each spring for the following academic year.

GRADUATION

ACADEMIC REQUIREMENTS

To earn a Bachelor of Science degree, a student must complete 180 quarter credits of university-level courses, (192 for the BS in Forest Engineering and BS in Wood Science and Technology degrees, and 245 for the BS in Forest Engineering/Civil Engineering double degree program) including:

- Written and oral communications, 13 credits including a senior writing intensive course.
- OSU baccalaureate core curriculum.
- Completion of an approved departmental curriculum.
- Grades of "C-" or better in all required forestry courses for those pursuing a degree in forest engineering, forest management, and forest recreation resources, and "C-" or better in upper-division core or breadth courses for natural resource majors.
- All courses used to complete major requirements in forest engineering, forest management, forest recreation resources, and wood science and technology cannot be taken with S/U grading. Natural resources majors can take up to two S/U graded

courses in their core, breadth, or option.

- Approved work experience as noted below.

PROFESSIONAL AND PERSONAL REQUIREMENTS

Those majoring in forest engineering, forest engineering-civil engineering, forest management, or wood science and technology must complete six months of satisfactory employment in an area related to their major. Those majoring in forest recreation resources or outdoor recreation leadership and tourism must satisfactorily complete a supervised internship.

Students are personally responsible for fulfilling all curricular requirements in proper sequence. Work performance and personal conduct are thoroughly appraised by the college. Since the profession of forestry is highly regarded for its ethical and academic standards, students are responsible for observing the Professional Code of Conduct of the college in its entirety. Departure from these ethical requirements may be reason for removing a student from the college.

FOREST ENGINEERING

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FACTULTY

Professors Adams⁶, Garland¹, Kellogg⁶, McDonnell⁵, Murphy, Sessions¹, Tesch
Associate Professors Pyles¹, Schoenholtz, Skaugset⁴

Assistant Professors Boston⁴, Bowers, Parker, Wing^{3,7}

Instructors Kiser², Wimer

ADJUNCT FACULTY

Edwards^{1,3}, Lysne⁶, Starnes^{1,6}

COURTESY FACULTY

Aulerich¹, Dykstra¹, Powers, Wigington

1=Licensed Professional Engineer,

2=Certified Photogrammetrist,

3=Professional Land Surveyor,

4=Registered Professional Forester,

5=Registered Professional Hydrologist,

6=Certified Forester,

7=Licensed Water Right Examiner

Undergraduate Majors

Forest Engineering (BS)

**Forest Engineering-Civil Engineering
(Two BS degrees)**

Graduate Major

Forest Engineering (MF, MS, PhD)

Graduate Areas of Concentration

Forest Engineering

Forest Hydrology

Forest Operations

Forest Soil Science

Harvesting

Harvesting and Silviculture

Graduate Minor

Forest Engineering

The mission of the Department of Forest Engineering is to advance safe, economical, and environmentally sound forest operations through outstanding teaching and innovative leadership in research and outreach education. The Department of Forest Engineering offers an undergraduate degree leading to professional practice in forest engineering, and more broadly defined graduate programs at the master's and doctorate levels with concentrations in forest hydrology, forest soil science, forest operations, and timber harvesting systems. The department also offers a doctoral degree jointly with the Department of Forest Science that combines concentrations in silviculture and harvesting.

The Forest Engineering undergraduate program provides an engineering education within a strong forestry context. The undergraduate program is founded on fundamental principles in forest science and engineering science that enable students to develop the skill and knowledge required for planning and designing engineered forest operations that achieve forest management objectives. Specifically, the Forest Engineering undergraduate program provides fundamental coverage of the following:

- Physical and biological aspects of soil and water resources
- Surveying and measurement of land and forest resources
- Analysis and design of the forest transportation system
- Analysis and design of harvesting operations
- Forest land management and operational planning principles

Integration of these topics enables forest engineering graduates to develop and manage safe, economical, and environmentally sound forest operations.

Design experiences that integrate the topics listed above and steadily build on previous course material are distributed throughout the upper-division portion of the program. The forest operations design sequence during the senior year provides an opportunity for students to bring together all the topics from the

curriculum in a project that includes the field and office engineering tasks associated with the planning and design of forest operations.

Forest engineering graduates are employed by private forestry firms, public forestry agencies, logging and construction companies, engineering consulting firms, and surveying firms. Some graduates establish their own consulting businesses after a few years of field experience. Career progression following graduation can be quite varied. Some graduates gravitate toward technical positions while others move quickly toward management of harvesting and other forest operations, or more broadly defined management of the forest land base.

ACCREDITATION AND PROFESSIONAL LICENSING

The Bachelor of Science in Forest Engineering degree is accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET) and the Society of American Foresters.

Completion of the five-year, dual-degree Forest Engineering-Civil Engineering program results in a BS in Forest Engineering, accredited by the Society of American Foresters and ABET, and a BS in Civil Engineering, offered by the Department of Civil Construction and Environmental Engineering, and accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012; (410)347-7700.

Forest engineering is a licensed profession in the state of Oregon. The BS in Forest Engineering degree has been approved by the Oregon State Board of Examiners for Engineering and Land Surveying (OSBEELS) as evidence of adequate preparation for the Fundamentals of Engineering Examination, the first of two examinations required for professional engineering licensing. The BS in Forest Engineering degree, with the completion of appropriate program electives, also has been approved by OSBEELS as evidence of adequate preparation for the Fundamentals of Land Surveying Examination, the first of two examinations required for professional land surveyor licensing.

FOREST ENGINEERING (BS, HBS)

The BS in Forest Engineering degree is offered through a four-year resident curriculum, and as part of a five-year dual degree program from which graduates receive two Bachelor of Science degrees, one in forest engineering and one in civil engineering. The dual degree program is offered in conjunction with the Department of

Civil, Construction, and Environmental Engineering. Curricula for both programs are listed below. Both programs begin with basic science and mathematics, progress on through engineering science and forest science, to arrive at professional-level courses in forest engineering that include: surveying, soil and water resources, timber harvesting, operations analysis, road design, and planning.

In addition to the listed courses, all students are required to complete a total of six months of satisfactory employment in an area related to their major. This is usually accomplished by two or more summers of work, but it may include work during the academic year. Work performance and personal conduct are thoroughly appraised by the College of Forestry.

Students in the dual degree program must be admitted to the College of Engineering Professional Program following completion of the pre-engineering course work. More detailed information on the curriculum and the current undergraduate advising guide can be found on the department's Web page at <http://www.cof.orst.edu/cof/fe>.

Freshman Year (48)

CH 201. *Chemistry for Engineering Majors (3)
 COMM 111. *Public Speaking (3)
 or COMM 114. *Argument and Critical Discourse (3)
 FE 101. Orientation to Forest Engineering (2)
 FE 102. Forest Engineering Computations (2)
 FOR 111. Intro to Forestry (3)
 FOR 141. Tree and Shrub Identification (3)
 GEO 221. Environmental Geology (3)
 HHS 231. *Lifetime Fitness for Health (2)
 and HHS 241-251. *Lifetime Fitness: (various activities) (1)
 MTH 251. *Differential Calculus (4)
 MTH 252. Integral Calculus (4)
 MTH 254. Vector Calculus I (4)
 PH 211. *General Physics with Calculus (4)
 WR 121. *English Composition (3)
 WSE 210. Wood Technology and Utilization (4)
 Literature and Arts BCC elective (3)

Sophomore Year (47)

CSS 205. *Soils: Sustainable Ecosystems (4)
 ECON 201. *Intro to Microeconomics (4)
 ENGR 211. Statics (3)
 ENGR 212. Dynamics (3)
 ENGR 213. Strength of Materials (3)
 ENGR 311. Thermodynamics (3)
 or ENGR 201. Electrical Fundamentals (3)
 FE 330. Forest Engineering Fluid Mechanics and Hydraulics (3)
 FOR 240. *Forest Biology (4)
 MTH 256. Applied Differential Equations (4)
 PH 212. *General Physics with Calculus (4)
 ST 314. Introduction to Statistics for Engineers (3)

WR 327. *Technical Writing (3)
 Difference, Power, and Discrimination BCC elective (3)
 Western Culture BCC elective (3)

Junior Year (52)

FE 308. Forest Surveying (4)
 FE 309. Forest Photogrammetry (4)
 FE 310. Forest Route Surveying (4)
 FE 315. Soil Engineering (4)
 FE 316. Soil Mechanics (4)
 FE 357. GIS and Forest Engineering Applications (2)
 FE 371. Harvesting Process Engineering (4)
 FE 434. Forest Watershed Management (4)
 FE 440. Forest Operations Analysis (3)
 FE 470. Logging Mechanics (4)
 FE 471. Harvesting Management (3)
 FOR 321. Forest Mensuration (5)
 FOR 441. Silviculture Principles (4)
 Cultural Diversity BCC elective (3)

Senior Year (45)

Forest Engineering program electives (8)
 FE 415. Forest Road Engineering (4)
 FE 416. Forest Road System Management (4)
 FE 441. Production Planning (3)
 FE 449. Strategic and Tactical Planning Techniques (3)
 FE 450, FE 451. Forest Operations Design I, II (3,3)
 FE 460. Forest Operations Regulations and Policy Issues (3)
 FE 480. Forest Engineering Practice and Professionalism (1)
 FOR 330. Forest Resource Economics I (4)
 FS 453. Forest Management and Wildlife Conservation (3)
 Contemporary Global Issues BCC elective (3)
 Science, Technology and Society BCC elective (3)

Footnotes:

*=Baccalaureate core courses.
 BCC=Baccalaureate core courses.
 +=Required courses for professional engineering program.

FOREST ENGINEERING-CIVIL ENGINEERING (BS, HBS) DUAL DEGREE

Freshman Year (46)

CE 101. Civil, Construction, Environmental Engineering Orientation (1)+
 CE 102. Civil, Construction, Environmental Engineering Orientation (1)+
 or CE 103. Civil, Construction, Environmental Engineering Orientation (1)
 CH 201, CH 202. *Chemistry for Engineering Majors (3,3)+
 CH 205. Laboratory for CH 202 (1)
 COMM 111. *Public Speaking (3)+
 or COMM 114. *Argument and Critical Discourse (3)
 FE 101. Orientation to Forest Engineering (2)
 FE 102. Forest Engineering Computations (2)+
 FOR 141. Tree and Shrub Identification (3)
 GEO 221. Environmental Geology (3)

HHS 231. *Lifetime Fitness for Health (2) and HHS 241–251. *Lifetime Fitness: (various activities) (1)
 MTH 251. *Differential Calculus (4)+
 MTH 252. Integral Calculus (4)+
 MTH 306. Matrix and Power Series Methods (4)+
 PH 211. *General Physics with Calculus (4)+
 WR 121. *English Composition (3)+ Literature and Arts BCC elective (3)

Sophomore Year (52)

CE 245. Engineering Graphics and Design (3)+
 CSS 205. *Soils: Sustainable Ecosystems (4)
 ENGR 201. Electrical Fundamentals (3)+
 ENGR 211. Statics (3)+
 ENGR 212. Dynamics (3)+
 ENGR 213. Strength of Materials (3)+
 FOR 240. *Forest Biology (4)
 MTH 254. Vector Calculus I (4)
 MTH 256. Applied Differential Equations (4)
 PH 212, PH 213. *General Physics with Calculus (4,4)+
 ST 314. Introduction to Statistics for Engineers (3)+
 WSE 210. Wood Technology and Utilization (4)
 Cultural Diversity BCC elective (3)
 Western Culture BCC elective (3)

Forest Engineering Junior Year (48)

ECON 201. *Intro to Microeconomics (4)
 FE 308. Forest Surveying (4)
 FE 309. Forest Photogrammetry (4)
 FE 310. Forest Route Surveying (4)
 FE 357. GIS and Forest Engineering Applications (2)
 FE 371. Harvesting Process Engineering (4)
 FE 434. Forest Watershed Management (4)
 FE 440. Forest Operations Analysis (3)
 FE 470. Logging Mechanics (4)
 FE 471. Harvesting Management (3)
 FOR 321. Forest Mensuration (5)
 FOR 441. Silviculture Principles (4)
 WR 327. *Technical Writing (3)

Civil Engineering Junior Year (48)

CE 311. Fluid Mechanics I (4)
 CE 313. Hydraulic Engineering (4)
 CE 321. Civil Engineering Materials (4)
 CE 381, CE 382. Structural Theory I, II (4,4)
 CE 383. Design of Steel Structures (4)
 CE 392. Intro to Transportation Engineering (4)
 ENGR 311. Thermodynamics (3)
 ENVE 321. ^Environmental Engineering Fundamentals (4)
 FE 315. Soil Engineering (4)
 FE 316. Soil Mechanics (4)
 FE 480. Forest Engineering Practice and Professionalism (1)
 FOR 330. Forest Resource Economics I (4)

Senior Year (50)

CE Design elective (3)
 CE 419. Civil Infrastructure Design (4)
 CE 481. Reinforced Concrete I (4)
 CE 491. Highway Engineering (4)
 FE 415. Forest Road Engineering (4)
 FE 416. Forest Road System Management (4)

FE 441. Production Planning (3)
 FE 449. Strategic and Tactical Planning Techniques (3)
 FE 450, FE 451. Forest Operations Design I, II (3,3)
 FE 460. Forest Operations Regulations and Policy Issues (3)
 FS 453. Forest Management and Wildlife Conservation (3)
 Contemporary Global Issues BCC elective (3)
 Difference, Power, and Discrimination BCC elective (3)
 Science, Technology and Society BCC elective (3)

Footnotes:

*=Baccalaureate core courses.
 BCC=Baccalaureate core courses.
 +=Required courses for professional engineering program.

FOREST ENGINEERING (MF, MS, PhD)

Graduate Areas of Concentration

Forest engineering (MF, MS), forest hydrology (MF, MS, PhD), forest operations (MF), forest soil science (MF, MS, PhD), harvesting (PhD), harvesting/silviculture (PhD jointly with Forest Science)

The Department of Forest Engineering offers the Master of Forestry degree with concentrations in forest operations, forest engineering, forest hydrology and forest soil science; the Master of Science degree with concentrations in forest engineering, forest hydrology, and forest soil science; and the Doctor of Philosophy degree with concentrations in timber harvesting, forest hydrology, and forest soil science. The department, together with the Department of Forest Science, offers a PhD program with a concentration in harvesting and silviculture.

The graduate programs in engineering and timber harvesting focus on timber harvesting and transportation engineering problems and include course work in soil mechanics and hydrology. Remaining course work is selected to fit the student's special interest and may include work in industrial, civil, or mechanical engineering, business, or statistics. Undergraduate preparation should include calculus, engineering mechanics, soil mechanics, logging methods, and operations analysis and planning. The harvesting and silviculture PhD program consists of course work in silviculture, ecosystem analysis, logging systems, transportation systems, operations analysis, and statistics.

The graduate program in forest operations focuses on the operational rather than engineering analysis and design aspects of industrial or governmental forest management. Course work provides a broad background in forest transportation, harvesting, and planning, followed by courses in forest

operations management, and a selection of electives from forest engineering, forest science, forest economics, forest products, and business. Undergraduate preparation should include calculus, introductory engineering mechanics (statics), introductory harvesting, and a sound background in the biological and ecological aspects of forestry.

The graduate program in forest hydrology provides sound theoretical training and application of theory to the solution of water resources problems associated with forest management. Hydrology majors should have undergraduate preparation in calculus, physics, chemistry, computer programming, soils, plant physiology, and meteorology. Recommended courses within the program are in soils, forest hydrology, water quality, and statistics. Additional course work focuses on applications to forest systems. Remaining courses may be taken in a specialty such as hydrology, soils, stream ecology, water resources, or policy and planning.

The graduate program in forest soil science focuses on the critical role of soils in relation to forest hydrology, forest management, and sustainable management of forest ecosystems. Undergraduate preparation should include calculus, chemistry, forestry, physics, and soil science. Recommended courses within the program are in forest hydrology, forestry, soil science, and statistics. In-depth technical knowledge of principles and practices of forest soil science is developed based on specific career objectives and availability of specific research projects designed to enhance scholarly achievement.

The Department of Forest Engineering at Oregon State University is one of the largest in the nation with excellent teaching, research, and Extension facilities and programs, including the 12,500 acre McDonald/Dunn Research Forest within a few minutes drive of campus. Emphasis is on Pacific Northwest conditions, but graduates are actively serving in many regions of the world. The department maintains close ties with industry and with appropriate government agencies.

FOREST ENGINEERING GRADUATE MINOR

For more details, see the departmental adviser.

COURSES

FE 101. ORIENTATION TO FOREST ENGINEERING (2). Introduction to the forest engineering discipline. Discussion of critical issues, available resources, career opportunities and professional opportunities. Overview of field instruments and analytical approaches.

FE 102. FOREST ENGINEERING COMPUTATIONS (2). Formulating and implementing computational solutions to forest

engineering analysis and design problems. PREREQ: Trigonometry, calculus (recommended).

FE 308. FOREST SURVEYING (4). Fundamentals of forest surveying as applied to forestry problems including concepts of plane surveying, differential leveling, U.S. Public Land Survey System, measurement theory, and datums and projections. Emphasis is on concepts of forest surveying as related to mapping, and GIS. PREREQ: FOR 111, MTH 112, MTH 241.

FE 309. FOREST PHOTOGRAMMETRY (4). Fundamentals of aerial photography and photogrammetry as applied to forestry problems including concepts of photo geometry, scale, film and filter types, and interpretation. Emphasis is on concepts of aerial photo geometry and interpretation as related to mapping, GIS, and field orientation. PREREQ: FE 308.

FE 310. FOREST ROUTE SURVEYING (4). Route surveying and site surveying applied to forestry problems. Use of surveying equipment; traversing; computations; leveling; horizontal, vertical, compound, reverse and spiral curves; earthwork; construction staking as applied to new road and existing road P-line survey. Includes rapid survey techniques. PREREQ: FE 309, FE 308.

FE 311. ADVANCED FOREST SURVEYING (4). Advanced techniques for forest surveying. Directional instruments; electronic distance measurements; field astronomy; State Plane Coordinate Systems; horizontal control, specifications, triangulation and trilateration; U.S. Public Land Survey System; introductory survey law. PREREQ: FE 310. Taught alternate years.

FE 315. SOIL ENGINEERING (4). Use of soil in engineering and construction. Identification and classification. Engineering properties of soil: permeability, compressibility, and strength. Compaction principles and methods. Field control of soil engineering projects. PREREQ: ENGR 213, and CE 311 or CEM 311 or FE 330.

FE 316. SOIL MECHANICS (4). Soil strength and soil mechanics theories applied to analysis of slope stability, retaining structures, foundations, and pavements. PREREQ: CE 372 or FE 315.

FE 330. FOREST ENGINEERING FLUID MECHANICS AND HYDRAULICS (3). Fluid properties, pressure, fluid statics, continuity, energy equation, single and series pipe flow, open channel hydraulics, peakflow estimates for culvert design, stream crossing design. PREREQ: ENGR 213, FE 102.

FE 357. GIS AND FOREST ENGINEERING APPLICATIONS (2). An introduction to the appropriate use and potential applications of geographic information systems (GIS) in forest management and operations planning.

FE 370. HARVESTING OPERATIONS (4). Timber harvesting and transport methods from the forest to the mill. Technical feasibility, economic, and environmental relationships in forestry operations. For non-forest engineering students. PREREQ: Junior standing in forestry.

FE 371. HARVESTING PROCESS ENGINEERING (4). Timber harvesting equipment and systems. Harvesting process evaluation and decisions aided by forest engineering analysis. PREREQ: ENGR 211, FE 102. COREQ: FE 308, FE 357.

FE 405. READING AND CONFERENCE (1-16).

FE 406. PROJECTS (1-16).

FE 407/FE 507. SEMINAR (1-16).

FE 415/FE 515. FOREST ROAD ENGINEERING (4). Location, surveying, design, cost estimation, and construction practices for forest roads. Lecture on principles, and laboratory field practice in locating, surveying, designing, and cost estimating. PREREQ: FE 310.

FE 416/FE 516. FOREST ROAD SYSTEM MANAGEMENT (4). Structural characteristics of bridges, load rating, structural design of culverts,

aggregate testing and evaluation, environmental assessment of forest road systems, road maintenance cycles and management. PREREQ: ENGR 211, ENGR 213, FE 316, FE 415/FE 515.

FE 430/FE 530. WATERSHED PROCESSES (4). Effects of land use practices on the physical hydrology (interception, infiltration, evapotranspiration, subsurface flow and surface runoff, water yields, and peak flows) of forested watersheds. Surface erosion, mass soil movements, stream temperatures, nutrient levels and effects of management activities upon riparian systems; forest practice rules. PREREQ: Junior standing.

FE 434/FE 534. FOREST WATERSHED MANAGEMENT (4). Physical hydrology, sediment budgets, and riparian systems of forested watersheds and the effects of forest management activities on these processes. PREREQ: CH 121 or CH 201, CSS 205 or CSS 305, MTH 241.

FE 439X/FE 539X. ECOLOGY AND MANAGEMENT OF FOREST SOILS (3). Study of properties, processes, ecology, and management of soils in forested ecosystems with emphasis on applications to forest operations, silviculture, and sustainable management of forested ecosystems. PREREQ: CSS 305 or equivalent. REC: Courses in silviculture, chemistry, physics and microbiology.

FE 440/FE 540. FOREST OPERATIONS ANALYSIS (3). Identification and measurement of production components in harvesting systems. Methods analysis, productivity improvement and engineering economics. Report writing skills emphasized. PREREQ: FE 102, FE 370, basic statistics.

FE 441/FE 541. PRODUCTION PLANNING (3). Resource planning using critical path analysis, tactical approaches and regulations. Business planning including bidding, budgeting, scheduling, equipment replacement analysis, and fleet maintenance. PREREQ: FE 440/FE 540, senior standing.

FE 449/FE 549. STRATEGIC AND TACTICAL PLANNING TECHNIQUES (3). Use of linear, mixed integer, heuristic methods, and simulations to solve complex forest management problems with emphasis on intertemporal multiple use scheduling, spatial analysis, and transportation planning. COREQ: FOR 330 or equivalent or instructor approval. PREREQ: FOR 441 or equivalent or instructor approval required.

FE 450/FE 550. ^FOREST OPERATIONS DESIGN I (3). Timber harvest planning. Establishing goals, data collection, identifying values and limitations, establishing plan expectations, identifying feasible harvesting systems and making assessments applying technical, economic, and social conditions. PREREQ: FE 434/FE 534, FE 449, FE 470/FE 570, FE 471/FE 571. COREQ: FE 416/FE 516, FE 480. (Writing Intensive Course)

FE 451/FE 551. ^FOREST OPERATIONS DESIGN II (3). Timber harvest planning. Evaluation of alternative harvest system choices, formulating and scheduling harvest units to meet goals and objectives, communicating and implementing harvest plans, monitoring plans and communicating long term results. PREREQ: FE 450/FE 550. (Writing Intensive Course)

FE 456. *INTERNATIONAL FORESTRY (3). An introduction to the biological, physical, and sociological factors that shape the world's forests and the activities used to manage those forests. What influence these factors have on forest policies, practices, and outcomes. PREREQ: Introductory course in biology. CROSSLISTED as FOR 456. (Bacc Core Course)

FE 460/FE 560. FOREST OPERATIONS REGULATIONS AND POLICY ISSUES (3). Provides review of policy and regulations affecting forest practices, employment, safety and health and transportation. Policy and rule-making discussed.

FE 470/FE 570. LOGGING MECHANICS (4). Relationship of torque, power, and thrust to the operation of cable and ground-based harvesting systems. On-highway and off-highway heavy truck performance. PREREQ: FE 372, ENGR 213. ENGR 211.

FE 471/FE 571. HARVESTING MANAGEMENT (3). Verification of harvesting assessment plans and operational planning/field layout. Practical logging skills related to harvest planning, operations monitoring, and designing worker training programs. PREREQ: FE 371, FE 470.

FE 480. FOREST ENGINEERING PRACTICE AND PROFESSIONALISM (1). Personal and professional skills, attributes, and issues in forest engineering practice. Includes topics such as ethics, land stewardship, media relations and risk management. PREREQ: Senior standing.

FE 499. SPECIAL TOPICS (1-16).

FE 501. RESEARCH AND SCHOLARSHIP (1-16).

FE 503. THESIS (1-16).

FE 505. READING AND CONFERENCE (1-16).

FE 506. PROJECTS (1-16).

FE 507. SEMINAR (1-16). Subject matter as required by graduate programs.

FE 532. FOREST HYDROLOGY (3). Application of hydrologic principles to forest and rangelands, with special emphasis on the influence of land management on the hydrologic cycle in both rain and snow dominated regions. PREREQ: FE 430/FE 530, BRE 512.

FE 533. FOREST HYDROLOGY LABORATORY (1). Laboratory application of hydrologic principles to forest and rangelands, with special emphasis on the influence of land management on the hydrologic cycle in both rain and snow dominated regions. COREQ: FE 532.

FE 535. WATER QUALITY AND FOREST LAND USE (3). Influence of natural and land-use factors on water quality; monitoring strategies and analytical methods; municipal watershed management. PREREQ: FE 430/FE 530.

FE 536. FOREST EROSION PROCESSES (3). A process level look at natural and accelerated erosion in pristine and managed forest landscapes of the Pacific Northwest including investigation of applied solutions for preventing or mitigating accelerated erosion. PREREQ: FE 430 or equivalent (basic hydrology course), CSS 205 or CSS 305 or equivalent (general soils course).

FE 537. HILLSLOPE HYDROLOGY (4). Advanced course on hillslope hydrology covering the physical, chemical and isotopic nature of runoff generation from the pore scale to the catchment scale.

FE 538. FIELD HYDROLOGY (3). Advanced course in field hydrology techniques used in catchment hydrology research that focuses on how to measure and quantify water fluxes into, through, and out of catchments.

FE 552. FOREST TRANSPORTATION SYSTEMS (4). Analysis of interactions between harvesting and road systems. Advanced topics in road and landing spacing, determination of road standards, analysis of logging road networks, transfer and sort yard facility location. Simultaneous resource scheduling and transportation planning. PREREQ: FE 215, FE 440/FE 540. REC: FE 541.

FE 572. ADVANCED LOGGING MECHANICS I (4). Performance of on-road and off-road logging vehicles including trucks, wheeled and tracked skidders and forwarders. Fundamentals of cable logging system performance. Payload analysis. PREREQ: FE 215, ENGR 211, FE 470/FE 570.

FE 573. ADVANCED LOGGING MECHANICS II (3). Influence of design upon performance and interactions between ground vehicles and support surface. Simulation of ground vehicle performance. Properties of wire rope. Load-tension relationships,

payload calculation and carriage design for cable logging. Helicopter logging. PREREQ: FE 572.

FE 601. RESEARCH AND SCHOLARSHIP (1-16).

FE 603. THESIS (1-16).

FE 605. READING AND CONFERENCE (1-16).

FE 606. PROJECTS (1-16).

FE 607. SEMINAR (1-16). Subject matter is required by graduate programs.

FE 630. SPECIAL TOPICS IN FOREST HYDROLOGY (1-3). Recent advances in various aspects of forest hydrology and watershed behavior and management. Subjects will vary with faculty. May be retaken for credit.

FE 640. SPECIAL TOPICS IN FOREST ENGINEERING (1-3). Recent advances in logging engineering, forest engineering, and forest operations. Content will vary with instructor. May be retaken for credit.

FOREST RESOURCES

John Walstad, Head
280 Peavy Hall
Oregon State University
Corvallis, OR 97331-5703
(541) 737-4951

E-mail: forest.resources@oregonstate.edu
Web site: <http://www.cof.orst.edu/cof/fr/>

FACULTY

Professors Adams, Bliss, Boyle, Doescher, Fletcher, Hann, Jensen, N. Johnson, R. Johnson, Landgren, S. Reed, Ripple, Salwasser, Shelby, Tappeiner, Walstad
Associate Professors Elwood, Fitzgerald, Jackson, Lindberg, Montgomery, Shindler, Simon-Brown, Temesgen
Assistant Professors Bennett, Reuter, Rosenberger, Tynon
Senior Instructors Huntington, M. Reed
Instructors Altimus, Stemper, Zahler

ADJUNCT FACULTY

Professors Arthur, Castle, Kimerling, Lavender, Lunch, Rogers, Sessions, Walker
Assistant Professor Lach

COURTESY FACULTY

Professors Achterman, Buckman, Cloughesy, Haynes, Powers, Stankey, Starkey
Associate Professors Alig, Bettinger, Brooks, Daniels, Fried, Marshall, Peterson
Assistant Professors Alexander, Joslin, Schrader, Walters

Undergraduate Majors Forest Management (BS)

Options

Earth Information Science and Technology
Forest Biology
Forest Harvesting
Forest Recreation Resources
Forest Soils
Philosophy
Public Administration

Range Management
Statistics
Wildlife

Forest Recreation Resources (BS)

Options

Cultural Resource Management
Environmental Resource Interpretation
Forest Resources
Landscape Design
Law Enforcement
Public Administration
Resource Planning
Sociology
Tourism

Natural Resources (BS) Outdoor Recreation Leadership and Tourism (BS)

Options

International Ecotourism
Tourism and Commercial Recreation Management

Undergraduate Minors Forest Management Forest Recreation Resources Natural Resources

Graduate Majors

Economics (MA, MS, PhD)

Graduate Areas of Concentration

Industrial Organization
International Economics
Resource and Environmental Economics

Forest Resources (MF, MS, PhD)

Graduate Areas of Concentration

Community and Resource Development
Forest Biometrics/Modeling
Forest Economics
Forest Management
Forest Management Science/ Operations Research
Forest Measurement
Forest Modeling
Forest Planning Administration
Forest Policy
Forest Recreation
Forest Social Science
Forestry
Land Use Planning
Natural Resource Education and Extension
Natural Resource Policy and Law
Remote Sensing and GIS
Silviculture

Graduate Minor Forest Resources

The Department of Forest Resources provides broad-based education for those interested in natural resource systems and how to manage them. Two undergraduate degree options are offered: Forest Management, which emphasizes the understanding and management of forest resources for

multiple uses, and Forest Recreation Resources, which prepares managers for recreational opportunities in forests and other natural resource areas.

The department is also an active participant in the Natural Resources Interdisciplinary Degree program, which offers several forestry-related specialties.

The department also collaborates with the OSU-Cascades Campus in offering the degree program in Outdoor Recreation Leadership and Tourism.

Students majoring in other programs at OSU may elect a minor in forest recreation resources. This program provides basic knowledge about recreation resource planning and management.

GRADUATES

Graduates in forest management and forest recreation resources find employment with a variety of governmental and private organizations. They work as analysts, managers, forestry and recreation consultants, suppliers of forestry services, guides, outfitters, concessionaires, managers of resort properties and recreation managers for federal, state, and local government agencies.

FOREST MANAGEMENT (BS, HBS)

The successful forest manager must understand the biological and physical processes of forest ecosystems, as well as the social and economic forces that influence forest policies and management actions. The Forest Management core curriculum includes basic courses in the biological, physical, and social sciences, as well as professional courses designed to prepare students to manage forest resources. Strength in a related field can be obtained by selecting a listed option or minor in a field such as business administration, forest biology, forest harvesting, forest products, soils, philosophy, public administration, range management, recreation management, statistics, or wildlife.

The Bachelor of Science in Forest Management carries the Society of American Forester's accreditation of professional forester.

All students pursuing the BS in Forest Management degree are required to get a grade of "C" or better in required courses taught in the College of Forestry or their approved substitutes taught elsewhere.

A minor or option is not required in forest management, but many are offered as a way to complement the core curriculum. Note that courses required for an option or minor are in addition to those required for the major. Some may require prerequisites not included in the core curriculum.

Freshman Year (44)

CH 121, CH 122. General Chemistry (5,5)
 CH 130. General Chemistry of Living Systems (4)
 COMM 111. *Public Speaking (3)
 or COMM 114. *Argument and Critical Discourse (3)
 FOR 111. Intro to Forestry (3)
 FOR 112. Introduction to Computer Applications in Forestry (3)
 FOR 241. Dendrology (5)
 FOR 251. Recreation Resource Management (4)
 HHS 231. *Lifetime Fitness for Health (3)
 MTH 245. *Mathematics for Management, Life, and Social Sciences (4)
 WSE 210. Wood Technology and Utilization (4)

Sophomore Year (48)

BI 211, BI 212, BI 213. *Principles of Biology (4,4,4)
 ECON 201. *Intro to Microeconomics (4)
 ECON 202. *Intro to Macroeconomics (4)
 FE 308. Forest Surveying (4)
 FOR 220. Aerial Photo Interpretation and Forest Measurements (4)
 or FE 309. Forest Surveying (4)
 GEO 265. Geographic Information System (GIS) Practicum (3)
 MTH 241. *Calculus for Management and Social Science (4)
 ST 351, ST 352. Intro to Statistical Methods (4,4)
 Writing I (3)
 Writing II (3)

Junior Year (45)

BOT 415/ENT 415. Forest Insect and Disease Management (5)
 CSS 305. Principles of Soil Science (4)
 CSS 306. Problem Solving: Soil Science Applications (1)
 FOR 321. Forest Mensuration (5)
 FOR 322. Forest Models (3)
 **FOR 341. Forest Ecology (4)
 **FOR 355. Management for Multiple Resource Values (4)
 FOR 365. *Issues in Natural Resources Conservation (3)
 **FOR 406. Projects (Sect. 4, Integrated projects) (1)
 FOR 330, FOR 331. Forest Resource Economics I, II (4,4)
 **FOR 443. Silvicultural Practices (4)
 **FS 453. Forest Management and Wildlife Conservation (3)
 **Denotes corequisites junior year spring term

Senior Year (43)

FE 370. Harvesting Processes (4)
 FE 434. Forest Watershed Management (4)
 FOR 407. Seminar (Starker Lecture Series) (1)
 or FOR 406 Projects (Sect. 2, Presentation skills) (1)
 FOR 442. Silviculture Reforestation (4)
 FOR 457. Techniques for Forest Resource Analysis (4)
 FOR 459. Forest Resource Planning and Decision Making (4)
 FOR 460. *Forest Policy (4)
 BCC Perspectives (12)
 BCC Science, Technology and Society (3)
 Electives (3)

Total: 180**EARTH INFORMATION SCIENCE AND TECHNOLOGY OPTION (21)**

(for Forest Management majors)
 Forest Management majors must take the five required core courses, plus two advanced courses from the list found in the Interdisciplinary Studies section of this catalog. The two advanced courses are selected in consultation with a departmental faculty adviser so as to best meet the student's professional interests.

OPTIONS UNDER FOREST MANAGEMENT DEGREE

Options are not required in forest management, but are offered as ways to complement the core curriculum. Students may also enhance their major by addition of any minor offered at OSU, such as business administration, earth information science and technology, or forest products.

Note that courses required for an option or minor are in addition to those required for the major. Some may require prerequisites not included in the core curriculum.

FOREST BIOLOGY OPTION (21)

BOT 321. Introduction to Plant Systematics (4)
 BOT 331. Plant Physiology (4)
 FS 444. Forest Genetics (4)
 or BI 311. Genetics (4)

Electives:

Choose at least 9 credits from among the following areas (at least 1 credit must be upper division). Credits can not be used elsewhere in the major:

- Biology
- Botany and Plant Pathology
- Entomology
- Forest Science
- Crop and Soil Science (emphasis on Soils)
- Zoology

See FM adviser for detailed specifications.

FOREST RECREATION RESOURCES OPTION (23-26)

FOR 251. Recreation Resource Management (4)
 FOR 351. Recreation Behavior and Management (4)
 FOR 356. Recreation Resource Planning (4)
 FOR 391. Natural Resource Communications (3)
 FOR 432. Economics of Recreation Resources (4)
Select four credits from below:
 FOR 352. Wilderness Management (3)
 FOR 451. History and Cultural Aspects of Recreation (4)
 FOR 453. Nature Based Tourism (3)
 FOR 493. Environmental Interpretation (4)
 FOR 495. Interpretive Projects (2)

FOREST SOILS OPTION (22)

CSS 315. *Nutrient Management and Cycling (4)
 CSS 435. Physics of Soil Ecosystems (3)
 CSS 445. Geochemistry of Soil Ecosystems (4)
 CSS 466. Soil Morphology and Classification (4)
 GEO 201. *Physical Geology (4)
 MB 448. Microbial Ecology (3)

PHILOSOPHY OPTION (26-28)

PHL 201. *Introduction to Philosophy (4)
 PHL 205. *Ethics (4)
 PHL 301, PHL 302, PHL 303. *History of Western Philosophy (4,4,4)
 PHL 365. *Law in Philosophical Perspective (4)
 or PHL 470. Philosophy of Science (3)
 PHL 342. Contemporary Ethics (4)
 or PHL 440. Environmental Ethics (3)

PUBLIC ADMINISTRATION OPTION (26) (BS FOREST MGMT)

ECON 435. The Public Economy (4)
 PS 472, PS 473. Public Administration (4,4)
 PS 474. Bureaucratic Politics (4)
 PS 475. Environmental Politics and Policy (4)
 Political science electives (6)

RANGE MANAGEMENT OPTION (21)

ANS 121. *Intro to Animal Sciences (4)
 ANS 436. Sheep Production Systems (3)
 or ANS 443. Beef Production Systems (3)
 FW 251. Principles of Fish and Wildlife Conservation (3)
 RNG 347. Arid Land Biomes (3)
 RNG 348. Arid Land Plants (2)
 RNG 350. Grassland Ecosystems (3)
 RNG 477. *Agroforestry (3)

STATISTICS OPTION (30)

MTH 251. *Differential Calculus (4)
 MTH 252. Integral Calculus (4)
 MTH 253. Infinite Series and Sequences (4)
 MTH 254. Vector Calculus I (4)
 ST 421, ST 422. Intro to Mathematical Statistics (4,4)
 ST 431. Sampling Methods (3)
 ST 448. Operations Research Methods (3)

WILDLIFE OPTION (21-23)

FW 251. Principles of Wildlife Conservation (3)
 FW 311. Biology of Birds (3)
 FW 317. Biology of Mammals (3)
 FW 320. Introductory Population Dynamics (3)
 FW 321. Fisheries and Wildlife Resource Ecology (3)
 FW 481. Wildlife Ecology (3)
Select one of the following:
 FW 425. Field Studies in Riparian Diversity (5)
 FW 451. Avian Conservation and Management (5)
 FW 458. Management of Big Game Animals (4)
 FW 479. Wetlands and Riparian Ecology (offered alternate years) (3)

FOREST RECREATION RESOURCES MAJOR (BS, HBS)

The BS in Forest Recreation Resources (FRR) provides a strong liberal education oriented toward management of natural resource-based recreation, and the social science and communication aspects of forestry and natural resources. Managers of wildland recreation resources are primarily concerned with human uses of forests, and they must blend an understanding of social and biological sciences with management practices to provide the desired recreation opportunities on those lands.

Completion of an approved option or minor is **required** for the BS in Forest Recreation Resources degree. Declaration of the option or minor should be done by the end of the sophomore year. Courses for an option or minor are in addition to the core curriculum. Some courses may require prerequisites not included in the core curriculum.

Choice of minor must be approved by a faculty adviser. Currently approved minors include business administration, earth information science and technology, fisheries and wildlife, philosophy, range resources, and resource economics.

The following options are for students majoring in forest recreation resources only. In addition to the options listed, students may work with a faculty adviser to develop an individualized option (individualized options will not appear as options on a student's transcript).

All students pursuing the BS in Forest Recreation Resources degree must get a grade of "C" or better in required courses taught in the College of Forestry or their approved substitutes taught elsewhere.

Freshman Year (45)

ECON 201. *Intro to Microeconomics (4)
 FOR 111. Intro to Forestry (3)
 FOR 112. Intro to Computer Applications in Forestry (3)
 FOR 251. Recreation Resource Management (4)
 FW 251. Principles of Wildlife Conservation (3)
 GEO 265. Geographic Information Systems (GIS) Practicum (3)
 MTH 245. *Mathematics for Management, Life, and Social Sciences (4)
 Fitness (3)
 Writing I, II (3,3)
 Perspectives (5)
 Electives/option/minor (6)

Sophomore Year (45)

COMM 111. *Public Speaking (3)
 or COMM 114. *Argument and Critical Discourse (3)
 FOR 220. Aerial Photo Interpretation and Forest Measurements (4)
 FOR 240. *Forest Biology (4)
 FOR 241. Dendrology (5)
 RNG 341. Rangeland Resources (3)
 ST 351. Intro to Statistical Methods (4)

Perspectives (15)
 Science, Technology and Society (3)
 Electives/option/minor (4)

Junior Year (45)

FOR 323. Recreation Research Methods (4)
 FOR 351. Recreation Behavior and Management (4)
 FOR 352. Wilderness Management (3)
 FOR 353. Field School (3)
 FOR 356. Recreation Resource Planning (4)
 FOR 365. *Issues in Natural Resources Conservation (3)
 FOR 391. Natural Resource Communications (3)
 FOR 407. Seminar (Sect. 20, Career Development) (1)
 FOR 410. Internship (8)
 FOR 441. Silviculture Principles (4)
 FOR 444. Ecological Aspects of Park Management (3)
 Electives/option/minor (5)

Senior Year (45)

FOR 330. Forest Resource Economics I (4)
 FOR 432. Economics of Recreation Resources (4)
 FOR 451. History and Cultural Aspects of Recreation (4)
 FOR 457. Techniques for Forest Resource Analysis (4)
 FOR 459. For Resource Planning and Decision Making (4)
 FOR 460. ^Forest Policy (4)
 FS/FW 453. Forest Management and Wildlife Conservation (3)
 Electives/option/minor (18)

CULTURAL RESOURCE MANAGEMENT OPTION (25)

ANTH 110. *Intro to Cultural Anthropology (3)
 ANTH 330. *Evolution of People, Technology, and Society (3)
 ANTH 435. Cultural Resources: Policy and Procedures (3)
 FOR 493. Environmental Interpretation (4)
 Plus a minimum of 6 credits from each of these two groups:

Anthropology

ANTH 230. Time Travelers (3)
 ANTH 380. *Cultures in Conflict (3)
 ANTH 411. World Cultures-North America (4)
 ANTH 431. Archeological Theory (3)
 ANTH 432. *The Archaeology of Domestication and Urbanization (3)
 ANTH 433. First Americans, Last Frontiers (3)
 ANTH 436. Northwest Prehistory (3)
 ANTH 472. Contemporary Indian Issues (3)
 ANTH 481. *Natural Resources and Community Values (3)

History

HST 467, HST 468. History of the American West (3,3)
 HST 469. History of the Pacific Northwest (3)
 HST 481. *Environmental History of the U.S. (3)
 HSTS 418. **Science and Society (3)
 HSTS 421. *Technology and Change (3)

ENVIRONMENTAL RESOURCE INTERPRETATION OPTION (24)

ED 463. Environmental Education (3)
 FOR 390. Forestry for Teachers (3)
 FOR 493. Environmental Interpretation (4)
 FOR 495. Interpretive Projects (2)

Select 6 credits from each group:**Natural History (6)**

BI 301. *Human Impacts on Ecosystems (3)
 ENT 350. Biology of Insects (4)
 FW 311. Biology of Birds (3)
 FW 315. Biology of Fishes (3)
 FW 317. Biology of Mammals (3)
 GEO 102. *The Surface of the Earth (4)
 Z 371, Z 372. Vertebrate Biology and Lab (3,2)
 Z 473. Biology of Amphibians and Reptiles (3)

Cultural Resources (6)

ANTH 110. *Intro to Cultural Anthropology (3)
 ANTH 230. Time Travelers (3)
 ANTH 330. *Evolution of People, Technology, and Society (3)
 ANTH 431. Archeological Theory (3)
 ANTH 433. First Americans, Last Frontiers (3)
 ANTH 435. Cultural Resources: Policy and Procedures (3)
 HST 467, HST 468. History of the American West (3,3)
 HST 469. History of the Pacific Northwest (3)

FOREST RESOURCES OPTION (21)

FE 430. Watershed Processes (4)
 or FE 370. Harvesting Operations (4)
 FOR 321. Forest Mensuration (5)
 FOR 331. Forest Resource Economics II (4)
Select 8 credits from the following:
 AREC 353. Public Land Statutes and Policy (4)
 AREC 453. Public Land and Resource Law (4)
 FOR 456. *International Forestry (3)
 FOR 462. Natural Resource Policy and Law (3)
 FOR 463. Environmental Policy and Law Interactions (3)
 FS 491. Sustainable Forestry: Multiple Perspectives (3)
 NR 455. Natural Resource Decision Making (3)
 FOR 442. Silvicultural Reforestation (4)
 FOR 443. Silvicultural Practices (4)
 FW 436. Wildland Fire Science (3)

LANDSCAPE DESIGN OPTION (26-27)

HORT 226, 227. Landscape Plant Materials (3,3)
 HORT 280. Landscape Design Theory (2)
 HORT 281. Landscape Design Studio (3)
 HORT 301. Principles of Horticultural Technology (4)
 HORT 315. Principles and Practices of Landscape Maintenance (4)
 HORT 358. Landscape Construction Techniques (4)
 Plus one more upper-division horticulture course

LAW ENFORCEMENT OPTION (24)

COMM 440. Theories of Conflict and Conflict Management (3)
 FW 341. Fish and Wildlife Law Enforcement (2)
 PHL 205. *Ethics (4)
 SOC 340. Deviant Behavior and Social Control (3)
 SOC 441. Criminology and Penology (3)
 SOC 448. Law and Society (3)
Select 6 credits from the following:
 SOC 421. Social Change and Modernization (3)
 SOC 424. Social Psychology (3)
 SOC 426. *Social Inequality (3)
 SOC 437. Race and Ethnic Relations (3)
 SOC 440. Juvenile Delinquency (3)

Additional Requirements:

Completion of a departmentally approved, off-campus, law enforcement training program such as the Santa Rosa (California) Training Center (NPS oriented) or Skagit Valley (Washington) College (state park oriented) is required. Students are advised to apply to the Oregon State Police Cadet program to gain work experience.

PUBLIC ADMINISTRATION OPTION (24) UNDER FOREST RECREATION RESOURCES (BS)

PS 201. *Intro to U.S. Government and Politics (4)
 PS 472, PS 473. Public Administration (4,4)
Select three courses from the following group:
 ECON 435. The Public Economy (4)
 PS 371. Public Policy Problems (4)
 PS 400. Political Analysis (4)
 PS 414. ^Interest Groups (4)
 PS 415. Politics and the Media (4)
 PS 474. Natural Resource Policy and Bureaucratic Politics (4)
 PS 475. Environmental Politics and Policy (4)
 PS 476. *Science and Politics (4)
 PS 479. ^Topics in Public Policy and Public Administration (4)

RESOURCE PLANNING OPTION (24-25)

AREC 253. *Evolution of U.S. Environmental and Natural Resources Law (4)
 GEO 301. Map and Image Interpretation (4)
 GEO 360. Cartography (4)
 GEO 420. Geography of Resource Use (3)
 GEO 465. Geographic Information Systems (3)
Select one of the following courses:
 AREC 250. *Intro to Environmental Economics and Policy (3)
 AREC 352/ECON 352. *Environmental Economics and Policy (3)
 AREC 454. Rural Development Economics and Policy (3)
 ECON 490. Regional Economics (4)
 FOR 463. Environmental Policy and Law Interactions (3)
Select one of the following:
 GEO 423. Land Use (3)
 GEO 451. Environmental Site Planning (3)

GEO 452. Principles and Practices of Rural and Resource Planning (3)

SOCIOLOGY OPTION (21)

SOC 204. *Intro to Sociology (3)
 SOC 360. *Population Trends and Policy (3)
 SOC 424. Social Psychology (3)
 or PSY 360. Social Psychology (3)
 SOC 480. *Environmental Sociology (3)
 SOC 481. Society and Natural Resources (3)
 Plus two more upper-division SOC course (6)

TOURISM OPTION (23-26)

BA 390. Marketing (4)
 BA 492. Consumer Behavior (4)
 FOR 453. Nature-Based Tourism (3)
Plus four from the following group:
 BA 498. Services Marketing (4)
 ECON 490. Regional Economics (4)
 GEO 423. Land Use (3)
 GEO 426. Third-World Resource Development (3)
 GEO 451. Environmental Site Planning (3)
 GEO 452. Principles and Practices of Rural and Resource Planning (3)
 PS 475. Environmental Politics and Policy (4)

OUTDOOR RECREATION LEADERSHIP AND TOURISM MAJOR (BS)

For information, contact OSU-Cascades, (541) 322-3100 or visit <http://www.osucascades.edu>. Students may also obtain information about lower-division requirements from Kreg Lindberg, Associate Professor, 241 Cascades Hall, 2600 NW Cascades Way, Bend, OR 97701. (541) 322-3126. E-mail: kreg.lindberg@osucascades.edu
 The major offers two options, International Ecotourism, and Tourism and Commercial Recreation Management.

FOREST MANAGEMENT MINOR (31)

Students majoring in other programs at OSU may elect a minor in forest management. This program provides basic knowledge about management of forest resources. (This minor is not for students in forest engineering, forest management, or forest recreation resources.)

Core

FOR 111. Intro to Forestry (3)
 FOR 141. Tree and Shrub Identification (3)
 FOR 220. Aerial Photo Interpretation and Forest Measurements (4)
 FOR 240. *Forest Biology (4)
 FOR 330. Forest Resource Economics I (4)
 FOR 441. Silviculture Principles (4)
Select a minimum of 6 credits from:
 FE 370. Harvesting Operations (3)
 FE 430. Watershed Processes (4)
 FOR 321. Forest Mensuration (5)
 FOR 331. Forest Resource Economics II (4)
 FOR 457. Techniques for Forest Resource Analysis (4)
 FOR 460. ^Forest Policy (4)

FS 444. Forest Genetics (4)
 FS 453. Forest Management and Wildlife Conservation (3)

FOREST RECREATION RESOURCES MINOR (27)

Students majoring in other programs at OSU may elect a minor in forest recreation resources. This program provides basic knowledge about recreation resource planning and management. (This minor is not for forest management students.)

Core

FOR 251. Recreation Resource Management (4)
 FOR 351. Recreation Behavior and Management (4)
 FOR 352. Wilderness Management (3)
 FOR 356. Recreation Resource Planning (4)
 FOR 391. Natural Resource Communications (3)
Select 9 credits from:
 FOR 365. *Issues in Natural Resources Conservation (3)
 FOR 432. Economics of Recreation Resources (4)
 FOR 444. Ecological Aspects of Park Management (3)
 FOR 451. History and Cultural Aspects of Recreation (4)
 FOR 453. Nature Based Tourism (3)
 FOR 460. ^Forest Policy (4)
 FOR 493. Environmental Interpretation (4)
 FOR 495. Interpretive Projects (2)

NATURAL RESOURCES MINOR (28)

Students majoring in other programs at OSU can choose a minor in natural resources. The minor is intended to provide a broad exposure to the natural resources field. It offers course work in seven areas that integrate a number of natural resource disciplines.

FOR 111. Intro to Forestry (3)
 FOR 251. Recreation Resource Management (4)
 FW 251. Principles of Wildlife Conservation (3)
 RNG 341. Rangeland Resources (3)
One upper-division course from each of the following breadth requirements courses list:
 Resource Values/Philosophy (3)
 Social and Political (3-4)
 Land and Water (3-5)

Any additional classes from the breadth requirements course list to total 28 credits. Students who have taken one or more of these courses in their major may not also count those courses towards the Natural Resources minor. They may substitute any other courses from the list of Natural Resources Breadth courses to reach the 28-credit requirement.

ECONOMICS (MA, MAg, MS, PhD)

Requirements for graduate-level economics degrees are determined by the Economics Department in the College of Liberal Arts. Please see the "Economics" under the College of Liberal Arts for details.

Graduate Areas of Concentration

Industrial organization, international economics, resource and environmental economics

The Department of Economics offers the MA, MS, and PhD degrees, as well as courses applicable toward graduate degrees in forest resources and agricultural and resource economics. The department also participates in the Master of Arts in Interdisciplinary Studies (MAIS) program. The graduate program in economics emphasizes a strong foundation in economic theory and econometrics.

A number of graduate teaching and research assistantships are awarded each year to incoming and continuing graduate students. To assure full consideration for financial assistance, applications must be received by March 1.

For additional information, please contact:

The Director of Graduate Studies, Department of Economics, 303 Ballard Extension Hall, Oregon State University, Corvallis, Oregon 97331-3612. E-mail: econgrad@oregonstate.edu. Web site: <http://oregonstate.edu/dept/econ/>.

ADMISSION REQUIREMENTS

For admission, an applicant must have at least a "B" average in the last two years of undergraduate study. Graduate Record Examination (verbal, quantitative, and analytical) results must be submitted. The undergraduate major need not be economics, but an appropriate background in economic theory, calculus, linear algebra, and statistics is recommended. Provisional admission is granted in special circumstances.

MASTER'S DEGREE

The master's degree requirement includes courses in economic theory (ECON 512, ECON 513, ECON 515) and econometrics (ECON 523, ECON 525, ECON 526), a specialty field of study in economics, and additional elective courses in order to meet the 45-graduate credit requirement. Students must maintain a minimum grade point (GPA) average of 3.00 in all graduate work and in all graduate credits in economics. Well-prepared students should be able to complete the master's program within two years.

DOCTOR OF PHILOSOPHY DEGREE

The PhD degree in economics has four main requirements:

1. Satisfactorily complete the graduate core courses in economic theory (ECON 512, ECON 513, ECON 550, ECON 611, ECON 612, ECON 613, ECON 515, ECON 615) and in econometrics (ECON 523, ECON 525, ECON 526, ECON 625, ECON 627) and pass comprehensive examinations on this core material.
2. Satisfactorily complete at least one major field of study in economics and submit a satisfactory field paper.
3. Submit and orally defend an acceptable dissertation proposal.
4. Complete 112 (approved) graduate credits and an acceptable dissertation.

Students must maintain a minimum GPA of 3.00 in all graduate work and in all graduate credits in economics. Once all core and field examinations have been passed, the student is guided by his or her dissertation committee. A student with the recommended background can complete the doctoral program in four years, but many students take five years.

A more detailed description of the economics graduate degree requirements is in the department's pamphlet, "Graduate Study in Economics," which may be obtained from the department office.

FOREST RESOURCES (MAg, MF, MS, PhD)**Graduate Areas of Concentration**

Community and resource development, forest biometrics/modeling, forest economics, forest management, forest management science/operations research, forest measurements, forest modeling, forest planning administration, forest policy, forest recreation, forest social science, forestry, landscape ecology, natural resource education and extension, natural resource policy and law, remote sensing and GIS, silviculture

Graduate and research programs in the Department of Forest Resources focus on forest management, forest economics, forest policy, forest measurements and models, remote sensing and GIS, forest social science and recreation, natural resource education and Extension, and silviculture. Programs lead to the Master of Forestry, Master of Science, and Doctor of Philosophy degrees. The department also participates in the Master of Arts in Interdisciplinary Studies (MAIS) program. Specific information about graduate degree programs is available on the department Web site at <http://www.cof.orst.edu/cof/fr/> or in a booklet obtainable from the Department of Forest Resources.

Students enrolling in graduate programs in forest resources usually have undergraduate degrees in forestry or related fields. Applicants without forestry backgrounds are required to achieve competence in forestry and appropriate subjects by taking undergraduate courses, through independent study, or by other means decided by each student's graduate advisory committee. All graduates must be knowledgeable in the broad aspects of forest resource management and policy, as well as in their specialties.

Beyond certain minimum requirements, students have considerable flexibility in designing a curriculum to achieve a desired blend of theory and practice in one or more specialized areas. All degree programs include course work in other departments. Thesis research typically draws on the strengths of these related departments, which may include the Departments of Forest Science, Forest Engineering, Wood Science and Engineering, Economics, Agricultural and Resource Economics, Statistics, Business Administration, Computer Science, Fisheries and Wildlife, Rangeland Resources, Political Science, History, Sociology, Anthropology, Botany and Plant Pathology, and other departments.

FOREST RESOURCES GRADUATE MINOR

For more details, see the departmental adviser.

COURSES**FOR 111. INTRODUCTION TO FORESTRY (3).**

Forest resources in the world; forests and human well-being; where and how forests grow; environmental and human values; products, characteristics, and uses; basic elements of use, planning and management. Interpretation of forestry literature; professional origins in the U.S. REQ: Field trips.

FOR 112. INTRODUCTION TO COMPUTER APPLICATIONS IN FORESTRY (3).

An overview of computing applications used in all aspects of forestry work including advanced word processing, spreadsheets and charting, presentation development, working with graphics and images, file sharing, and Web page development.

FOR 141. TREE AND SHRUB IDENTIFICATION (3).

Learn to identify the principal forest trees of North America, and the principal trees and shrubs of the Pacific Northwest. Also learn about forested regions of the world, and the structure and function of forest plants.

FOR 199. SPECIAL STUDIES (1-16).**FOR 220. AERIAL PHOTO INTERPRETATION AND FOREST MEASUREMENTS (4).**

An introduction to the field collection of forest measurements and the aerial photos used to assess the forest resource. The spatial relationship of field and photo-based data are emphasized and related to the building of a geographic information system. Successful completion of FOR 220 should help students compete for summer jobs requiring measurements skills. PREREQ: MTH 105, FOR 111.

FOR 240. *FOREST BIOLOGY (4). Forest plants and animals, communities, and ecosystems, their functioning and their relationship to resource management. REQ: Field trips. (Bacc Core Course)

FOR 241. DENDROLOGY (5). Learn to identify the principal forest trees of North America, and the principal trees and shrubs of the Pacific Northwest, including the ranges over which they grow, important ecological characteristics, and principal uses. Also learn about forested regions of the world, and the structure and function of forest plants.

FOR 251. RECREATION RESOURCE MANAGEMENT (4). Overview of recreation resource management including study of land and water resources used for outdoor recreation. The planning and management of natural and cultural resources for long-term resource productivity, with a focus on rural and wildland areas of the forest, range and coast.

FOR 321. FOREST MENSURATION (5). Theory and practice of sampling and cruising techniques; stratified and nonstratified sampling systems with fixed plots, variable plots, and 3-P designs. PREREQ: FOR 220, ST 351, ST 352.

FOR 322. FOREST MODELS (3). Introduction to static and dynamic forest models: defining what they are, how they might be used, and, in general terms, how they are developed. PREREQ: FOR 321, ST 351, ST 352.

FOR 323. RECREATION RESEARCH METHODS (4). Research methods applied to the study of outdoor recreation issues and problems; interpretation of research results. PREREQ: FOR 251, ST 351.

FOR 330. FOREST RESOURCE ECONOMICS I (4). Basic arithmetic of interest and capital budgeting. Basic wood products markets and markets and externalities. Nonmarket valuation, and multiple-use forestry. Impacts of forest management and policy decisions on public welfare. PREREQ: ECON 201, MTH 245.

FOR 331. FOREST RESOURCE ECONOMICS II (4). Forest products markets, appraisal, rotation, thinning, uneven-aged management and forest regulation. Economics of timber management and harvest scheduling. PREREQ: ECON 202, FOR 330, ST 352.

FOR 341. FOREST ECOLOGY (4). Basic physiological characteristics of trees, succession, climax, and related concepts. Vegetation classification. Stand structure, diversity, competition, growth, soils-forests interactions, biomass and nutrient distribution, energy relations, nutrient element dynamics, ecology of disturbances. PREREQ: BI 211, BI 212, BI 213, FOR 241, CSS 305. COREQ: FOR 355, FOR 443, FS 453, FOR 406-4; two-day field trip.

FOR 351. RECREATION BEHAVIOR AND MANAGEMENT (4). Principles of human behavior as used in the analysis of recreation management issues. Sociological and psychological approaches are emphasized.

FOR 352. WILDERNESS MANAGEMENT (3). Wilderness as land use concept. Wilderness history, preservation, planning and management. Wilderness in the context of other land uses.

FOR 353. FIELD SCHOOL (3). A field course focused on current management in park and recreation areas. A major field trip is required. PREREQ: FOR 251. Additional fee. Departmental approval required.

FOR 354. AMENITY RESOURCE MANAGEMENT (3). Management of amenity resources such as recreation, fish, wildlife, and visual aesthetics in the context of multiple use land management. PREREQ: FOR 111. Not for FM or FRR majors.

FOR 355. MANAGEMENT FOR MULTIPLE RESOURCE VALUES (4). Management of a variety of resource attributes in multiple use context, including considerations for recreation, fish, wildlife, aesthetics, watersheds, and forest products. PREREQ: FOR 111. COREQ: FOR 341, FOR 406-4, FOR 443, FS 453. Not for FRR majors.

FOR 356. RECREATION RESOURCE PLANNING (4). Theory and function of recreation resource planning. Techniques for collection, storage, analysis and display of planning data. Practice in use of recreation planning models. PREREQ: FOR 251, ST 351.

FOR 365. *ISSUES IN NATURAL RESOURCES CONSERVATION (3). Background of major current issues in natural resources conservation with emphasis on forests, soils, and water and potential sustainable carrying capacity. Focus on evaluating facts and opinions related to issues. Basics of terrestrial and aquatic ecology, recent and current issues of soil, water, and forest use and management. (Bacc Core Course)

FOR 371X. INTERNATIONAL ECOTOURISM (3). An introduction to ecotourism: what it is, market and business issues, its positive and negative impacts, and planning and management issues. PREREQ: GEOG 212.

FOR 372X. TOURISM AND PARK MANAGEMENT (3). Covers two broad topics: first, the philosophy, history, and management of protected areas, such as national parks; and second, the relationship between tourism and protected areas, including the level of park visitation, the role of the private sector in visitor services, user pays issues, and visitor experience issues.

FOR 390. FORESTRY FOR TEACHERS (3). Cooperative learning and critical thinking skills used in discussions and labs to introduce forestry concepts to pre-teachers of K-12 students. Includes forest ecology, forest products, management practices, and conservation of forest resources. REQ: Cascades, Coast Range field trips.

FOR 391. NATURAL RESOURCE COMMUNICATIONS (3). Concepts and techniques for communication with various constituents in the natural resources arena. Principles of working in team environments and with the public are presented.

FOR 401. RESEARCH AND SCHOLARSHIP (1-16).

FOR 405. READING AND CONFERENCE (1-16).

FOR 406. PROJECTS (1-16). Section 2: Starker Lectures, Graded P/N; Section 4: Integrated Projects, graded.

FOR 407. SEMINAR (1-16). Section 1: Ambassadors; Section 2: Presentation Skills, graded; Section 4: Forestry and Wildlife (2 credits); Section 5: International Forestry; Section 6: Professionalism; Section: Career Development; Section 21: Senior Seminar; Graded P/N.

FOR 408. WORKSHOP (1-3).

FOR 410. INTERNSHIP (8). Full-time supervised professional experience emphasizing functional proficiency under joint sponsorship of university and agency personnel. PREREQ: FOR 251, FOR 323, FOR 351, FOR 352, FOR 356, FOR 391, FOR 407-Section 020, departmental approval required. Graded P/N.

FOR 420/FOR 520. ADVANCED AERIAL PHOTOS AND REMOTE SENSING (3). Planning the photo mission, height measurements, photo mensuration, introduction to remote sensing. Use of an analytic stereoscopic plotter to make precise photo measurements and planimetric and topographic maps from photos. PREREQ: A photo interpretation course (FOR 220) or the equivalent; a remote sensing course (GEO 444/GEO 544) or the equivalent. Offered alternate years.

FOR 421/FOR 521. ADVANCED GIS APPLICATIONS IN FORESTRY (3). Geographic information systems (GIS) literature review, seminars, and project work involving forest resources, wildlife habitat, and landscape ecology using remotely sensed data, digital elevation models, and other digitized data. PREREQ: A GIS course (GEO 265, FE 357, GEO 465/GEO 565) or the equivalent. Offered alternate years.

FOR 432/FOR 532. ECONOMICS OF RECREATION RESOURCES (4). Application of economic concepts to forest recreation management and resource allocation. Demand, supply, and valuation of both market and non-market forest recreation resources. Benefit-cost analysis applied to a recreation management project. PREREQ: ECON 201, ST 351.

FOR 441. SILVICULTURE PRINCIPLES (4). Nursery operation, vegetation management, herbivores, fire, seeding and planting techniques. Introduction to principles and techniques involving vegetation control, thinning, fertilizing, and harvesting. Environmental considerations related to forest stand treatments. PREREQ: FOR 141, FOR 240.

FOR 442/FOR 542. SILVICULTURE REFORESTATION (4). Seed, seedlings, and cuttings. Nursery operation, planting techniques, seeding and vegetation management. Herbivores, uses of fire in reforestation. REQ: Field trips. PREREQ: BI 211, BI 212, BI 213; CSS 305; FOR 322; COREQ: FOR 341, FOR 355, FOR 406-4, FOR 443; two-day field trips.

FOR 443/FOR 543. SILVICULTURAL PRACTICES (4). Manipulation of immature and mature forest stands for various resource management objectives. Principles and techniques involving vegetation control, thinning, fertilizing, and harvesting. Environmental considerations related to stand treatments. PREREQ: FOR 322. COREQ: FS 453, FOR 341, FOR 355, FOR 406-4; two-day field trips.

FOR 444/FOR 544. ECOLOGICAL ASPECTS OF PARK MANAGEMENT (3). Ecological principles applied to the management of park recreation uses. The relationship between biological and physical science information and recreation management decisions is explored. PREREQ: FOR 251, plus an ecology course.

FOR 445. ECOLOGICAL RESTORATION (4). Fundamentals of restoring and reclaiming disturbed landscapes and ecosystems. Topics to be covered include types and assessment of site conditions; determining restoration goals and feasibility; hydrologic, biotic, and soil functions and their importance in restoration; and measures of successful restoration. PREREQ: BI 370 or instructor approval required.

FOR 446. WILDLAND FIRE ECOLOGY (3). Ecological aspects of fire in forest, rangeland, and other ecosystems. Topics include fire history, behavior and effects, plus social considerations. Case studies and special topics also included. Distance education delivery using video- and Web-based technologies; no class meetings. PREREQ: Course work in ecology and natural resource management. CROSSLISTED as FW 446 and RNG 446.

FOR 451/FOR 551. HISTORY AND CULTURAL ASPECTS OF RECREATION (4). Role of conservation and outdoor recreation in U.S. environmental history. American attitudes toward nature. Evaluation of major governmental land and water policies. Evolution of the national parks and forests systems. Significant leaders in the parks movement. Role of cultural resources in recreation and parks.

FOR 453/FOR 553. NATURE-BASED TOURISM (3). The relationship between natural resource based recreation and tourism. Issues of tourism planning, management and impacts are explored.

FOR 456. *INTERNATIONAL FORESTRY (3). An introduction to the biological, physical, and sociological factors that shape the world's forests and the activities used to manage those forests. What influence these factors have on forest policies, practices, and outcomes. PREREQ: Introductory course in biology. CROSSLISTED as FE 456. (Bacc Core Course)

FOR 457/FOR 557. TECHNIQUES FOR FOREST RESOURCE ANALYSIS (4). Use of linear programming, nonlinear programming, dynamic programming, and simulation to solve complex forest management problems, with emphasis on intertemporal multiple use scheduling. Forestry transportation problems, multiple-use allocation, and investment analysis. REQ: Field trips. PREREQ: FOR 330.

FOR 459/FOR 559. FOREST RESOURCE PLANNING AND DECISION MAKING (4). Integration of biological, economic, and amenity characteristics of the forest system in resource management planning and decision making. Senior capstone class projects. REQ: Field trips. PREREQ: FOR 457, FOR 460, and senior standing or departmental approval.

FOR 460/FOR 560. ^FOREST POLICY (4). Policy formulation and analysis for forest resources. Consideration of policy affecting land management approaches to planning, management, and social and economic development. Major forestry policy areas covered include outdoor recreation, range, timber, wilderness, and wildlife and fish. PREREQ: Senior standing. (Writing Intensive Course)

FOR 462/FOR 562. NATURAL RESOURCE POLICY AND LAW (3). First of two offerings designed to provide an introduction to current environmental and natural resource law issues and disputes for students who will have to meet, consult, and work with lawyers throughout their professional career. Focus is on mechanisms governing resource allocation within the constraints of private property rights. Emphasis is placed on the federal Endangered Species Act and its relation to water allocation and public trust doctrines. Students will also gain a broad understanding of regulatory "takings" law and the evolving dynamic of government imposed constraints on private property rights in the context of natural resource and species protection.

FOR 463/FOR 563. ENVIRONMENTAL POLICY AND LAW INTERACTIONS (3). Second of two offerings designed to provide an introduction to current environmental and natural resource law issues and disputes for students who will have to meet, consult, and work with lawyers throughout their professional career. Focus is on the arena of regulatory environmental laws. Environmental torts, regulation of point and non-point source pollution under the federal Clean Water Act, wetlands protection, and laws governing agricultural and forest practices will be examined as examples of regulatory frameworks for achieving resource protection. Students will be exposed to the basic framework of federal laws regulating air and hazardous waste pollutants.

FOR 471X. ECOTOURISM IMPACTS (3). ProvideS students with an in-depth understanding of the impacts of ecotourism, using the broad categorization of economic, environmental, and socio-cultural impacts. Although the focus is on ecotourism's impacts, these will be set within the context of the impacts of tourism generally. Issues and examples both from the US and overseas will be presented. The spatial focus will be at the site level (e.g., attractions, natural areas, communities), but broader issues also will be discussed. Impact evaluation methods will be described, and students will conduct a case study evaluation.

FOR 472X. ECOTOURISM POLICY AND PLANNING (3). Provides students with an in-depth understanding of ecotourism policy and planning. Although the focus is on ecotourism, course content will be set within the context of general tourism policy and planning. Issues and examples both from the US and overseas will be presented. The spatial focus will be at the site level (e.g., attractions, natural areas, communities), but broader planning levels (e.g., national or regional) also will be discussed.

FOR 473X. RESORT MANAGEMENT (3). provides an overview of resort management and operations, including a review of the growth of resorts in the United States, and expansion of resorts world-wide. Operations and management of ski, golf, and gaming resorts will be emphasized.

FOR 485. *CONSENSUS AND NATURAL RESOURCES (3). Students will use a working group approach. They will select a natural resource topic, study the team process and interaction as a method of learning, explore the issue using systems practice and strive for consensus on solutions to their issue. CROSSLISTED as ANS 485/ANS 585, HORT 485/HORT 585, FW 485/FW 585, SOC 485/SOC 585, PS 485/PS 585. (Bacc Core Course)

FOR 493/FOR 593. ENVIRONMENTAL INTERPRETATION (4). Interpretation of natural and cultural features in parks, museums, and similar settings. Emphasis on learning and applying effective communication techniques in the development of brochures, exhibits, talks, museums, and visitor centers. PREREQ: FOR 391.

FOR 495/FOR 595. INTERPRETIVE PROJECTS (2). Development of specific natural and cultural resource interpretive projects including interpretive plans, brochures, audio-visual programs and displays. PREREQ: FOR 493/FOR 593.

FOR 499/FOR 599. SPECIAL TOPICS (1-16). Topics of current importance in forest resources issues, education, policies, economics, management, business, social values, silviculture, and biometrics. Topics will change from term to term. May be repeated with different topics for credit. Section 8: Social aspects of natural resource management (3 credits) graded. PREREQ: Senior or graduate standing.

FOR 501. RESEARCH AND SCHOLARSHIP (1-16).

FOR 503. THESIS (1-16).

FOR 505. READING AND CONFERENCE (1-16).

FOR 506. PROJECTS (1-16). Section 2: Starker Lectures, Graded P/N.

FOR 507. SEMINAR (1-16). Section 2: Presentation Skills (graded); Section 4: Forestry and Wildlife (2 credits); Section 5: International Forestry; Section 6: Professionalism; Section 10: American Forestry; Section 11: Thesis; Seminar; graded P/N.

FOR 508. WORKSHOP (1-3).

FOR 510. INTERNSHIP (1-9).

FOR 524. FOREST BIOMETRICS (3). Advanced topics in forest biometrics, including measurement of forest structure and dynamics, application of sampling theory and methods, and statistical techniques for interpreting forestry data. PREREQ: FOR 322, ST 511.

FOR 525. FOREST MODELING (3). Examination of regression techniques and assumptions used to develop static and dynamic equations of tree and stand attributes. PREREQ: ST 552.

FOR 533. ECONOMICS OF PRIVATE FORESTRY (3). Economic and social characteristics of owners of small woodlands. Study of credit, incentives, leasing, and other measures to increase production on small woodlands. PREREQ: FOR 330. Not offered every year.

FOR 534. ECONOMICS OF THE FOREST RESOURCE (3). Economic aspects of forest production, regulation, and silvicultural applications. Microeconomic interactions of forest production and regulation and environmental constraints. PREREQ: FOR 330, FOR 331 or equivalent. Offered alternate years.

FOR 535. MARKETS AND PRICES IN THE FOREST SECTOR (3). Review of models of demand and supply behavior in markets for timber and forest products from current literature: private stumpage supply (including non-commodity values); supply of processed products and derived demand for logs and timber; demand in major end-uses of wood and fiber (including housing); market dynamics; and non-competitive markets. PREREQ: FOR 331 or equivalent, and AREC 512 or AREC 513 or equivalent. Offered alternate years.

FOR 537. FOREST RECREATION ECONOMICS (3). Public goods and externalities in forest resources. Institutional analysis of forest amenities. Demand and valuation of forest amenity resources. Theory and application of nonmarket valuation techniques. Offered alternate years.

FOR 558. CONCEPTS OF FOREST RECREATION PLANNING AND MANAGEMENT (3). Examines research that forms the conceptual basis for tool, techniques, and approaches used in recreation planning and management. PREREQ: Senior standing.

FOR 561. FOREST POLICY ANALYSIS (3). Basic elements of forest policy problems, including resource allocation and efficiency, distribution, and interpersonal equity, taxation, regulation, and control, and planning and uncertainty. Emphasis on policy and analysis and its uses in policy decision.

FOR 564. PRIVATE FORESTS IN SOCIETY (4). Examines private forests as components of social systems and ecosystems. All categories of private forests will be considered, but the focus will be on nonindustrial private forests. Students will develop an understanding of private forests, their owners, and current social, economic, and policy issues surrounding these forests.

FOR 601. RESEARCH AND SCHOLARSHIP (1-16).

FOR 603. THESIS (1-16).

FOR 605. READING AND CONFERENCE (1-16).

FOR 606. PROJECTS (1-16).

FOR 607. SEMINAR (1-16).

FOR 699. SPECIAL TOPICS (1-16). Topics of current importance in forest resources issues, education, policies, economics, management, business, social values, silviculture, and biometrics. Topics will change from term to term. May be repeated with different topics for credit.

FOR 808. WORKSHOP (1-9).

FOREST SCIENCE

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FACULTY

Professors Adams; Bond; Bondi; Cromack; Harmon; Hayes; Hibbs; Hobbs; Oester; Radosevich; Salwasser; Strauss
Associate Professors Ahrens; Law; Maquire, D.; Puettmann; Rose, R.; Ross; Turner
Assistant Professors Brunner; Cazares-Gonzalez; Ganio; Howe; Krankina; Luoma; Maguire, C.; Withrow-Robinson

ADJUNCT FACULTY

Gartner; Hansen, E; Jensen; Jones, J.A.; Lajtha; Myrold; Ripple; Starkey; Sulzman; Tappenier; Tesch; Unsworth; Walstad

COURTESY FACULTY

Acker; Adams, M.; Aitken; Amaranthus; Anderson; Apple; Blair; Bormann; Bradshaw; Brooks; Castellano; Cissel; Cohen; Compton; Copes; Dreisbach; Dyrness; Garman; Grant; Gray, A.; Green; Gregg; Griffiths; Halpern; Homann; Irwin; Johnson, G.R.; Kellogg; Kelsey; Kimberling; Laurence; Lee, Kyu-Sung; Lee, Who-Shin; Li, C.Y.; Liegel; Mattson; McComb; Meinzer; Molina; Neilson; Niwa; O'Dell; Ohmann; Perakis; Philips; Pyke; Rygielwicz; Sandberg; Sedell; Smith, J.; Solomon, Sorenson; Spies; St. Clair; Swanson; Swanson; Thies; Thomas; Trappe; Vance; Weber; Wondzell; Youngblood; Zach

Graduate Major**Forest Science (MF, MS, PhD)****Graduate Areas of Concentration**

Agroforestry/Sustainable Forestry (MS only)

Forest Biology (MF only)

Forest Ecology (MS, PhD)

Forest Genetics (MS, PhD)

Forest Science (MS, PhD)

Forest Tree Physiology (MS, PhD)

Integrated Forest Protection (MS, PhD)

Silviculture (MF, MS, PhD)

Silviculture/Harvesting Systems (PhD only)

Graduate Minor**Forest Science**

The Department of Forest Science offers graduate programs leading to the Master of Forestry (MF), Master of Science (MS), and Doctor of Philosophy (PhD) degrees. The Department of Forest Science also

participates in the Master of Arts in Interdisciplinary Studies (MAIS) graduate program.

The MF program emphasizes three areas: biology, silviculture, and integrated forest protection. The MF in Silviculture (accredited by the Society of American Foresters) is administered jointly with the Department of Forest Resources. Students in either program prepare for careers as professional forest biologists, silviculturists, or pest managers capable of analyzing opportunities for natural resource management for landowners.

The MS and PhD programs are structured specifically for those interested in careers in research, teaching, and specialized areas of forest science and forestry practice. The degrees are available in five areas of concentration: forest ecology, forest genetics (including biotechnology), forest physiology, silviculture, and integrated forest protection. An MS degree is also offered with a specialization in agroforestry/sustainable forestry.

A special doctoral program, administered cooperatively with the Department of Forest Engineering, is offered in silviculture/harvesting systems. This program is concerned with both biological and engineering aspects of forest harvesting and subsequent reforestation.

The Department of Forest Science also participates in the Master of Arts in Interdisciplinary Studies (MAIS) graduate program.

Research in the Department of Forest Science focuses on fundamental and applied research to support forest practices in areas of reforestation, silviculture of young and mature natural stands and plantations, and land capability classification. All biological levels of organization within natural and managed forest communities and individual trees are addressed by current departmental research projects. Emphasis in graduate education is placed on the ability to define and solve researchable problems in forest biology. Graduate students are encouraged to participate actively in the department's large, diverse program of seminars, continuing education courses and workshops, international research, and other professional and educational activities.

FOREST SCIENCE (MF, MS, PhD)**Graduate Areas of Concentration**

Agroforestry/sustainable forestry (MS only), forest biology (MF only), forest ecology (MS, PhD), forest genetics (MS, PhD), forest science (MS, PhD), forest tree physiology (MS, PhD), integrated forest protection (MS, PhD), silviculture (MF, MS, PhD), silviculture/harvesting systems (PhD only)

The Department of Forest Science offers graduate programs leading to the Master of Forestry, Master of Science, and Doctor of Philosophy degrees. Graduate programs are offered in one of six disciplinary areas of specialization:

- Forest Ecology
- Forest Genetics
- Forest Physiology
- Integrated Forest Protection
- Silviculture
- Sustainable Forestry/Agroforestry

The department also offers a specialization in forest biology (MF only) and joint degree programs with concentrations in silviculture (MF, with the Department of Forest Resources) and in silviculture/harvesting (PhD, with the Department of Forest Engineering).

For more information, contact the head of the department or any faculty member.

FOREST SCIENCE GRADUATE MINOR

For details, see the departmental adviser.

COURSES

FS 401. RESEARCH AND SCHOLARSHIP (1-16).

FS 405. READING AND CONFERENCE (1-16).

FS 430/FS 530. *BIOTECHNOLOGIES: AGRICULTURE, FOOD AND RESOURCE ISSUES (3). A multidisciplinary course that examines the scientific, social, political, economic, environmental, and ethical controversies surrounding agricultural and natural resource biotechnologies. CROSSLISTED as BI 430/BI 530. (Bacc Core Course)

FS 444/FS 544. FOREST GENETICS (4). Genetic principles as applied to forest trees: role of evolutionary forces on patterns of natural variation, impacts of management on forest gene pools, tree breeding theory and practice, biotechnology. REQ: Field trips. PREREQ: FOR 341 or BOT 341.

FS 450/FS 550. INTEGRATED FOREST PROTECTION (4). Management of forest pests (insects, diseases, weeds, and vertebrates) with an ecological perspective and in a silvicultural context. PREREQ: FOR 341, BOT 415/ENT 415.

FS 453. FOREST MANAGEMENT AND WILDLIFE CONSERVATION (3). The ecology and conservation of wildlife in managed forests, the influences of forest management on wildlife and their habitats, and management of forests to achieve wildlife objectives. PREREQ or COREQ: FOR 240, or FOR 341, or BI 370, or equivalent course in ecology. CROSSLISTED as FW 453.

FS 491/FS 591. SUSTAINABLE FORESTRY: MULTIPLE PERSPECTIVES (3). Examination of social, biological, and philosophical factors in natural resource management; includes concepts of sustainability and their consequences for forests and human communities. REQ: Field trip, group/individual projects. PREREQ: Upper-division standing, must include a total of 6 credits in forestry, sociology, or philosophy. CROSSLISTED as PHL 491/PHL 591, SOC 491/SOC 591.

FS 499. SELECTED TOPICS IN FOREST SCIENCE (1-16). In-depth studies of specific topics within a field of specialization. Examples include biotechnology in forestry, mycorrhizal ecology, tree improvement, landscape ecology, global climatic change in relation to forestry, advanced silviculture prescriptions, agroforestry, and others.

FS 501. RESEARCH AND SCHOLARSHIP (1-16).**FS 503. THESIS (1-16).**

FS 505. READING AND CONFERENCE (1-16). Some sections graded P/N.

FS 506. PROJECTS (1-16).

FS 507. SEMINAR (1-16). Some sections graded A/F.

FS 520X. POSING RESEARCHABLE QUESTIONS (1).

1-credit four-week course acquaints students to scientific method and formation of researchable questions. Consists of lectures, readings, discussions, and a written and oral term paper.

FS 521. NATURAL RESOURCE RESEARCH PLANNING (2). Research planning and study plan development, investigative procedures, the principles and ethics of natural resource science, principles and practices in scientific communication. PREREQ: FS 520X.

FS 523. NATURAL RESOURCE DATA ANALYSIS (4). Hands-on experience in applied statistical data analysis and research data management. Students are encouraged to use data sets from their own research for final projects. Widely used, commercially available statistical software packages, e.g., SAS are used. Emphasis is placed on micro- and minicomputers in the practical application and actual implementation of statistical analysis techniques. PREREQ: ST 412/ST 512, and concurrent registration in ST 415/ST 515.

FS 532X. PLANNING AGROFORESTRY PROJECTS (2). Through lecture, discussion, field trips and a class project, students in this introductory course will examine various agroforestry concepts, systems, technologies and practices. The course will focus on how to plan, implement, and evaluate different agroforestry systems/practices, and the resulting potential benefits of these strategies.

FS 533. FUNDAMENTALS OF SILVICULTURE (3). Introduction to silvics, forest ecosystem dynamics, and the scientific basis for regeneration techniques, density management, silvicultural systems and other forest management practices. PREREQ: Graduate standing.

FS 543. ADVANCED SILVICULTURE (4). The scientific basis of forest regeneration and silvicultural practices and prescriptions in immature and mature stands. REQ: Field trips. PREREQ: F 432, F 433.

FS 545. ADVANCED FOREST COMMUNITY ECOLOGY (4). Dynamics of undisturbed forest ecosystems, responses of ecosystems to perturbation, optimization of response for attainment of management objectives. REQ: Field trips. PREREQ: FOR 433, BOT 441, or BOT 442, or BOT 443, or equivalent.

FS 548. BIOLOGY OF INVASIVE PLANTS (3). Concepts of plant physiology, genetics and population dynamics are used to understand how plant invasions occur and some communities continue to exist. Management implications are explored. PREREQ: One year biological science; BOT 341 and BOT 442 recommended.

FS 553. FOREST WILDLIFE HABITAT MANAGEMENT (4). Management of terrestrial vertebrates in forest ecosystems. Effects on silvicultural practices and landscape pattern on habitats and populations. PREREQ: FOR 341 or equivalent course in ecology. Crosslisted as FW 553.

FS 561. PHYSIOLOGY OF WOODY PLANTS (3).

The structure, growth and physiological processes of trees and shrubs. PREREQ: CH 221, CH 222, CH 223, CH 331, CH 332, and BOT 331.

FS 564. INTERACTIONS OF VEGETATION AND ATMOSPHERE (3). Quantitative treatment of radiation, heat, mass and momentum exchange between vegetation and atmosphere; forest, natural and agricultural ecosystem examples. Physical and biological controls of carbon dioxide and water vapor exchange; remote sensing of canopy processes; models of stand-scale evaporation, photosynthesis and respiration; landscape and regional scale exchanges; vegetation and planetary boundary layer coupling; vegetation in global climate models. PREREQ: PH 201, MTH 251, BI 201. CROSSLISTED as ATS 564.

FS 565. FOREST ECOSYSTEM MANAGEMENT (4). Interrelations among biological, social, and philosophical issues in relation to ecosystem management with specific focus on biology. PREREQ: Basic understanding of either ecosystem principles or social sciences as applied to resource management.

FS 599. SELECTED TOPICS IN FOREST SCIENCE (1-16). In-depth studies of specific topics within a field of specialization. Examples include biotechnology in forestry, mycorrhizal ecology, tree improvement, landscape ecology, global climatic change in relation to forestry, advanced silviculture prescriptions, agroforestry, and others.

FS 601. RESEARCH AND SCHOLARSHIP (1-16).**FS 603. THESIS (1-16).****FS 605. READING AND CONFERENCE (1-16).****FS 606. PROJECTS (1-16).**

FS 629. TEACHING PRACTICUM IN FOREST SCIENCE (1). Preparation of graduate students in forest science and related disciplines for their first teaching experiences. Using concepts and information introduced in the class, students will develop the curriculum for one credit of college-level instruction (or an equivalent approved by the instructor) in a topic of their choice.

FS 630. CURRENT TOPICS IN PLANT BREEDING (3). Extensive reading and discussion of literature relevant to current and timely topics in applied plant breeding and genetics. PREREQ: CSS 430/CSS 530 or equivalent. Offered alternate years. CROSSLISTED as CSS 630, HORT 630.

FS 646. ECOSYSTEMS ANALYSIS AND APPLICATION (4). The structure and function of forests and associated streams in natural and managed ecosystems. Nutrient cycling processes and their long-term effects on forest growth and yield. Emphasizes current research and growth simulation models. PREREQ: FOR 341; CSS; 420; MB 448. REQ: Field trips.

FS 699. SELECTED TOPICS (1-16).**SUSTAINABLE NATURAL RESOURCE COURSES**

SNR courses are open only to students who have been accepted into the Graduate Certificate Program in Sustainable Natural Resources.

SNR 506X. INDEPENDENT PROJECT IN NATURAL RESOURCE SUSTAINABILITY (2).

Student identify, pose, frame, and analyze the various components of an important natural resource sustainability problem within their country, region, or organization and, at the end of term, present a workplan for its resolution. Oral and written reports are expected. PREREQ: Enrollment in Graduate Certificate Program in Sustainable Forestry and departmental approval.

SNR 511X. SUSTAINABLE NATURAL RESOURCE DEVELOPMENT (1). Using readings, class discussions, and field trips, we introduce the program sessions and pedagogical methods, familiarize students with basic working definitions of sustainability, and build capacity to work as a group on a common project. PREREQ: Enrollment in Graduate Certificate Program in Sustainable Forestry and departmental approval.

SNR 520X. SOCIALLY SUSTAINABLE NATURAL RESOURCES (3). Using readings, personal experiences, and class discussions, students explore five principles of socially sustainable forestry, and review the role they play in creating forest-based sustainable communities. PREREQ: Enrollment in Graduate Certificate Program in Sustainable Forestry.

SNR 521X. ECONOMICS OF SUSTAINABLE NATURAL RESOURCE MANAGEMENT (3). Focuses on the sources of market failure, the means of correcting market failure, and the real-world examples of making progress toward sustainable resource use by means of market mechanisms. PREREQ: Enrollment in Graduate Certificate Program in Sustainable Forestry and departmental approval.

SNR 522X. BASIC BELIEFS AND ETHICS IN NATURAL RESOURCES (1). Examines the basic philosophies and ethical systems in American forestry: including Pinchot's agricultural approach and Leopold's biotic forestry, and compares them to contemporary public attitudes and considers their implications for sustainability. PREREQ: Enrollment in Graduate Certificate Program in Sustainable Forestry and departmental approval.

SNR 532X PLANNING AGROFORESTRY PROJECTS (1). The objective is to develop basic understanding and appreciation of agroforestry concepts, systems, technologies and practices as used and applied in tropical and temperate zones of the world. PREREQ: Enrollment in Graduate Certificate Program in Sustainable Forestry and departmental approval.

SNR 533X. ALTERNATIVE FOREST PRODUCTS (1). Explore the three components of understanding and managing alternative forest products, also known as Non-timber Forest Products (NTFPs), while considering other natural/social resources. PREREQ: Enrollment in Graduate Certificate Program in Sustainable Forestry and departmental approval.

SNR 530X. ECOLOGICAL PRINCIPLES OF SUSTAINABLE NATURAL RESOURCES (3) Exploration of ecological principles for sustainable natural resource development and use. PREREQ: Enrollment in Graduate Certificate Program in Sustainable Forestry and departmental approval.

SNR 531X. SUSTAINABLE SILVICULTURE (1). Strategies for sustainable silviculture, and evaluation of environmental performance of forestry will be examined using classroom lectures, discussions of case studies, and field exercises. PREREQ: Enrollment in Graduate Certificate Program in Sustainable Forestry and departmental approval.

SNR 534X. REDUCED IMPACT TIMBER HARVEST (1). Explores planning, implementation, monitoring, and evaluation of reduced impact timber harvesting. PREREQ: Enrollment in Graduate Certificate Program in Sustainable Forestry and departmental approval.

SNR 535X. SUSTAINABLE MANAGEMENT OF AQUATIC AND RIPARIAN RESOURCES (1). Explores integrated strategies for sustainable management of watersheds, estuaries, coastal zones, and aquatic resources. Special emphasis will be given to the ecosystems of the Pacific Northwest, and to the links between land uses and aquatic environments. PREREQ: Enrollment in Graduate Certificate Program in Sustainable Forestry and departmental approval.

WOOD SCIENCE AND ENGINEERING

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woodscience.oregonstate.edu/

FACULTY

Professors Brown, McLain, Milota¹,
Morrell, Rosowsky, Wilson
Associate Professors Brunner, Funk,
Gartner, Gupta, Hansen, Karchesy,
Leavengood, Leichti, Panches, Reeb,
Simonsen
Assistant Professor Li

COURTESY FACULTY

Professors Galligan, Suddarth
Associate Professor Humphrey, Kelley

ADJUNCT FACULTY

Associate Professor Lawton, T. Miller

¹=Licensed Professional Engineer

Undergraduate Major

Wood Science and Technology (BS)

Options

Bio-based Composites Manufacturing
Forest Products Marketing
Wood Engineering and Science
*Wood Industry Environmental, Health,
and Safety*
Wood Industry Management
*Wood Industry Production Planning and
Quality Control*

Minor

Forest Products

Graduate Major

Forest Products (MF)

Graduate Areas of Concentration

Forest Products

Wood Science (MS, PhD)

Graduate Areas of Concentration

*Biodeterioration and Wood
Preservation*
Computer-Aided Wood Processing
Forest Products Marketing
Materials Science/Wood Composites
Process Modeling and Analysis
Timber Engineering
Wood Anatomy and Quality
Wood Chemistry
Wood Physics/Moisture Relations

Graduate Minors

Forest Products

Wood Science

The world demand for wood and wood-based products is growing with population increases and rising standards of living. Over 5,000 different types of products are made from wood because of its properties and because it is a renewable resource. To meet the growing demand with minimal environmental impacts we must make smarter use of wood and wood fiber. This creates many opportunities for 21st century wood science and technology graduates whose education integrates science, engineering, business and technology.

The Department of Wood Science and Engineering offers several challenging options that lead to a BS in Wood Science and Technology. Graduates find diverse career opportunities in the broad wood products and allied industries or public agencies in Oregon, the Pacific Northwest, and increasingly, around the world. Entry-level positions with the BS are often in marketing, sales, production management, technical services, or quality control. From that initial position the number of opportunities expands dramatically. Because society's demand for wood products is increasing at a time when available resources are tightening, OSU graduates are often innovative leaders in solving this dilemma. The undergraduate curriculum is designed to provide a foundation of knowledge and skills for the lifelong learning that is so important for advancement beyond entry-level positions.

Undergraduate students must select one of six options that are designed for specific career interests or for flexibility in choice. All students must complete six months of work experience, usually during the summer months. Department faculty provide career counseling and help with finding internships and permanent employment. Scholarships for qualified wood science and technology students are available through the College of Forestry or through a special departmental program. Students pursuing several of the options described below can easily complete the requirements for a minor in business administration or a science field. Students may also earn concurrent bachelor's degrees in science, engineering, or business by taking additional time to complete requirements.

The department also offers a Forest Products minor that provides a foundation of wood science and technology to help students apply their own specialty to rewarding careers in the forest products and allied industries. The department also offers MS and PhD degrees in wood science. These graduate programs ensure a foundation in science that is supplemented with programs

tailored to student interest. Many students pursue dual majors in science or engineering fields. Interested students should see the department Web page for more information or contact the department head.

The undergraduate degree program is accredited by the Society of Wood Science and Technology (SWST).

WOOD SCIENCE AND TECHNOLOGY (BS, HBS)

Students seeking the BS in Wood Science and Technology must successfully complete the course requirements in the baccalaureate core, the wood science and technology core, and one of the options described below. Students are also required to complete six months of approved work or internship experience, usually during the summer months.

BACCALAUREATE CORE REQUIREMENTS (27)

(Not satisfied by the wood science and technology core or an option.)

Writing I: WR 121. *English Composition (3)
Writing II: WR 214. *Writing in Business (3)
or WR 327. *Technical Writing (3)
Writing III: COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical Discourse (3)
Fitness: HHS 231. *Lifetime Fitness for Health (2)
HHS 241-251. *Lifetime Fitness: (various activities) (1)
Western Culture elective (3)
Cultural Diversity elective (3)
Literature and Arts elective (3)
Difference, Power, and Discrimination elective (3)
Global Issues Synthesis elective (3)

WOOD SCIENCE AND TECHNOLOGY CORE (61)

FOR 111. Intro to Forestry (3)
FOR 112. Intro to Computer Applications in Forestry (3)
FOR 141. Tree and Shrub Identification (3)
FOR 240. *Forest Biology (4)
ECON 202. *Intro to Macroeconomics (4)
WSE 210. Wood Technology and Utilization (4)
WSE 211. Wood Properties and Measurements Lab (1)
WSE 312. Wood and Fiber Anatomy (4)
WSE 314. Wood and Fiber Physics (4)
WSE 316. Wood and Fiber Chemistry (3)
WSE 318. Mechanical Behavior of Wood (4)
WSE 407. Senior Seminar (1)
WSE 411, WSE 412, WSE 413. ^Forest Products Projects I, II, III (2,2,2)
WSE 440. Wood Drying and Preservation (3)
WSE 441. Primary Wood Processing (4)
WSE 442. Composites Manufacturing (4)
WSE 445. Chemical Wood Processes and Pollution Control (3)
WSE 460. *Wood as a Resource for Housing (3)

BIO-BASED COMPOSITES MANUFACTURING OPTION (BCM) (104)

This option prepares students for technical careers in development, evaluation and manufacturing of engineered wood composite products. CH 221, 222, 223. *General Chemistry (5,5,5)
 CH 334, 335. Organic Chemistry (3,3)
 ENGR 211. Statics (3)
 ENGR 212. Dynamics (3)
 ENGR 213. Strength of Materials (3)
 ENGR 311. Thermodynamics (3)
 ENGR 312. Thermodynamics: Applications (4)
 ENGR 321. Materials Science (3)
 ENGR 322. Mechanical Properties of Materials (4)
 ENGR 331, 332, 333. Momentum, Energy, and Mass Transfer I, II, III (4,4,3)
 ENGR 390. Engineering Economy (3)
 ME 316. Mechanics of Materials (3)
 ME 480. Materials Selection (3)
 MTH 251. *Differential Calculus (4)
 MTH 252. *Integral Calculus (4)
 MTH 254. *Vector Calculus (4)
 MTH 256. *Applied Differential Equations (4)
 PH 203. *General Physics (5)
 PH 211, PH 212. *General Physics with Calculus (4,4)
 ST 314. Intro to Statistics for Engineers (3)
 WSE 452. Process Control in the Forest Products Industry (4)
 Student-selected electives (3)
Note: Students enrolling in the BCM option are expected to have completed the necessary preparation for MTH 251 in high school or by completing college course equivalents. Recitation for physics PH 221, 222 (1,1) is not required, but is strongly recommended. Students in the BCM option must complete a Senior Project (WSE 411, 412, 413) with a topic that integrates the knowledge and skills developed in this area of specialization.

FOREST PRODUCTS MARKETING OPTION (FPM) (103)

This option prepares students for careers in industrial marketing and business management. Graduates may earn a minor in business administration. BA 211. Financial Accounting (4)
 BA 213. Managerial Accounting (4)
 BA 230. Business Law I (4)
 BA 275. Quantitative Business Methods (4)
 BA 340. Finance (4)
 BA 347. International Business (4)
 BA 350. Organizational Systems (4)
 or BA 352. Organizational Behavior (4)
 BA 357. Operations Management (4)
 BA 390. Marketing (4)
 BA 494. Marketing Channels (4)
 BA 496. Marketing Research (4)
 BA 497. Global Marketing (4)

CH 121, CH 122, CH 123. General Chemistry (5,5,5)
 ECON 201. *Intro to Microeconomics (4)
 MTH 111. *College Algebra (4)
 MTH 112. *Foundations of Elementary Mathematics (4)
 MTH 241. *Calculus for Management and Social Science (4)
 MTH 245. *Mathematics for Management, Life, and Social Science (4)
 PH 201, PH 202. *General Physics (5,5)
 WSE 446. Secondary Wood-Products Manufacturing (3)
 WSE 455. Forest Products Marketing (3)
 Student-selected electives (4)
Note: Completion of the FPM option with a GPA of 2.5 fulfills the requirements for a transcript-visible Business Administration minor. Students who graduate and complete these business courses may also apply to the College of Business to enroll in a 58-credit, four-term MBA degree program. Students in the FPM option must complete a Senior Project (WSE 411, 412, 413) with a topic that integrates the knowledge and skills developed in this area of specialization.

WOOD ENGINEERING AND SCIENCE OPTION (WES) (103)

This is a flexible program that prepares students for technical careers or graduate school. Students select courses (often minors) that complement their interests and the wood science and technology core. CH 130. General Chemistry of Living Systems (4)
 and CH 201, CH 202. *Chemistry for Engineering Majors (3,3)
 or CH 221, CH 222, CH 223. *General Chemistry (5,5,5)
 ECON 201. *Intro to Microeconomics (4)
 MTH 111. *College Algebra (4)
 MTH 112. *Elementary Functions (4)
 MTH 251. *Differential Calculus (4)
 MTH 252. *Integral Calculus (4)
 MTH 254. *Vector Calculus I (4)
 PH 203. *General Physics (5)
 PH 211, 212. *General Physics with Calculus (4,4)
 PH 221, 222. *Recitation for Physics 211, 212 (1,1)
 ST 351, 352. Intro to Statistical Methods (4,4)
 WSE 446. Secondary Wood-Products Manufacturing (3)
 WSE 452. Process Control in the Forest Products Industry (4)
 Approved area of concentration (minimum of 27 credits including 12 upper-division credits)
 Student-selected electives (7–12)
Note: The area of concentration may be satisfied by completing an approved minor in another field or an integrated program of study approved by the Wood Science and Technology lead adviser.

WOOD INDUSTRY ENVIRONMENTAL, HEALTH, AND SAFETY OPTION (EHS) (103)

This option is designed to prepare students for careers helping industry achieve workplace goals, entering government service to help establish and enforce appropriate regulations, or to prepare for graduate school. CH 221, 222, 223. *General Chemistry (5,5,5)
 CH 334, 335. Organic Chemistry (3,3)
 CHE 211. Material Balances and Stoichiometry (3)
 CHE 212. Energy Balances (4)
 CHE 311. Thermodynamic Properties and Relationships (3)
 H 385. Safety and Health Standards and Laws (3)
 H 445. *Occupational Health (3)
 H 485. Safety, Health and Environmental Law (3)
 H 488. Occupational Safety (3)
 ENGR 390. Engineering Economy (3)
 ENVE 321. Environmental Engineering Fundamentals (4)
 ENVE 421. Water and Waste Water Characterization (4)
 ENVE 425. Air Pollution Control (3)
 ENVE 431. Fate/Transport of Chemicals in Environmental Systems (4)
 MTH 251. *Differential Calculus (4)
 MTH 252. Integral Calculus (4)
 MTH 254. Vector Calculus (4)
 MTH 256. Applied Differential Equations (4)
 PH 203. *General Physics (5)
 PH 211, PH 212. *General Physics with Calculus (4,4)
 ST 314. Intro to Statistics for Engineers (3)
 WSE 446. Secondary Wood-Products Manufacturing (3)
 Student-selected electives (7)
Note: Students enrolling in the EHS option are expected to have completed the necessary preparation for MTH 251 in high school or by completing college course equivalents. Recitation for physics PH 221, 222 (1,1) is not required, but is strongly recommended. Students in the EHS option must complete a Senior Project (WSE 411, 412, 413) with a topic that integrates the knowledge and skills developed in this area of specialization.

WOOD INDUSTRY MANAGEMENT OPTION (WIM) (103)

This option is designed for those who seek business management career opportunities in the broad forest products industry. Graduates may earn a minor in business administration. BA 211. Financial Accounting (4)
 BA 213. Managerial Accounting (4)
 BA 230. Business Law (4)
 BA 275. Quantitative Business Methods (4)
 BA 340. Finance (4)
 BA 350. Organizational Systems (4)
 or BA 352. Organizational Behavior (4)

BA 357. Operations Management (4)
 BA 390. Marketing (4)
 CH 121, CH 122, CH 123. General Chemistry (5,5,5)
 ECON 201. *Intro to Microeconomics (4)
 MTH 111. *College Algebra (4)
 MTH 112. *Elementary Functions (4)
 MTH 241. *Calculus for Management and Social Science (4)
 MTH 245. *Mathematics for Management, Life, and Social Sciences (4)
 PH 201, 202. *General Physics (5,5)
 WSE 446. Secondary Wood-Products Manufacturing (3)
 WSE 452. Process Control in the Forest Products Industry (4)
 WSE 455. Forest Products Marketing (3)
 Student-selected electives (16)

Note: Completion of the WIM option with a GPA of 2.5 fulfills the requirements for a transcript-visible Business Administration minor. Students who graduate and complete these business courses may also apply to the College of Business to enroll in a 58-credit, four-term MBA degree program.

WOOD INDUSTRY PRODUCTION PLANNING AND QUALITY CONTROL OPTION (WIPP) (104)

This option provides preparation for production planning and technical quality control in wood products manufacturing.
 CH 121,122, 123. General Chemistry (5,5,5)
 ENGR 248. Engineering Graphics and 3-D Modeling (3)
 ENGR 350. Sustainable Engineering (3)
 ENGR 390. Engineering Economy (3)
 IE 337. Industrial Manufacturing Systems (4)
 IE 355, IE 356. Quality and Applied Statistics I, II (4,4)
 IE 366. Work Design and Operations Measurement (4)
 IE 367. Production Planning and Control (4)
 IE 368. Facility Design and Operations Management (4)
 IE 444. Industrial Safety (3)
 IE 450. Total Quality Management (3)
 IE 464. Design and Scheduling of Cellular Manufacturing Systems (3)
 MTH 251. *Differential Calculus (4)
 MTH 252. Integral Calculus (4)
 MTH 254. Vector Calculus (4)
 PH 203. *General Physics (5)
 PH 211, PH 212. *General Physics with Calculus (4,4)
 ST 314. Intro to Statistics for Engineers (3)
 WSE 446. Secondary Wood-Products Manufacturing (3)
 WSE 452. Process Control in the Forest Products Industry (4)
 Student-selected electives (12)

Note: Students enrolling in the WIPP option are expected to have completed the necessary preparation for MTH 251 in high school or by completing college course equivalents. Recitation for physics PH 221, 222 (1,1) is not required, but is strongly recommended. Students in the WIPP option must

complete a Senior Project (WSE 411, 412, 413) with a topic that integrates the knowledge and skills developed in this area of specialization.

FOREST PRODUCTS MINOR (27-28)

WSE 210 Wood Technology and Utilization (4)
 WSE 211. Wood Properties and Measurement Laboratory (1)
 WSE 312. Wood and Fiber Anatomy (4)
Select (18-19) of the following courses to reach a 27 credit minimum.
 FOR 111. Intro to Forestry (3)
 WSE 314. Wood and Fiber Physics (4)
 WSE 316. Wood and Fiber Chemistry (3)
 WSE 318. Mechanical Behavior of Wood (4)
 WSE 407. Seminar (1)
 WSE 440. Wood Drying and Preservation (3)
 WSE 441. Primary Wood Processing (4)
 WSE 442. Composites Manufacturing (4)
 WSE 445. Chemical Wood Processing and Pollution Control (3)
 WSE 446. Secondary Wood-Products Manufacturing (3)
 WSE 452. Process Control in the Forest Products Industry (4)
 WSE 455. Forest Products Marketing (3)
 WSE 460. *Wood as a Resource for Housing (3)

FOREST PRODUCTS (MF DEGREE ONLY)

Graduate Area of Concentration Forest products

The Department of Wood Science and Engineering offers graduate programs leading toward the Master of Science, Master of Forestry, and Doctor of Philosophy degrees.

The MF, or non-thesis master's degree in Forest Products, is a terminal degree for professionals seeking advanced education in a specialized area. A master's paper and course work are required for completion. The paper topic may be on a wide variety of topics.

Graduate students in wood science or forest products come from a wide range of undergraduate degree programs in science, engineering and business.

Excellent laboratories are available for teaching and research in Richardson Hall, Peavy Hall, and the Forest Research Laboratory. Student research involves seeking solutions to current problems in wood science and technology and related fields. Research areas include wood anatomy and quality, process modeling and analysis, scanning technology, wood drying, wood-based composite materials, structural engineering and design, protection and preservation of wood, wood and adhesives chemistry, and business. Most graduate students are employed as part-time graduate research assistants.

Since Oregon's forest industry is one of the largest in the United States and faculty members in the department maintain a close working relationship with Oregon industry and governmental agencies, students benefit from the valuable input and cooperation in teaching, research, and Extension programs between OSU faculty and manufacturers and users of forest products. Graduates find employment in management or technical positions in the private sector or at universities.

WOOD SCIENCE (MS, PhD)

Graduate Areas of Concentration

Biodeterioration and wood preservation, computer-aided wood processing, forest products marketing, materials science/wood composites, process modeling and analysis, timber engineering, wood anatomy and quality, wood chemistry, wood physics/moisture relations

The Department of Wood Science and Engineering offers graduate programs leading toward the Master of Science, Master of Forestry, and Doctor of Philosophy degrees. The department also participates in the Master of Science in Materials Science program. Thesis research and academic programs can be developed in the many special disciplines represented by the faculty. Minors are most commonly selected from statistics, engineering, chemistry, botany, plant pathology, or business.

Many students pursue a dual major degree in wood science and a field of engineering, forest science or other area. A wide variety of science, engineering and business opportunities are available.

Graduate students in wood science come from a wide range of undergraduate degree programs in science, engineering and business.

Excellent laboratories are available for teaching and research in Richardson Hall, Peavy Hall, and the Oak Creek Laboratory. Student research involves seeking solutions to current problems in wood science and technology and related fields. Research areas include wood anatomy and quality, process modeling and analysis, scanning technology, wood drying, wood-based composite materials, structural engineering and design, protection and preservation of wood, wood and adhesives chemistry, and forest products marketing and business. Most graduate students are employed as part-time graduate research assistants.

Since Oregon's forest industry is one of the largest in the United States, and faculty members in the department maintain a close working relationship with Oregon industry and governmental agencies, students benefit from the valuable input and cooperation in

teaching, research, and Extension programs between OSU faculty and manufacturers and users of forest products. Graduates find employment in management or technical positions in the private sector or at universities.

FOREST PRODUCTS GRADUATE MINOR

For more details, see the departmental adviser.

WOOD SCIENCE GRADUATE MINOR

For more details, see the departmental adviser.

COURSES

WSE 201. INTRODUCTION TO WOOD SCIENCE AND TECHNOLOGY (1). Introduction to the breadth of disciplines and opportunities within the wood science and technology profession. Discussion of critical issues, available resources, career opportunities and professional requirements directed toward the new major or exploring student.

WSE 210. WOOD TECHNOLOGY AND UTILIZATION (4). Characteristics and uses of wood and fiber products; manufacturing processes; effect of tree growth and harvesting on forest products manufacturing and properties. Wood identification.

WSE 211. WOOD PROPERTIES AND MEASUREMENTS LABORATORY (1). Measurement of basic wood properties; measurement and grades of wood raw materials and products.

WSE 312. WOOD AND FIBER ANATOMY (4). Minute anatomy and variability of wood species; natural characteristics and deterioration; density, cell wall properties, and wood and fiber surfaces. PREREQ: WSE 210.

WSE 314. WOOD AND FIBER PHYSICS (4). Hygroscopic nature of the wood fiber and solid wood; wood-fluid relationships; steady-state flow processes; electrical, thermal, and sonic properties of wood and wood-based composite materials. PREREQ: PH 202; calculus.

WSE 316. WOOD AND FIBER CHEMISTRY (3). Lignin, polysaccharides, and extractives of wood and bark; distribution, isolation, structure, and relationships with anatomy, properties and uses. PREREQ: One year of general chemistry.

WSE 318. MECHANICAL BEHAVIOR OF WOOD (4). Statics and strength of materials emphasizing wood and wood-based composites; introduction to elasticity; mechanical properties of wood; introduction to wood design. PREREQ: PH 201.

WSE 401. RESEARCH AND SCHOLARSHIP (1-16).

WSE 405. READING AND CONFERENCE (1-16).

WSE 406. PROJECTS (1-16).

WSE 407. SEMINAR (1).

WSE 411. ^FOREST PRODUCTS PROJECTS I (2). Capstone course in which students plan, execute, and report a research-type project of their own choice related to the field of forest products. Project selection and planning, culminating in a written work plan. PREREQ: WSE 312, WSE 314, WSE 316, WSE 318. (Writing Intensive Course)

WSE 412. ^FOREST PRODUCTS PROJECT II (2). Capstone course in which students plan, execute, and report a research-type project of their own choice related to the field of forest products. Project is executed according to the work plan developed in WSE 411. (Writing Intensive Course)

WSE 413. ^FOREST PRODUCTS PROJECT III (2). Capstone course in which students plan, execute, and report a research-type project of their own choice related to the field of forest products. Findings are analyzed and presented in a written report and an oral presentation. PREREQ: WSE 412. (Writing Intensive Course)

WSE 440/WSE 540. WOOD DRYING AND PRESERVATION (3). Drying wood, including lumber, veneer, and particles. Moisture-related problems of wood during processing and in-service. Wood-destroying organisms; extending the life of wood using preservatives. PREREQ/COREQ: WSE 314 or equivalent. Lec/lab.

WSE 441/WSE 541. PRIMARY WOOD PROCESSING (4). Mechanical breakdown of lumber, veneer, and chips from a processing perspective; mill/plant layout; quality and process control applications. Field trips. PREREQ: WSE 210; WSE 440.

WSE 442/WSE 542. COMPOSITES MANUFACTURING (4). Composites, wood adhesive and adhesion processes and plant layouts; laminated and panel products; quality control, recovery and grades. Field trips. PREREQ: WSE 210.

WSE 445/WSE 545. CHEMICAL WOOD PROCESSING AND POLLUTION CONTROL (3). Survey of the chemical processing of wood with emphasis on its environmental impact. Topics include treating of wood to resist decay, pulping and papermaking, and adhesives used in wood composites. PREREQ: WSE 316 or equivalent. Lec/lab.

WSE 446. SECONDARY WOOD-PRODUCTS MANUFACTURING (3). Application of machining, assembling, and finishing techniques to wood-based products to increase their value; the use of computers for design and process planning; environmental considerations in secondary processing. PREREQ: WSE 210.

WSE 452/WSE 552. PROCESS CONTROL IN THE FOREST PRODUCTS INDUSTRY (4). Use of sensing devices, analysis methods, and hardware to control variables found in typical wood products processes. PREREQ: WSE 314, WSE 441, WSE 442 or WSE 443, ST 351 or BA 275.

WSE 455/WSE 555. FOREST PRODUCTS MARKETING (3). Marketing and its application in the forest products industry. PREREQ: BA 390.

WSE 458/WSE 558. WOOD DESIGN (4). Study of basic wood properties and design considerations. Design and behavior of wood connectors, beams, columns and beam columns. Introduction to plywood and glue laminated members. Analysis and design of structural diaphragms and shear walls. PREREQ: CE 381 and CE 382.

WSE 460. *WOOD AS A RESOURCE FOR HOUSING (3). The role of wood as a renewable resource in construction of residential and commercial buildings; covering all aspects of its selection and use in planning, purchasing, construction, and maintenance. With a focus on the consequence of material selection upon cost, performance, environment, and society. (Bacc Core Course)

WSE 470. *FORESTS, WOOD, AND CIVILIZATION (3). Multidisciplinary examination of issues related to the roles of forests, trees, and wood in civilization, as providers of commodities, ecosystem services, and spiritual and artistic inspiration. Issues include global supply and demand, wood ownership and political power, and perceptions and uses of forest resources in different societies. (Bacc Core Course)

WSE 501. RESEARCH AND SCHOLARSHIP (1-16).

WSE 503. THESIS (1-16).

WSE 505. READING AND CONFERENCE (1-16).

WSE 506. PROJECTS (1-16).

WSE 507. SEMINAR (1). Section 1: Beginning Seminar; Section 2: Seminar.

WSE 521. WOOD SCIENCE I (4). A comprehensive overview and integration of wood anatomy, wood physics, wood chemistry and wood mechanics; global contemporary issues impacting the wood and fiber sector; integration of basic wood sciences to understand the complex relationships between environment and wood material properties, and the influence of both on the use of wood-based materials.

WSE 522. WOOD SCIENCE II (4). Continuation of the comprehensive overview and integration of wood and fiber anatomy, physics, chemistry, and mechanics; integration of basic wood science to understand relationships with wood and fiber properties and their impact on final use. Focus on biological, chemical and physical degradation of wood; adhesion; and physical and engineering properties of wood.

WSE 560. ADVANCED TIMBER ENGINEERING (3). Advanced study in timber engineering. Strong emphasis on structural theory and material fundamentals combined with design of building systems having wood as a principle material. PREREQ: CE 482/CE 582.

WSE 601. RESEARCH AND SCHOLARSHIP (1-16).

WSE 603. THESIS (1-16).

WSE 605. READING AND CONFERENCE (1-16).

WSE 606. PROJECTS (1-16).

WSE 607. SEMINAR (1). Section 1: Beginning Seminar Section 2: Graduate Seminar

WSE 611. SELECTED TOPICS IN WOOD AND FIBER SCIENCE (1-3). May be taken more than once.