

FOREST ECOSYSTEMS AND SOCIETY

The faculty, staff, and students in the Department of Forest Ecosystems and Society are dedicated to the discovery and dissemination of knowledge related to the interactions among landscapes, forests, and people. Humans are dependent on forests in many ways. We seek to understand the diversity of benefits derived from forests and expand our knowledge of how forests function to provide those benefits. We provide the expertise needed by scientists, managers, and the general public as they jointly decide how these values can be sustained in the face of climate change, land use pressures and economic uncertainties. We contribute scientific understanding to decisions that lead to sustaining these important values on forestlands in Oregon, in the U.S., and around the globe now and in the future.

The Department of Forest Ecosystems and Society offers a graduate program in Forest Ecosystems and Society. The program includes Master of Forestry (MF), Master of Science (MS), and Doctor of Philosophy (PhD) degrees. The department also offers an online-only Master of Natural Resources (MNR) degree and online-only graduate certificates in Sustainable Natural Resources; Urban Forestry; and Forests and Climate Change.

Research

Research in the Department of Forest Ecosystems and Society focuses on fundamental and applied research to help solve complex natural resource challenges. We integrate biophysical and social sciences across scales within natural and managed forest ecosystems. The MS and PhD programs emphasize the ability to define and solve researchable problems and function in interdisciplinary terms. 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 Ecosystems and Society Graduate Degree Programs

The **MS and PhD degrees in Forest Ecosystems and Society** are structured specifically for those interested in careers in resource management, research, teaching, and specialized areas of forest science, social science, and interdisciplinary science. The degrees are available in seven areas of concentration: forest, wildlife and landscape ecology; genetics and physiology; integrated social and ecological systems; the science of conservation, restoration and sustainable management; social science, policy, and natural resources; soil-plant-atmosphere continuum; and sustainable recreation and tourism.

The **Master of Forestry degree** is a non-thesis degree that supports advancement in non-research professional forestry and forestry-related professional positions. Students prepare for careers as professional forest biologists, silviculturists, or other specialists capable of analyzing opportunities for natural resource management for landowners. This degree typically takes 12–15 months to complete and requires the student to complete a capstone project.

The **Master of Natural Resources (MNR) degree** is offered as a non-thesis option only. The MNR curriculum facilitates learning by natural resource professionals who work in settings that require cross-disciplinary competency to find solutions to natural resource problems. The MNR is taught entirely online through OSU Ecampus (although it may be possible

for some students to work toward the MNR degree while in residence at OSU).

Certificates in Sustainable Natural Resources, Urban Forestry, and Forests and Climate Change are available independently, or in association with the MNR program.

Interdisciplinary Graduate Degree Programs

The Department of Forest Ecosystems and Society participates in a number of other interdisciplinary graduate degree programs at OSU, including the Master of Arts in Interdisciplinary Studies (MAIS), Master of Environmental Arts and Humanities, PhD in Molecular and Cellular Biology, Environmental Sciences, Water Resources, and Applied Economics.

Undergraduate Programs

Majors

- Natural Resources (<http://catalog.oregonstate.edu/college-departments/forestry/forest-ecosystems-society/natural-resources-bs-hbs/>)
 - Options:**
 - Conservation Law Enforcement (<http://catalog.oregonstate.edu/college-departments/forestry/forest-ecosystems-society/natural-resources-bs-hbs/conservation-law-enforcement-option/>)
 - *Ecological Restoration*
 - *Fish and Wildlife Conservation*
 - *Forest Ecosystems*
 - *Human Dimensions in Natural Resources*
 - *Individualized Specialty Option*
 - *Integrated Conservation Analysis*
 - *Landscape Analysis*
 - Natural Resource Education (<http://catalog.oregonstate.edu/college-departments/forestry/forest-ecosystems-society/natural-resources-bs-hbs/natural-resource-education-option/>)
 - *Policy and Management*
 - *Urban Forest Landscapes*
 - *Wildland Fire Ecology*
- Tourism, Recreation, and Adventure Leadership (<http://catalog.oregonstate.edu/college-departments/forestry/forest-ecosystems-society/tourism-recreation-adventure-leadership-bs-hbs/>)
 - Options:**
 - *Adventure Leadership Education*
 - *Nature, Eco- and Adventure Tourism*
 - *Outdoor Recreation Management*
 - *Sustainable Tourism Management*

Minors

- Natural Resources (<http://catalog.oregonstate.edu/college-departments/forestry/forest-ecosystems-society/natural-resources-minor/>)
- Tourism, Recreation, and Adventure Leadership (<http://catalog.oregonstate.edu/college-departments/forestry/forest-ecosystems-society/tourism-recreation-adventure-leadership-minor/>)

Graduate Programs

Majors

- Forest Ecosystems and Society (<http://catalog.oregonstate.edu/college-departments/forestry/forest-ecosystems-society/forest-ecosystems-society-mf-ms-phd/>)
- Natural Resources (<http://catalog.oregonstate.edu/college-departments/forestry/forest-ecosystems-society/natural-resources-mnr/>)

Certificates

- Forests and Climate Change (<http://catalog.oregonstate.edu/college-departments/forestry/forest-ecosystems-society/forests-climate-change-graduate-certificate/>)
- Sustainable Natural Resources (<http://catalog.oregonstate.edu/college-departments/forestry/forest-ecosystems-society/sustainable-natural-resources-graduate-certificate/>)
- Urban Forestry (<http://catalog.oregonstate.edu/college-departments/forestry/forest-ecosystems-society/urban-forestry-graduate-certificate/>)

Troy Hall, Department Head

321 Richardson Hall
Oregon State University
Corvallis, OR 97331-5752
Phone: 541-737-2088
Email: fesdept@oregonstate.edu
Website: <http://fes.forestry.oregonstate.edu/>

Faculty

Professors Betts, Bondi, Duluca, Hall, Johnson, Kavanagh, Needham, Nelson, Puettmann, Ripple, Rosenberger, Still, Strauss

Associate Professors Creighton, Howe, Krawchuk Lindberg, Reuter, Warren, Withrow-Robinson

Assistant Professors Ahrens, D'Antonio, Davis, Hajjar, Munanura, Rosenberg, Schulze, Shen

Senior Instructors Anzinger, Bishaw, Ries, Stemper

Instructors Diebel, Fisher, Jones, Mangla, Perry

Emeritus Adams, Beschta, Bliss, Bond, Cromack, Harmon, Hibbs, Jackson, Jensen, K.N. Johnson, Lachenbruch, Law, McComb, Norris, Oester, Perry, Radosevich, Shelby, Shindler, Simon-Brown, Sollins, Tynon, Waring,

Adjunct Faculty

Bailey, Ganio, Rivers, Shaw

Courtesy/Affiliate Faculty

Alcasena Urdiroz, Alexander, Barros, Bell, Brooks, Charnley, Cheng, Christiansen, Day, Distler, Eisenberg, Gray, Hadley, Hagar, K. Hall, Homiyack, Huber-Stearns, Kim, King, Kroll, Luoma, Martin Pinto, Meinzer, Newsome, Perakis, Ross, Sanders, Spies, Swanson, Taylor, Verschuyll, Woodruff, Zhang

Forest Ecosystems and Society (FES)

FES 115, ECOLOGY OF OREGON COAST FOREST, 1 Credit

A combination of lecture, lab, and field exercises to explore the ecology and development of Oregon coastal forests. Lec/lab. Graded P/N.

Equivalent to: FS 115

FES 199, SPECIAL TOPICS, 1-16 Credits

Equivalent to: FS 199

This course is repeatable for 16 credits.

FES 202, SOFTWARE TOOLS IN QUANTITATIVE SOCIAL SCIENCE RESEARCH, 3 Credits

Develop and apply software skills to analyze quantitative social science data, then interpret and present results. Using software, students will conduct statistical analysis of primary and/or secondary data (for example, their own survey data or data from sources such as the US Census American Community Survey).

Prerequisite: ST 201 with C or better

FES 240, *FOREST BIOLOGY, 4 Credits

Structure, function, development and biology of forest vegetation and their relationships to forestry and natural resource applications. Field trips required. Lec/lab/rec. (Bacc Core Course)

Attributes: CPBS – Core, Pers, Biological Science

Equivalent to: FES 240H, FOR 240

Available via Ecampus

FES 240H, *FOREST BIOLOGY, 4 Credits

Structure, function, development and biology of forest vegetation and their relationships to forestry and natural resource applications. Field trips required. Lec/lab/rec. (Bacc Core Course)

Attributes: CPBS – Core, Pers, Biological Science; HNRS – Honors Course Designator

Equivalent to: FES 240

FES 241, DENDROLOGY, 3 Credits

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. Lec/lab/rec.

Equivalent to: FES 141

Available via Ecampus

FES 242, FOREST PLANTS OF THE PACIFIC NORTHWEST, 3 Credits

Field course on the identification and ecology of forest trees, shrubs, and herbs of the Pacific Northwest. Overnight camping required. Students should be prepared to hike 3-5 miles per day.

FES 341, FOREST ECOLOGY, 3 Credits

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.

Equivalent to: FOR 341

Available via Ecampus

FES 342, FOREST TYPES OF THE NORTHWEST, 3 Credits

Forest trees in nature are aggregated into stable or transitory associations known as forest cover types. Knowledge of forest cover types, their species composition and ecology, is applicable to the fields of forestry, fire management, wildlife management, and forest ecology.

Equivalent to: FOR 342

Available via Ecampus

FES 343, FORESTS OF THE EASTERN UNITED STATES, 3 Credits

Major Southeast US forest types will be visited and morphological, geographic, ecological and economic characteristics of important forest tree species examined.

Prerequisite: FES 141 with C or better or FES 241 with C or better

This course is repeatable for 3 credits.

FES 350, URBAN FORESTRY, 3 Credits

Introduction to principles and practices of planting and managing trees as a system of urban environment; understanding the economic, environmental, social aspects of urban forests, and an overview of contemporary land use issues and societal perspectives between people and plants. CROSSLISTED as FES 350/HORT 350.

Equivalent to: FOR 350

Recommended: Foundational forestry and horticulture courses

Available via Ecampus

FES 355, MANAGEMENT FOR MULTIPLE RESOURCE VALUES, 3 Credits

Management of a variety of resource attributes in multiple use context, including considerations for recreation, fish, wildlife, aesthetics, watersheds, and forest products.

Equivalent to: FOR 355

Available via Ecampus

FES 365, *ISSUES IN NATURAL RESOURCES CONSERVATION, 3 Credits

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)

Attributes: CSGI – Core, Synth, Global Issues

Equivalent to: FOR 365

Available via Ecampus

FES 399, SPECIAL TOPICS, 0-16 Credits

This course is repeatable for 16 credits.

FES 401, RESEARCH AND SCHOLARSHIP, 1-16 Credits

Equivalent to: FS 401

This course is repeatable for 16 credits.

FES 403, THESIS, 1-16 Credits

Equivalent to: FS 403

This course is repeatable for 16 credits.

FES 405, READING AND CONFERENCE, 1-16 Credits

Equivalent to: FS 405

This course is repeatable for 16 credits.

FES 406, PROJECTS, 1-16 Credits

This course is repeatable for 16 credits.

FES 407, SEMINAR, 1-16 Credits

Some sections graded A-F. This course is repeatable for a maximum of 16 credits.

This course is repeatable for 16 credits.

FES 410, INTERNSHIP, 1-16 Credits

Full-time supervised professional experience emphasizing functional proficiency under joint sponsorship of university and agency personnel. Graded P/N.

This course is repeatable for 16 credits.

FES 412, FOREST ENTOMOLOGY, 3 Credits

Role of insects in natural and managed forests. Recognition of important forest insect pest groups and species, prediction of forest insect responses to environmental changes, and management strategies and treatments to protect forest resource values.

Prerequisite: BI 204 with C or better or BI 211 with C or better or BI 211H with C or better or BI 212 with C or better or BI 212H with C or better or BI 221 with C or better or BI 221H with C or better

FES 422, RESEARCH METHODS IN SOCIAL SCIENCE, 4 Credits

An introduction to research methods applied to social science issues and problems. Emphasis is on the nature of the research process, how to conduct research, and how to interpret and disseminate research results. Lec/lab.

Prerequisite: ST 201 with D- or better or ST 351 with D- or better or ST 351H with D- or better

Equivalent to: TOL 422

Available via Ecampus

FES 430, FOREST AS CLASSROOM, 4 Credits

Investigates instructional methods used to teach K-12 students about natural resources. Reveals how forest exploration can be used as a means to teach others about science, ecology, mathematics, social science, and history. Provides an opportunity for future teachers, naturalists, interpreters, and scientists to improve their teaching and communication skills.

Available via Ecampus

FES 433, PLANNING AGROFORESTRY PROJECTS, 2 Credits

Helps forestry and other natural resource students understand various agroforestry concepts, systems and technologies and practices worldwide. Lays the groundwork for students to identify different systems, characterize socio-economic conditions and plan sustainable agroforestry systems. Class activities examine how biological, economic, and social factors influence agroforestry farming decisions.

Prerequisite: BOT 341 with D- or better

FES 435, *GENES AND CHEMICALS IN AGRICULTURE: VALUE AND RISK, 3 Credits

A multidisciplinary course that examines the scientific, social, political, economic, environmental, and ethical controversies surrounding agricultural and natural resource biotechnologies. Lec/rec. CROSSLISTED as FES 435/TOX 435 and FES 535/MCB 535/TOX 535. (Bacc Core Course)

Attributes: CSST – Core, Synthesis, Science/Technology/Society

Equivalent to: FES 435H, TOX 435, TOX 435H

Recommended: One quarter each of biology and chemistry

Available via Ecampus

FES 440, WILDLAND FIRE ECOLOGY, 3 Credits

Fire histories and ecology of major forest, rangeland, and wetland ecosystems. Includes fire interactions with physical and biotic components of ecosystems, role of fire in ecological processes, and utilization in natural resource management.

Equivalent to: FOR 446

Recommended: Junior or senior standing, with coursework in ecology and natural resource management

Available via Ecampus

FES 444, ECOLOGICAL ASPECTS OF PARK MANAGEMENT, 3 Credits

Ecological principles applied to the management of park recreation uses. The relationship between biological and physical science information and recreation management decisions is explored.

Equivalent to: TOL 444

Recommended: An ecology course and completion or concurrent enrollment in FES 251 or FOR 251

FES 445, ECOLOGICAL RESTORATION, 4 Credits

Fundamentals of restoring and reclaiming disturbed landscapes and ecosystems. Topics 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. CROSSLISTED as FES 445/FW 445 and FES 545/FW 545.

Equivalent to: FOR 445, FW 445

Recommended: BI 370 or BI 370H

Available via Ecampus

FES 447, ARBORICULTURE, 4 Credits

The principles and practices of arboriculture, the art and science of selecting, planting, establishing and maintaining trees in urban, suburban, commercial and residential landscapes. CROSSLISTED as FES 447/HORT 447 and FES 547/HORT 547.

Equivalent to: FOR 447, HORT 447

Recommended: (FES 141 or FES 241 or HORT 226 or HORT 228) and (FOR 111 or HORT 112)

Available via Ecampus

FES 450X, LARGE CARNIVORES IN ECOLOGY, 1 Credit

Exploration of interesting effects of large carnivores on other animals and the structure and function of ecosystems. Featured carnivores include gray wolves, grizzly bears, cougars, lions, and others. Investigation of the global conservation status and trends of large carnivores and their prey.

FES 452, BIODIVERSITY CONSERVATION IN MANAGED FORESTS, 3 Credits

Designed for students in forestry, wildlife, fisheries and related fields. Introduces the concepts of, and approaches to, managing forest stands, landscapes and regions to achieve desired habitat conditions for indicator species and conservation of biological diversity. CROSSLISTED as FES 452/FW 452.

Equivalent to: FS 453, FW 452

Recommended: FES 240 or FES 341 or BI 370

Available via Ecampus

FES 454, MANAGING AT THE WILDLAND-URBAN INTERFACE, 3 Credits

Course targets fire-prone communities where resource professionals need to work cooperatively with local and federal agencies and citizens to gain acceptance for fire management programs and build joint responsibility for fuel reduction activities.

Equivalent to: FOR 454

Recommended: FOR 111 for non-Ecampus students

FES 455, URBAN FOREST PLANNING, POLICY AND MANAGEMENT, 4 Credits

Examination of planning, policy, and management strategies used in the stewardship of urban natural resources. Fundamentals for developing effective programs to maximize the economic, environmental, and social values and benefits of urban forest landscapes. CROSSLISTED as FES 455/HORT 455 and FES 555/HORT 555.

Prerequisite: FES 350 with C- or better or HORT 350 with C- or better

Equivalent to: FOR 455, HORT 455

Available via Ecampus

FES 477, *AGROFORESTRY, 3 Credits

Theory and worldwide practice of multiple-crop low input sustainable systems involving concurrent production of tree and agricultural products. Biological, economic, social, and political factors that underlie the application of agroforestry technology. CROSSLISTED as FES 477/NR 477 and FES 577/RNG 577. (Bacc Core Course)

Attributes: CSGI – Core, Synth, Global Issues; CSST – Core, Synthesis, Science/Technology/Society

Equivalent to: FS 477, NR 477

Recommended: Introductory course in biology.

FES 485, *CONSENSUS AND NATURAL RESOURCES, 3 Credits

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. (Bacc Core Course)

Attributes: CSST – Core, Synthesis, Science/Technology/Society

Equivalent to: FS 485

Available via Ecampus

FES 486, ^PUBLIC LANDS POLICY AND MANAGEMENT, 3 Credits

Examines public lands policy and management in the Western U.S. Overview of historical and current federal land management agency laws, regulations, and policies. Highlights political, legal, economic, ecological, and social context of public land management decisions. (Writing Intensive Course)

Attributes: CWIC – Core, Skills, WIC

Recommended: Sophomore standing

Available via Ecampus

FES 499, SELECTED TOPICS IN FOREST SCIENCE, 0-16 Credits

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.

This course is repeatable for 16 credits.

FES 500, MARKET TOOLS FOR MANAGING GREENHOUSE GAS EMISSIONS, 3 Credits

Examines the use of market-based approaches to managing greenhouse gas emissions; the role of forestry and natural resource management in mitigating greenhouse gas emissions; and the design of carbon and offset markets in the context of broader climate change policies.

CROSSLISTED as FES 500/MNR 500.

Equivalent to: MNR 500

Recommended: MTH 111

Available via Ecampus

FES 501, RESEARCH AND SCHOLARSHIP, 1-16 Credits

Equivalent to: FS 501

This course is repeatable for 16 credits.

FES 503, THESIS, 1-16 Credits

Equivalent to: FS 503

This course is repeatable for 999 credits.

FES 505, READING AND CONFERENCE, 1-16 Credits

Some sections graded P/N.

Equivalent to: FS 505

This course is repeatable for 16 credits.

Available via Ecampus

FES 506, PROJECTS, 1-16 Credits

Equivalent to: FS 506

This course is repeatable for 16 credits.

Available via Ecampus

FES 507, SEMINAR, 1-16 Credits

Some sections graded A-F.

Equivalent to: FS 507

This course is repeatable for 16 credits.

FES 508, WORKSHOP, 1-16 Credits

Equivalent to: FS 508

This course is repeatable for 16 credits.

FES 511, COMMUNITIES AND NATURAL RESOURCES, 5 Credits

Provides students from diverse backgrounds with interdisciplinary, experiential learning exposure to contemporary community and natural resource issues in rural Oregon. Social science concepts are employed to critically appraise current conditions and future prospects for rural, natural resource-dependent communities.

Equivalent to: FS 511

This course is repeatable for 15 credits.

FES 512, FOREST ENTOMOLOGY, 3 Credits

Role of insects in natural and managed forests. Recognition of important forest insect pest groups and species, prediction of forest insect responses to environmental changes, and management strategies and treatments to protect forest resource values.

Recommended: BI 204 or BI 211 or BI 211H or BI 212 or BI 212H or equivalent.

FES 520, POSING RESEARCH QUESTIONS, 3 Credits

Acquaints beginning graduate students in the natural resources to the scientific method and formation of good researchable questions. The course consists of lectures, readings and discussions. Concepts in the course are reinforced and amplified by discipline-specific companion modules. Students prepare and orally present a researchable question in their area of interest that is critiqued by the class and instructors.

Equivalent to: FS 520

FES 521, NATURAL RESOURCE RESEARCH PLANNING, 3 Credits

Research planning and study plan development, investigative procedures, the principles and ethics of natural resource science, principles and practices in scientific communication.

Equivalent to: FS 521

FES 522, RESEARCH METHODS SOCIAL SCIENCE, 4 Credits

An introduction to research methods applied to social science issues and problems. Emphasis is on the nature of the research process, how to conduct research, and how to interpret and disseminate research results. Lec/lab.

Equivalent to: FOR 522, MNR 522

Recommended: Recent statistics course

FES 523, QUANTITATIVE ANALYSIS IN SOCIAL SCIENCE, 4 Credits

Application and interpretation of statistical approaches to human dimensions of natural resources, recreation, and other social sciences. Emphasis is on an applied approach focusing on understanding data, selecting appropriate statistics for theoretical and managerial problems, using statistical software for analyses, and interpreting findings.

Recommended: (FES 522 or FOR 522) and ST 511

FES 524, NATURAL RESOURCES DATA ANALYSIS, 4 Credits

Hands-on experience in applied statistical modeling and data analysis for natural resources. Emphasis is on understanding of statistical models and the application and actual implementation of statistical analysis techniques, use of statistical software for analyses (e.g., R), and interpretation of findings. Students analyze data from their own research for final projects.

Prerequisite: ST 511 with B or better and ST 512 [B]

FES 525, INTERDISCIPLINARY APPROACHES TO SOCIO-ECOLOGICAL PROBLEMS, 3 Credits

Inter-, multi- and transdisciplinary approaches to socio-ecological problems, including terminology, assumptions, and analytical frameworks of different scientific fields. How disciplines have been integrated to approach specific case studies. Teams apply concepts, tools, and approaches in a final integrated analysis, resulting in proposed actions or policies.

FES 526, EFFECTIVE COMMUNICATION & PRESENTATION SKILLS FOR SCIENTISTS, 1 Credit

Provides an overview of communication principles and effective scientific communication skills for producing a seminar on proposed research presented to fellow scientists. Students evaluate strengths and weaknesses of communication styles; develop their ability to provide fair, timely feedback; and apply communication principles to evaluate strengths and weaknesses of presentations and proposed research.

This course is repeatable for 3 credits.

FES 527, FOREST CARBON ANALYSIS FOR ASSESSMENTS AND POLICY AGREEMENTS, 3 Credits

Role of forests in mitigating greenhouse gas emissions. International GHG policies and recommendations for monitoring emissions and forest carbon. Measurement, modeling, and projections of forest ecosystem carbon. Evaluation of policies for reducing GHG emissions and increasing forest carbon stores.

Prerequisite: FES 536 with C or better

Recommended: MNR 538 or MNR 550

Available via Ecampus

FES 530, FOREST AS CLASSROOM, 4 Credits

Investigates instructional methods used to teach K-12 students about natural resources. Reveals how forest exploration can be used as a means to teach others about science, ecology, mathematics, social science, and history. Provides an opportunity for future teachers, naturalists, interpreters, and scientists to improve their teaching and communication skills.

Available via Ecampus

FES 533, PLANNING AGROFORESTRY PROJECTS, 2 Credits

Helps forestry and other natural resource students understand various agroforestry concepts, systems and technologies and practices worldwide. Lays the groundwork for students to identify different systems, characterize socio-economic conditions and plan sustainable agroforestry systems. Class activities examine how biological, economic, and social factors influence agroforestry farming decisions.

Recommended: BOT 341 and/or equivalent course in ecology.

FES 535, GENES AND CHEMICALS IN AGRICULTURE: VALUE AND RISK, 3 Credits

A multidisciplinary course that examines the scientific, social, political, economic, environmental, and ethical controversies surrounding agricultural and natural resource biotechnologies. Lec/rec. CROSSLISTED as FES 435/TOX 435 and FES 535/MCB 535/TOX 535.

Equivalent to: BI 535, FS 535, MCB 535, TOX 535

Recommended: One quarter each of biology and chemistry

Available via Ecampus

FES 536, CARBON SEQUESTRATION IN FORESTS, 2 Credits

Examines processes controlling the sequestration of carbon in the forest system including the forest itself and wood products. Also examines how forests can be managed to sequester carbon as well as the important economic, policy, and other constraints. Lectures, readings, discussion, simulation models, and home work will be used to cover the material.

Recommended: Undergraduate-level biology or ecology.

FES 537, BELOWGROUND ECOSYSTEMS, 3 Credits

Physical and biological components and their interactions in different soil ecosystems with description and examination of the relationships between producers and decomposers in the soil.

Recommended: Undergraduate biology or ecology courses

FES 538, VALUATION OF NON-MARKET RESOURCES, 3 Credits

Focuses on the theory and methods for estimating the economic value of non-market resources (e.g. clean air and water, biodiversity, nature-based recreation, etc.). Blends the theory and econometrics of non-market valuation through hands-on applications of methods with real datasets. The valuation of non-market resources is a burgeoning field within applied economics and should continue to grow in both importance and applications.

Recommended: AREC 512 or ECON 512

FES 540, WILDLAND FIRE ECOLOGY, 3 Credits

Fire histories and ecology of major forest, rangeland, and wetland ecosystems. Includes fire interactions with physical and biotic components of ecosystems, role of fire in ecological processes, and utilization in natural resource management.

Recommended: Coursework in ecology and natural resource management

FES 542, WILDLIFE LANDSCAPE ECOLOGY, 3 Credits

Explores the interaction between spatial pattern and scale and ecological processes with particular emphasis on biodiversity in forests. The focus is on theory, methods and conservation applications in landscape ecology.

Recommended: Undergraduate courses in ecology and concurrent enrollment in ST 511

FES 543, ADVANCED SILVICULTURE, 3 Credits

The scientific basis of forest regeneration and silvicultural practices and prescriptions in immature and mature stands. Field trips are required. Lec/lab.

Equivalent to: FS 543

Recommended: FOR 442 and FOR 443

FES 545, ECOLOGICAL RESTORATION, 4 Credits

Fundamentals of restoring and reclaiming disturbed landscapes and ecosystems. Topics 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. CROSSLISTED as FES 445/FW 445 and FES 545/FW 545.

Equivalent to: FOR 545, FW 545

Recommended: BI 370 or BI 370H

Available via Ecampus

FES 546, ADVANCED FOREST COMMUNITY ECOLOGY, 4 Credits

Fundamental concepts of community including disturbance, diversity and succession. Strong emphasis on field skills and data interpretation. Saturday field trip required. Lec/lab.

FES 547, ARBORICULTURE, 4 Credits

The principles and practices of arboriculture, the art and science of selecting, planting, establishing and maintaining trees in urban, suburban, commercial and residential landscapes. CROSSLISTED as FES 447/HORT 447 and FES 547/HORT 547.

Equivalent to: HORT 547

Recommended: (FES 141 or FES 241 or HORT 226 or HORT 228) and (FOR 111 or HORT 112)

Available via Ecampus

FES 548, INVASIVE PLANTS: BIOLOGY, ECOLOGY AND MANAGEMENT, 3 Credits

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.

Equivalent to: FS 548

Available via Ecampus

FES 550, TROPHIC CASCADES, 2-3 Credits

Theory and empirical analysis of terrestrial carnivore effects on plants and ecosystems as mediated through herbivores. Emphasis on large carnivores, frequency/strength of trophic cascades, implications for ecosystem function, management, and restoration. Lectures, current literature, discussions, field exercise, term paper, and student presentations. CROSSLISTED as FES 550/FW 550.

Equivalent to: FOR 547, FW 547, FW 550

This course is repeatable for 3 credits.

FES 552, FOREST WILDLIFE HABITAT MANAGEMENT, 4 Credits

Management of terrestrial vertebrates in forest ecosystems. Effects on silvicultural practices and landscape pattern on habitats and populations. CROSSLISTED as FES 552/FW 552.

Equivalent to: FW 552

Recommended: FOR 341 or equivalent course in ecology.

Available via Ecampus

FES 554, MANAGING AT THE WILDLAND-URBAN INTERFACE, 3 Credits

Course targets fire-prone communities where resource professionals need to work cooperatively with local and federal agencies and citizens to gain acceptance for fire management programs and build joint responsibility for fuel reduction activities.

Equivalent to: FOR 554

Recommended: FOR 111 for non-Ecampus students

FES 555, URBAN FOREST PLANNING, POLICY AND MANAGEMENT, 4 Credits

Examination of planning, policy, and management strategies used in the stewardship of urban natural resources. Fundamentals for developing effective programs to maximize the economic, environmental, and social values and benefits of urban forest landscapes. CROSSLISTED as FES 455/HORT 455 and FES 555/HORT 555.

Equivalent to: FOR 555, HORT 555

Recommended: FES 350 or HORT 350

Available via Ecampus

FES 558, CONCEPTS OF FOREST RECREATION PLANNING AND MANAGEMENT, 3 Credits

Examines research that forms the conceptual basis for tools, techniques, and approaches used in recreation planning and management.

Equivalent to: FOR 558

FES 560, GREEN INFRASTRUCTURE, 4 Credits

Explores the relationship between the natural and built environments in cities and examines how planning for and managing green infrastructure assets (such as urban tree canopy, watersheds, and natural areas) increases economic health, community livability and ecological resilience in cities.

Available via Ecampus

FES 561, PHYSIOLOGY OF WOODY PLANTS, 3 Credits

The structure, growth and physiological processes of trees and shrubs.

Equivalent to: FS 561

Recommended: ((CH 231 or CH 231H) and (CH 232 or CH 232H) and (CH 233 or CH 233H)) and CH 331 and CH 332 and BOT 331

FES 565, URBAN FORESTRY LEADERSHIP, 2 Credits

Examines the application of leadership theories and principles to the decision-making, policy creation, and effective administration of urban forestry programs in the public, private, and non-profit sectors. Taught via Ecampus only.

Available via Ecampus

FES 577, AGROFORESTRY, 3 Credits

Theory and worldwide practice of multiple-crop low input sustainable systems involving concurrent production of tree and agricultural products. Biological, economic, social, and political factors that underlie the application of agroforestry technology. CROSSLISTED as FES 477/ NR 477 and FES 577/RNG 577.

Equivalent to: FS 577, NR 577, RNG 577

Recommended: Introductory course in biology.

FES 580, WRITING SCIENTIFIC MANUSCRIPTS, 1 Credit

Discussion of parts of a scientific manuscript and the submission, review, and publication process. Brief presentations and discussion of examples provided by the instructor and students. Students write their own manuscripts and work in teams to provide feedback on manuscript components.

FES 585, CONSENSUS AND NATURAL RESOURCES, 3 Credits

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.

Equivalent to: FS 585

Available via Ecampus

FES 586, PUBLIC LANDS POLICY AND MANAGEMENT, 3 Credits

Examines public lands policy and management in the Western U.S. Overview of historical and current federal land management agency laws, regulations, and policies. Highlights political, legal, economic, ecological, and social context of public land management decisions.

Available via Ecampus

FES 599, SELECTED TOPICS IN FOREST SCIENCE, 0-16 Credits

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.

This course is repeatable for 16 credits.

Available via Ecampus

FES 600, GLOBAL CHANGE ECOLOGY: IMPACTS, MITIGATION, AND ADAPTATION, 3 Credits

An interdisciplinary discourse on what is known about global change and dynamics of the earth system, including principles of climate, influences on ecosystem functioning and connectivity needed to understand responses of the earth system to human activities.

Equivalent to: FS 600

FES 601, RESEARCH AND SCHOLARSHIP, 1-16 Credits

Equivalent to: FS 601

This course is repeatable for 16 credits.

FES 603, THESIS, 1-16 Credits

This course is repeatable for 999 credits.

FES 605, READING AND CONFERENCE, 1-16 Credits

Equivalent to: FS 605

This course is repeatable for 16 credits.

FES 606, PROJECTS, 1-16 Credits

Equivalent to: FS 606

This course is repeatable for 16 credits.

FES 629, TEACHING PRACTICUM IN FOREST SCIENCE, 1 Credit

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.

Equivalent to: FS 629

FES 646, FOREST ECOSYSTEMS ANALYSIS AND APPLICATION, 4 Credits

The structure and function of forests and associated streams in natural and managed landscapes; application of ecosystem analysis to policy management decisions; roles of models; scaling from individual processes to ecosystems, landscapes, and beyond. Required classroom discussions, field trip.

Equivalent to: FS 646

Recommended: College-level ecology/biology, chemistry, and math; familiarity with Excel.

FES 699, SELECTED TOPICS, 1-16 Credits

This course is repeatable for 16 credits.

Master of Natural Resources (MNR)**MNR 500, MARKET TOOLS FOR MANAGING GREENHOUSE GAS EMISSIONS, 3 Credits**

Examines the use of market-based approaches to managing greenhouse gas emissions; the role of forestry and natural resource management in mitigating greenhouse gas emissions; and the design of carbon and offset markets in the context of broader climate change policies. CROSSLISTED as FES 500/MNR 500.

Equivalent to: FES 500

Recommended: MTH 111

Available via Ecampus

MNR 511, INTRODUCTION TO SUSTAINABLE NATURAL RESOURCES, 3 Credits

Overview of economic, environmental, social, cultural, ethical, and policy considerations of sustainable natural resource management. International collaborative efforts to address global natural resource issues. Key policy drivers, key stressors, balancing competing interests. Introductory course required for all Master of Natural Resources students; open to other graduate students. Taught via Ecampus only.

Recommended: Undergraduate biology or ecology course

Available via Ecampus

MNR 519, DIVERSITY, EQUITY AND INCLUSION IN NATURAL RESOURCE MGMT, 3 Credits

Explores practical approaches to operationalizing diversity, equity and inclusion (DEI) principles in natural resource management organizational settings, programs and outdoor settings. Examines case studies on topics such as accessibility to recreational places, implicit bias and cultural competency in public communications, and how enhancing workplace diversity increases social capital. Introduces DEI analysis through a research project in their local area.

Available via Ecampus

MNR 522, RESEARCH METHODS SOCIAL SCIENCE, 4 Credits

An introduction to research methods applied to social science issues and problems. Emphasis is on the nature of the research process, how to conduct research, and how to interpret and disseminate research results. Lec/lab.

Equivalent to: FES 522

Recommended: Upper-division or graduate level statistics

MNR 530, TROPICAL FOREST ECOLOGY AND MANAGEMENT: A GLOBAL PERSPECTIVE, 3 Credits

Study of tropical forest ecology and the common ecological patterns found within tropical forests. The threats and challenges that tropical forests face in the 21st century and the issues of human use and their impacts. Developing strategies for sustainable management and restoration approaches to alleviate pressure on remaining tropical forests. Taught via Ecampus only.

MNR 538, ADAPTING FORESTS TO CLIMATE CHANGE, 3 Credits

Climate change is expected to have profound effects on forests. Society can respond by managing in forests in ways that can help mitigate climate change or help forests adapt. Nonetheless, changes in climate and forest responses are uncertain, making management and policy decisions difficult and controversial. We will investigate the effects of climate change on forests, focusing on potential forest management and policy responses.

Available via Ecampus

MNR 550, CLIMATE CHANGE IMPACTS ON FOREST ECOSYSTEMS, 3 Credits

Forest management responses to climate change rely on understanding the mechanisms of interaction between forests and climate, as well as the capacity to evaluate impacts of future climate scenarios on forests. Considers effects of rising CO₂ and changing climate at the level of ecophysiological processes, changes in species distribution, changes in disturbance regimes, and ecosystem-level impacts mediated by the water, carbon, and nitrogen cycles. Modeling approaches include statistically-based bioclimatic envelopes, and dynamic global vegetation models that treat ecosystem processes and changes in biome distribution.

Recommended: Basic ecology course

Available via Ecampus

MNR 560, DEVELOPING THE MNR CAPSTONE PROPOSAL, 3 Credits

Applies content from across the MNR degree in developing a capstone project. Explores the types of capstone projects and methodologies. Identifies and evaluates the data needed to address natural resource problems or topics. Develops outlines for students' individualized MNR capstone projects.

Prerequisite: MNR 511 with C or better

Available via Ecampus

MNR 561, MNR CAPSTONE PROJECT, 1-6 Credits

Students work with their major advisor on the completion of their capstone project at the end of the MNR degree program. Students incorporate knowledge gained from coursework to address a natural resource problem within interconnected ecological, economic and social contexts.

Prerequisite: MNR 560 with C or better or SNR 506 with P or better

This course is repeatable for 12 credits.

Available via Ecampus

Natural Resources (NR)**NR 003, UNDERGRADUATE RESEARCH, 0 Credits**

Engage in research activities appropriate to the discipline; and through the research experience, acquire skills, techniques, and knowledge relevant to the field of study. In consultation with a faculty mentor, engage in research activity, and make and execute a plan for a project.

NR 201, MANAGING NATURAL RESOURCES FOR THE FUTURE, 3 Credits

Overview of the complexities involved in managing natural resources of the Pacific Northwest. Exposure to major natural resource issues of the region. Development of critical thinking skills useful in seeking solutions. Available via Ecampus

NR 202, NATURAL RESOURCE PROBLEMS AND SOLUTIONS, 3 Credits

Exploration of the multiple components (ecological, social, political, ethical) of selected natural resource problems. Uses case studies to illustrate how social and biophysical characteristics of environmental problems influence the methods used to try to solve these problems and their potential for success.

Recommended: NR 201

Available via Ecampus

NR 312, CRITICAL THINKING FOR NATURAL RESOURCE CHALLENGES, 3 Credits

Provides an introduction to critical thinking as it applies to issues and problems in natural resources. Attention is given to formal argument analysis, fallacies of argumentation, and critical scientific and philosophical concepts.

Recommended: Sophomore standing

NR 325, SCIENTIFIC METHODS FOR ANALYZING NATURAL RESOURCE PROBLEMS, 3 Credits

Approaches to disciplinary and interdisciplinary problem analysis in natural resources. Introduces systems thinking and the benefits and limitations of different tools used to integrate information from multiple disciplines and stakeholders. Applications of alternative analysis tools are illustrated through selected forest-related case studies. Lec/lab.

Prerequisite: MTH 111 with C- or better or Math Placement - ALEKS with a score of 060

Recommended: NR 201 and (ST 201 or ST 351)

NR 351, *WHEN SCIENCE ESCAPES THE LAB: SCIENCE AND RESOURCE MANAGEMENT, 3 Credits

Role of science in solving natural resource problems. Selecting the 'best available science.' How science is portrayed, filtered, and used by the media and interests groups to affect policy and management. Analysis of case studies on use of science in natural resource decision making. (Bacc Core Course)

Attributes: CSST – Core, Synthesis, Science/Technology/Society

Recommended: Sophomore standing and NR 312

NR 380, NATURE IN STORYTELLING OVER THE CENTURIES, 3 Credits

Examines the historic tendency across cultures to mythologize elements of the natural world, resulting in celebrated myths, fables, and stories. The course examines nature-based folklore from past centuries, uncovering early perceptions of landscapes, creatures, and plants held by societies and cultures. Focus then shifts to exploration of how elements of the natural world have been portrayed in contemporary film, television, and advertising, revealing how perceptions of nature have evolved over the past century. Connections between contemporary popular culture and old-world myths, fables, and stories will thus be revealed.

Available via Ecampus

NR 399, SPECIAL TOPICS, 0-16 Credits

This course is repeatable for 16 credits.

NR 401, RESEARCH AND SCHOLARSHIP, 1-16 Credits

This course is repeatable for 16 credits.

NR 403, THESIS, 1-16 Credits

This course is repeatable for 16 credits.

NR 405, READING AND CONFERENCE, 1-9 Credits

This course is repeatable for 18 credits.

NR 406, PROJECTS, 1-9 Credits

This course is repeatable for 16 credits.

Available via Ecampus

NR 407, SEMINAR, 1-9 Credits

This course is repeatable for 18 credits.

NR 410, INTERNSHIP, 1-6 Credits

This course is repeatable for 12 credits.

Available via Ecampus

NR 455, NATURAL RESOURCE DECISION MAKING, 4 Credits

Students will participate on collaborative planning teams that effectively engage stakeholders in the decision making process, and offer sound natural resource decisions that are supported by multiple interests.

Prerequisite: FES 485 with D- or better and (BI 371 [D-] or BI 373 [D-] or ENSC 479 [D-] or FE 460 [D-] or FES 486 [D-] or FOR 460 [D-] or FW 435 [D-] or FW 439 [D-] or FW 454 [D-] or FW 497 [D-] or GEOG 323 [D-] or HORT 318 [D-] or SOIL 395 [D-] or WR 462 [D-])

Available via Ecampus

NR 477, *AGROFORESTRY, 3 Credits

Theory and worldwide practice of multiple-crop low input sustainable systems involving concurrent production of tree and agricultural products. Biological, economic, social, and political factors that underlie the application of agroforestry technology. CROSSLISTED as FES 477/ NR 477 and FES 577/RNG 577. (Bacc Core Course)

Attributes: CSGI – Core, Synth, Global Issues; CSST – Core, Synthesis, Science/Technology/Society

Equivalent to: FES 477, FS 477, RNG 477

Recommended: Introductory course in biology.

NR 499, SPECIAL TOPICS, 1-16 Credits

This is a hybrid course when offered by Ecampus.

Equivalent to: NR 499H

This course is repeatable for 16 credits.

Available via Ecampus

NR 499H, SPECIAL TOPICS, 1-16 Credits

Attributes: HNRS – Honors Course Designator

Equivalent to: NR 499

This course is repeatable for 16 credits.

Sustainable Natural Resources (SNR)

SNR 506, INDEPENDENT PROJECT IN NATURAL RESOURCE SUSTAINABILITY, 2 Credits

Students 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. Graded P/N.

Prerequisite: SNR 511 with C or better

Available via Ecampus

SNR 511, SUSTAINABLE NATURAL RESOURCE DEVELOPMENT, 1 Credit

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 group on a common project.

Available via Ecampus

SNR 520, SOCIAL ASPECTS OF SUSTAINABLE NATURAL RESOURCES, 3 Credits

Using readings, personal experiences, and class discussions, students explore five principles of socially sustainable natural resource management, and review the role they play in creating natural resource-based sustainable communities.

Recommended: SNR 511

Available via Ecampus

SNR 521, ECONOMICS OF SUSTAINABLE NATURAL RESOURCE MANAGEMENT, 3 Credits

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.

Recommended: SNR 511

Available via Ecampus

SNR 522, BASIC BELIEFS AND ETHICS IN NATURAL RESOURCES, 3 Credits

Examines basic philosophies and ethical systems in American forestry, including Pinchot's agricultural/utilitarian approach and Leopold's biotic/ecological model, compares them to contemporary public attitudes and considers their implications for sustainability.

Available via Ecampus

SNR 530, ECOLOGICAL PRINCIPLES OF SUSTAINABLE NATURAL RESOURCES, 3 Credits

Focus on ecological sustainability and ecological concepts and principles, with examples drawn from forests and arid lands. Exploration of global ecosystems, ecological processes and services, factors that create and maintain diversity, ecosystem health and integrity. Principles for sustainable natural resource management and use.

Recommended: SNR 511 and a basic ecology course

Available via Ecampus

SNR 531, SUSTAINABLE SILVICULTURE AND FOREST CERTIFICATION, 3 Credits

Strategies for sustainable silviculture, and measuring and verifying environmental performance (including certification systems) are examined using classroom lectures, case studies, and field exercises. Part of the 18-credit Sustainable Natural Resources (SNR) Graduate Certificate; also open to other graduate students.

Recommended: SNR 511 and at least two years' experience working in a natural resources-related field

SNR 532, PLANNING AGROFORESTRY PROJECTS, 2 Credits

Develop basic understanding and appreciation of agroforestry concepts, systems, technologies and practices as used and applied in tropical and temperate zones of the world.

Recommended: SNR 530 (or equivalent ecology course) and SNR 511

Available via Ecampus

SNR 533, NONTIMBER FOREST PRODUCTS: AN INTERDISCIPLINARY INTRODUCTION, 3 Credits

Interdisciplinary introduction to the culture, history, economy, ecology, policy and management of nontimber forest products (NTFP), e.g., wild foods, medicines, floral greens, craft material and landscaping species. Includes domestic public and private forest and international case studies.

Available via Ecampus

SNR 534, REDUCED IMPACT TIMBER HARVEST, 2 Credits

Explores planning, implementation, monitoring, and evaluation of reduced impact timber harvesting. Part of the 18-credit Sustainable Natural Resources (SNR) Graduate Certificate; also open to other graduate students.

Recommended: SNR 511 and at least two years' experience working in a natural resources-related field

SNR 535, SUSTAINABLE MANAGEMENT OF AQUATIC AND RIPARIAN RESOURCES, 3 Credits

Explores integrated strategies for sustainable management of watersheds, estuaries, coastal zones, and aquatic resources. Special emphasis given to links between land uses and aquatic environments. Part of the 18-credit Sustainable Natural Resources (SNR) Graduate Certificate; also open to other graduate students.

Recommended: SNR 511

Available via Ecampus

SNR 540, GLOBAL ENVIRONMENTAL CHANGE, 3 Credits

Explore biophysical and social sciences that underlie contemporary global change issues: global biogeochemical cycles, climate system, climate change, threats to biodiversity; human dimensions of climate change, globalization, land cover and land use change, global environmental governance and management tools.

Recommended: Basic biology course

Available via Ecampus

SNR 808, WORKSHOP, 1-4 Credits

Describes the policies, practices, and market mechanisms that enhance ecological, economic, and social sustainability of natural resource production and natural ecosystems. Sustainable natural resource management attempts to meet the needs of the present without compromising the future of people or the ecosystems on which they depend.

This course is repeatable for 4 credits.

Tourism and Outdoor Leadership (TRAL)

TRAL 110, INTRODUCTION TO WHITE WATER KAYAKING, 2 Credits

Students will learn fundamentals of white water kayaking in sheltered & moving water based on the internationally recognized British Canoe (BC) and American Canoe Association (ACA) teaching and skills certification systems. Emphasis is on activity and basic skills.

TRAL 111, INTRODUCTION TO CANOEING, 2 Credits

Students will learn fundamentals of canoeing in sheltered & moving water based on the internationally recognized British Canoe (BC) and American Canoe Association (ACA) teaching and skills certification systems.

Emphasis is on activity and basic skills.

TRAL 115, OUTDOOR LIVING SKILLS, 2 Credits

Educates and introduces students on how to travel safely in the backcountry through proper preparation, risk awareness, Leave No Trace ethics, terrain recognition, navigation, and camp craft. Classroom and field (lab) experience. Includes one mandatory weekend overnight outing. CROSSLISTED as PAC 115/TRAL 115.

Corequisites: TRAL 118

Equivalent to: PAC 115

This course is repeatable for 4 credits.

TRAL 118, LABORATORY FOR OUTDOOR LIVING SKILLS, 1 Credit

Practical field application of concepts learned in PAC 115/TRAL 115, Outdoor Living Skills. Field (lab) experience includes one mandatory weekend overnight. Introduces how to travel safely in the backcountry through proper preparation, risk awareness, Leave No Trace ethics, terrain recognition, navigation, and camp craft. CROSSLISTED as PAC 118/TRAL 118.

Corequisites: TRAL 115

Equivalent to: PAC 118

This course is repeatable for 2 credits.

TRAL 130, INTRODUCTION TO OUTDOOR AND ADVENTURE PROFESSIONS, 3 Credits

Outdoor and adventure professions will be explored. Introduces students to practical and conceptual aspects of land and water trips in outdoor tourism, adventure, and educational settings. Innovative people and products will be examined in the context of outdoor and adventure professions and their impact; past, present, and future.

Equivalent to: TOL 130

TRAL 132, *FOUNDATIONS AND HISTORY OF OUTDOOR AND ADVENTURE PROFESSIONS, 3 Credits

History, evolution, and theoretical underpinning of outdoor and adventure professions as an important and evolving feature of Western culture within the United States and beyond. Influential ideas, paradigm shifts, events, and developments that have led to professionalism, institutionalization, dissemination, and impact on other subject areas and professions. Impact of other cultures on current state of the professions. (Bacc Core Course)

Attributes: CPWC – Core, Pers, West Culture

Equivalent to: TOL 132

TRAL 173, INTERMEDIATE ROCK CLIMBING, 2 Credits

Introduces variety of basic skills, gear and systems that will allow them to safely participate in a single pitch rock climbing environment based on internationally recognized American Mountain Guides Association (AMGA) teaching and skills certification systems. Presents students with various technical skills that will serve as a foundation for future land-based outdoor disciplines. Students will be introduced to gear, such as software (ropes, webbing, harnesses) and hardware (carabiners, friction devices); skills, such as knots, belaying, rappelling, lead climbing; and systems such as anchors and basic rescue techniques. CROSSLISTED as PAC 173/TRAL 173.

Equivalent to: PAC 173

This course is repeatable for 10 credits.

TRAL 215, GROUP FACILITATION, 4 Credits

Introduces facilitation, leadership, and management of groups. Group facilitation theory, techniques, and models for use in a variety of environments and with different populations. Prominent personality types and how to effectively facilitate these. Determining needs, utilizing appropriate techniques, sequencing, and processing to meet specific determined needs of groups.

TRAL 217, INTERMEDIATE ROCK, 2 Credits

Begins by affirming rock site management foundational skills such as proper equipment, knots, belay techniques, rappelling, and basic climbing anchor systems. Then focuses on building upon those foundational skills by covering more complex anchor systems, belay techniques, vertical rescues, releasable rappels, and movement through various rock specific terrains.

Recommended: TRAL 172 or similar training and equivalent skill level

TRAL 218, ROCK SITE MANAGEMENT, 2 Credits

Begins by affirming Intermediate Rock foundational skills such as proper equipment, knots, belay & lead climbing techniques, movement, rappelling, and basic climbing anchor systems based on internationally recognized American Mountain Guides Association (AMGA) teaching and skills certification systems. Class will then focus on building upon those foundational skills by covering more complex anchor systems, belay techniques, vertical rescues, releasable rappels and movement through various rock specific terrains.

Prerequisite: TRAL 173 with C or better or PAC 173 with C or better

TRAL 251, RECREATION RESOURCE MANAGEMENT, 4 Credits

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 wildlife areas of the forest, range and coast.

Equivalent to: FES 251

Available via Ecampus

TRAL 260, INTERMEDIATE PADDLESPORT, 2 Credits

Learn how to successfully paddle as a competent group member within moving water & whitewater environments up to class III. This course will emphasize that the student has a holistic approach to river running, can be an effective group member during river rescues, can contribute to the safety, group skills and leadership of a river descent and showcase the knowledge required of an intermediate whitewater paddler based on internationally recognized British Canoe (BC) and American Canoe Association (ACA) teaching and skills certification systems. Uses a variety of diverse whitewater specific kayaks and canoes.

Prerequisite: (TRAL 110 with C or better or PAC 110 with C or better) and (TRAL 111 [C] or PAC 111 [C])

TRAL 270, PRE-INTERNSHIP SEMINAR, 1 Credit

Exploration of career goals, internship opportunities, and the variety of practice areas in the tourism, recreation, and adventure leadership (TRAL) professions. Student preparation in planning, obtaining, and completing TRAL internships. The course is designed to assist undergraduate majors in TRAL prepare for the required internship. Graded P/N.

Equivalent to: TOL 270

TRAL 280, OUTDOOR LEADERSHIP FUNDAMENTALS, 3 Credits

A week-long outdoor expedition focusing on water-based and land-based skills while developing a comprehensive understanding of expedition behavior. Students will meet in the classroom to prepare for the week-long field expedition covering various topics such as risk management, expedition planning, navigation, water safety and other topics. The expedition will expose students to extended travel in the backcountry while further developing technical and interpersonal skills.

Prerequisite: (TRAL 110 with C or better or PAC 110 with C or better) and (TRAL 111 [C] or PAC 111 [C]) and TRAL 115 [C] and TRAL 118 [C] and TRAL 173 [C]

TRAL 299, SPECIAL TOPICS, 0-16 Credits

Topics of current importance in tourism, recreation, and/or adventure leadership education. Topics will change from term to term. May be repeated with different topics for credit.

This course is repeatable for 16 credits.

TRAL 309, CERTIFICATION PRACTICUM, 2 Credits

Allows students the opportunity to acquire nationally or internationally recognized certification in one or more disciplines. Will provide an avenue for students to acquire professional faculty guidance and mentoring so they are more able to attain a certification.

This course is repeatable for 6 credits.

TRAL 351, OUTDOOR RECREATION MANAGEMENT ON PUBLIC LANDS, 3 Credits

Explores current issues and problems in outdoor recreation management on public lands and approaches to address these. Emphasis on day-to-day, field-based management of recreation resources, rather than broad-scale planning.

Prerequisite: TRAL 251 with C- or better or FES 251 with C- or better

Equivalent to: FES 351

TRAL 352, WILDERNESS MANAGEMENT, 3 Credits

Wilderness as land use concept. Wilderness history, preservation, planning and management. Wilderness in the context of other land uses.

Equivalent to: FES 352

Available via Ecampus

TRAL 353, NATURE, ECO, AND ADVENTURE TOURISM, 4 Credits

Examines natural resource-based tourism issues in both domestic and international contexts, with examples from around the world. Explores distinctions between nature-based tourism and other forms of tourism (e.g., traditional mass tourism, adventure tourism, ecotourism), positive and negative impacts of natural resource-based tourism (e.g., social, cultural, economic, environmental), and other related issues such as marketing, accreditation and certification, poverty and pro-poor tourism, and sustainable design.

Equivalent to: FES 353

TRAL 354, COMMUNITIES, NATURAL AREAS, AND SUSTAINABLE TOURISM, 3 Credits

Introduces students to macro-level community and regional issues associated with tourism in natural areas. Explores positive and negative community impacts associated with tourism, traditional government-based tourism management and policies; community-based tourism management, and partnerships and stakeholder collaboration. Domestic and international examples are used to illustrate concepts and principles.

Equivalent to: FES 354

TRAL 357, *PARKS AND PROTECTED AREAS MANAGEMENT, 3 Credits

Provides a broad yet comprehensive understanding of the theories, problems, and techniques of managing parks, wild and scenic rivers, wilderness, and other protected areas. Covers the evolution of policies and recent issues in management of these protected areas, in the United States and around the world. (Bacc Core Course)

Attributes: CSGI – Core, Synth, Global Issues

Equivalent to: FES 357

TRAL 370, DESIGN AND MANAGEMENT OF OUTDOOR EXPERIENCES, 4 Credits

Introduction to pedagogical, administrative, and organizational knowledge, skills, and dispositions for effective design and management of effective short and extended duration outdoor experiences in wilderness-like areas. Covers personnel logistics, site planning, itinerary planning, educational and skills progression, communication with volunteers and program contacts, budgets.

Prerequisite: TRAL 280 with C or better or TOL 375 with C or better

Equivalent to: TOL 370

Recommended: Junior standing

TRAL 372, ETHICS AND ADVENTURE LEADERSHIP, 3 Credits

Examines ethical issues and situations inherent in adventure leadership and other experiential education settings. Leading adventure programs entails judgment-laden decisions that are made every hour of every day concerning participants, leaders, and programs. Students will become familiar with predominant ethical theories and apply these theories to practical situations with a view to assessing the values that influence their decisions and subsequent actions. Students will better understand how their decisions influence their professional work and those of others within the context of adventure leadership.

Equivalent to: TOL 372

Recommended: TOL 375 or TRAL 375 or other writing intensive course

TRAL 373, WILDERNESS AND ADVENTURE EDUCATION, 4 Credits

Rationale for and methods used in the application of wilderness and outdoor adventure education programs in education, recreation, corporate and human service settings. Covers historical and contemporary philosophies and practices in adventure education, with a primary emphasis on outdoor adventure education. Explores the educational, social, and ethical consequences of outdoor adventure education programs. Also explores the role of wilderness in the context of the United States and differing views of what constitutes wilderness from an international perspective.

Equivalent to: TOL 373

Recommended: TRAL 375 or TOL 375

TRAL 374, OUTDOOR ADVENTURE EDUCATION, 3 Credits

Rationale for and methods used in the application of outdoor adventure education programs in education, recreation, corporate and human service settings. Historical and contemporary philosophies and practices in outdoor adventure education. Explores the educational, social, and ethical consequences of outdoor adventure education programs.

Examines outdoor adventure education in the context of the United States and differing paradigms informing the practice in other cultures internationally. Presents current research in outdoor adventure education.

Prerequisite: TRAL 130 with C or better and TRAL 132 [C] and TRAL 215 [C]

TRAL 375, ^EXPERIENTIAL EDUCATION, 4 Credits

Theory, techniques, and practice of experiential education. Students will define learning objectives, design curriculum, develop teaching materials, and effectively teach a variety of audiences. (Writing Intensive Course)

Attributes: CWIC – Core, Skills, WIC

Equivalent to: TOL 375

TRAL 377, EXPEDITIONS I WATER, 5 Credits

A field-based course that develops the knowledge, skills, and dispositions needed to safely and effectively lead, and participate in, an extended water based expedition of one week or longer. Technical skill emphasis is on whitewater kayaks and/or rafts and/or canoes with an additional focus on swift water rescue skills.

Prerequisite: TRAL 370 with C or better and TRAL 260 [C]

Corequisites: TRAL 379

Equivalent to: TOL 377

TRAL 378, TOURISM AND RECREATION DATA ANALYSIS, 3 Credits

Introduces students to descriptive and inferential statistics. The focus is on 1) applying relevant statistical analyses to tourism and recreation data and 2) interpreting results.

Equivalent to: TOL 378

Recommended: MTH 111

TRAL 379, EXPEDITIONS II-LAND, 10 Credits

This is a field-based course that develops the knowledge, skills, and dispositions needed to safely and effectively lead and participate in an extended backcountry expedition of three weeks or longer. Emphasis is on mountaineering skills in a backcountry context.

Prerequisite: TRAL 370 with C or better

Corequisites: TRAL 377

Equivalent to: TOL 379

TRAL 399, SPECIAL TOPICS, 0-16 Credits

Topics of current importance in tourism, recreation, and/or adventure leadership education. Topics will change from term to term. May be repeated with different topics for credit.

This course is repeatable for 16 credits.

TRAL 401, RESEARCH AND SCHOLARSHIP, 1-16 Credits

Equivalent to: TOL 401

This course is repeatable for 16 credits.

TRAL 406, PROJECTS, 1-16 Credits

Equivalent to: TOL 406

This course is repeatable for 16 credits.

TRAL 410, INTERNSHIP, 1-16 Credits

Full-time supervised professional experience emphasizing functional proficiency under joint sponsorship of university and agency personnel. Graded P/N.

Equivalent to: TOL 410

This course is repeatable for 16 credits.

Recommended: FES 251 and FES 351 and FES 356 and FOR 391 and FOR 407

TRAL 432, ECONOMICS OF RECREATION AND TOURISM, 3 Credits

Applications of economic theory, concepts, and methods to outdoor recreation and nature-based tourism resources, projects and plans. Key topics include analyses of economic impacts, benefits and costs, demand and supply, and non-market valuation (e.g., revealed, stated, and benefit transfer methods).

Equivalent to: FES 432

Recommended: (AEC 350, ECON 201 or 201H) and (ST 202 or 202H)

TRAL 456, PLANNING FOR SUSTAINABLE RECREATION, 4 Credits

Concepts related to the creation and design of outdoor recreation plans. Techniques for collecting data pertaining to visitor experiences and preferences. Recreation planning at several levels, both for public and private lands, with emphasis on larger scale site planning where recreation is integrated with other resource uses. Lec/lab.

Prerequisite: TRAL 251 with C- or better or FES 251 with C- or better

Equivalent to: FES 456

TRAL 457, PLANNING FOR SUSTAINABLE TOURISM, 4 Credits

Examines relationships among tourists, tourism developments, and the planning of tourist attractions and services. Focuses on planning tourist resources and programs within a geographic region, as well as at both the destination and site levels. Planning tools and design concepts are reviewed, analyzed, and applied. Lec/lab.

Prerequisite: TRAL 251 with C or better or FES 251 with C or better

Equivalent to: FES 457

TRAL 474, ENTREPRENEURSHIP IN TOURISM, RECREATION, AND ADVENTURE LEADERSHIP, 3 Credits

Creation and management of tourism and outdoor leadership businesses.

Covers principles of running a successful business and includes special considerations for operations on public lands (e.g., concessionaires).

Equivalent to: TOL 474

Recommended: BA 101

TRAL 476, RISK MANAGEMENT IN TOURISM, RECREATION, AND ADVENTURE LEADERSHIP, 3 Credits

Risk management in tourism and outdoor leadership from an operational perspective. Focuses on risk in tourism and outdoor education programs as a contributing factor for learning, growth, and satisfaction of client motivations. Covers the nature of accidents in outdoor settings, addresses the practitioner's perspective of risk in the field, and describes theories and methods of implementing risk management. Covers the ethics of utilizing risk and potentially dangerous activities as a basis for enhancing client education and experience.

Equivalent to: TOL 476

TRAL 477, ADVENTURE THERAPY, 3 Credits

Provides students with an overview of adventure therapy, including its history, theory, current status and future trends. Includes program design, ethical issues, and best practices in the field.

Equivalent to: TOL 477

TRAL 478, LEGAL ISSUES IN TOURISM, RECREATION, AND ADVENTURE LEADERSHIP, 3 Credits

Covers the legal dimensions of tourism and outdoor leadership activities. Students will learn about the civil and criminal judicial system from a tourism and outdoor leadership perspective. They will learn to apply risk management methodologies and instruments, such as contracts, insurance, waivers and releases to address legal liability. The basic principles of intentional and negligent torts will be discussed, with an emphasis on practical applications. Also covers employment issues and general business law, including business structure and the use of entities as liability shields.

Prerequisite: TRAL 375 with C- or better or TOL 375 with C- or better

Equivalent to: TOL 478

TRAL 479, *NATURE AND THE HUMAN EXPERIENCE, 3 Credits

Examines the human experience with (and within) nature from biological, psychological, spiritual, and international/cultural perspectives. Identifies opportunities for fostering the human-nature connection to achieve organizational goals and individual and societal health. (Bacc Core Course)

Attributes: CSGI – Core, Synth, Global Issues

Equivalent to: TOL 479

Recommended: TOL 375 or other equivalent WIC course.

TRAL 493, ENVIRONMENTAL INTERPRETATION, 4 Credits

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.

Equivalent to: FES 493

Available via Ecampus

TRAL 499, SPECIAL TOPICS, 1-16 Credits

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.

Equivalent to: TOL 499

This course is repeatable for 16 credits.

Available via Ecampus

TRAL 593, ENVIRONMENTAL INTERPRETATION, 4 Credits

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.

Equivalent to: FES 593

Available via Ecampus