

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. Graduate education emphasizes 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. The degree emphasizes one of two areas: biology or silviculture. Students in either area 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 work on a capstone project.

The **Master of Natural Resources (MNR) degree** is offered as a non-thesis option only. Certificates in Sustainable Natural Resources, Urban Forestry, and Forests and Climate Change are available in association with the MNR program. 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).

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 (BS, HBS) (<http://catalog.oregonstate.edu/college-departments/forestry/forest-ecosystems-society/natural-resources-bs-hbs>)

This program is an interdisciplinary offering of the colleges of Agricultural Sciences, Forestry, Liberal Arts, and Science but is administered within Forestry.

Options:

- *Conservation and Technology* (<http://catalog.oregonstate.edu/college-departments/forestry/forest-ecosystems-society/natural-resources-bs-hbs/conservation-law-enforcement>)
- *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*

- **Sustainability (BS, HBS)**

This major is available from all colleges that offer undergraduate majors.

- Tourism, Recreation, and Adventure Leadership (<http://catalog.oregonstate.edu/college-departments/forestry/forest-ecosystems-society/tourism-recreation-adventure-leadership-bs-hbs>) (*Offered on the Corvallis and OSU-Cascades campuses.*)

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 (MAIS, MF, MS, PhD) (<http://catalog.oregonstate.edu/college-departments/forestry/forest-ecosystems-society/forest-ecosystems-society-mf-ms-phd-mais>)
- Master of Natural Resources (MNR) (<http://catalog.oregonstate.edu/college-departments/forestry/forest-ecosystems-society/natural-resources-mnr>)

Affiliated Interdisciplinary Graduate Major

- Applied Economics (MA, MS, PhD) (<https://catalog.oregonstate.edu/college-departments/agricultural-sciences/applied-economics/applied-economics-ma-ms-phd-mais>) (See Graduate School (<https://catalog.oregonstate.edu/college-departments/graduate-school>))

Graduate 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>)

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Faculty

Professors Bondi, T. Hall, Lachenbruch, Law, Oester, Puettmann, K.N.

Johnson, R. Johnson, Nelson, Ripple, Rosenberger, Ross, Strauss

Associate Professors Betts, Creighton, Ganio, Grotta, Howe, Lindberg,

Needham, Reuter, Still, Withrow-Robinson

Assistant Professors Ahrens, Campbell, D'Antonio, Davis, Hajjar,

Krawchuk, Luoma, Munanura, Rivers, Rosenberg, Schmidt, Schulze, Warren

Senior Instructors Anzinger, Bishaw

Instructors Diebel, Gassner, K. Hall, Liegel, Mangla, Olsen, Painter, Perry,

Ries, Stemper

Adjunct Faculty

Bailey, Lach, Lajtha, Walker

Courtesy/Affiliate Faculty

Alexander, Baur, Bell, Brooks, Castellano, Cazer-Gonzalez, Charnley, Cohen, Eisenberg, Fettig, Gray, Grimm-Greenblatt, Hagar, Kim, Kraft, Kroll, McCulloh, McKane, Meinzer, Morzillo, Murden, Newsome, Perakis, Phillips, Smith, Spies, Swanson, Taylor, Trappe, Vogeler, Woodruff, Zhao

Forest Ecosystems and Society

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.

FES 199. SPECIAL TOPICS. (1-16 Credits)

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).

Prerequisites: ST 201 with D- 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

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.

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.

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.

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.

Prerequisites: 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 HORT 350.

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.

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

FES 399. SPECIAL TOPICS. (0-16 Credits)

This course is repeatable for 16 credits.

FES 401. RESEARCH AND SCHOLARSHIP. (1-16 Credits)

This course is repeatable for 16 credits.

FES 403. THESIS. (1-16 Credits)

This course is repeatable for 16 credits.

FES 405. READING AND CONFERENCE. (1-16 Credits)

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.

Prerequisites: 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

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.

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

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.

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.

Prerequisites: 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 MCB 535, TOX 435/TOX 535, TOX 435H. (Bacc Core Course)

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

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.

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.

FES 445. ECOLOGICAL RESTORATION. (4 Credits)

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. Lec/lab/rec. CROSSLISTED as FW 445.

Equivalent to: FOR 445, FW 445

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. Lec/lab. CROSSLISTED as HORT 447.

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 FW 452.

Equivalent to: FW 452

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.

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 HORT 455.

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 NR 477. (Bacc Core Course)

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

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

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

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 MNR 500.

Equivalent to: MNR 500

FES 501. RESEARCH AND SCHOLARSHIP. (1-16 Credits)

This course is repeatable for 16 credits.

FES 503. THESIS. (1-16 Credits)

This course is repeatable for 999 credits.

FES 505. READING AND CONFERENCE. (1-16 Credits)

Some sections graded P/N.

This course is repeatable for 16 credits.

FES 506. PROJECTS. (1-16 Credits)

This course is repeatable for 16 credits.

FES 507. SEMINAR. (1-16 Credits)

Some sections graded A-F.

This course is repeatable for 16 credits.

FES 508. WORKSHOP. (1-16 Credits)

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.

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.

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.

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.

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: MNR 522

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.

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.

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

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.

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.

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 MCB 535, TOX 435/TOX 535, TOX 435H.

Equivalent to: MCB 535, TOX 535

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.

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.

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.

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.

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.

FES 545. ECOLOGICAL RESTORATION. (4 Credits)

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. CROSSLISTED as FW 545.

Equivalent to: FW 545

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. Lec/lab. CROSSLISTED as HORT 547.

Equivalent to: HORT 547

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.

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 FW 550.

Equivalent to: 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. Lec/lab. CROSSLISTED as FW 552.

Equivalent to: FW 552

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.

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 HORT 555.

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.

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.

FES 561. PHYSIOLOGY OF WOODY PLANTS. (3 Credits)

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

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.

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.

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.

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.

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.*

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.

FES 601. RESEARCH AND SCHOLARSHIP. (1-16 Credits)

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)

This course is repeatable for 16 credits.

FES 606. PROJECTS. (1-16 Credits)

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.

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.

FES 699. SELECTED TOPICS. (1-16 Credits)

This course is repeatable for 16 credits.

Master of Natural Resources

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.

Equivalent to: FES 500

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.

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

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.

MNR 550. CLIMATE CHANGE IMPACTS ON FOREST ECOSYSTEMS. (3 Credits)

Forest management responses to climate change will 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. This course will consider 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 will include statistically-based bioclimatic envelopes, and dynamic global vegetation models that treat ecosystem processes and changes in biome distribution.

MNR 560. MASTER'S CASE STUDY. (1-9 Credits)

Capstone project integrating course work, readings, and assignments to address complex natural resource problems of local or regional importance. Taught via Ecampus only. Graded P/N.

This course is repeatable for 9 credits.

Natural Resources

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.

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.

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.

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.

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

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. Lec/lab. (Bacc Core Course)

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

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.

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.

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.

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.

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. CROSMLISTED as FES 477/ FES 577. (Bacc Core Course)

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

Equivalent to: FES 477

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.

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 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.

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.

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.

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.

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.

SNR 530. ECOLOGICAL PRINCIPLES OF SUSTAINABLE NATURAL RESOURCES. (3 Credits)

Focus an 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.

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.

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.

SNR 533. ALTERNATIVE (NONTIMBER) FOREST PRODUCTS. (2 Credits)

Explores the economic, environmental, and sociocultural components of understanding and managing alternative forest products, also known as nontimber forest products (NTFPs), while considering other natural/social resources. Part of the 18-credit Sustainable Natural Resources (SNR) Graduate Certificate; also open to other graduate students.

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.

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.

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.

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 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.

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 TRAL 115/PAC 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.

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.

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

TRAL 172. ROCK SITE MANAGEMENT. (2 Credits)

Students will be introduced to a variety of basic skills, gear and systems that will allow them to safely manage and participate in a single pitch rock climbing environment. This class will present 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; and systems such as anchors, raises, lowers. CROSSLISTED as PAC 172.

Equivalent to: PAC 172

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.

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.

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.

TRAL 280. OUTDOOR LEADERSHIP FUNDAMENTALS. (5 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.

Prerequisites: PAC 110 with C or better and TRAL 115 [C] and TRAL 118 [C] and TRAL 215 [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 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.

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

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.

TRAL 353. NATURE, ECO, AND ADVENTURE TOURISM. (3 Credits)

Introduces students to natural resource-based tourism issues in both domestic and international contexts. Explores distinctions between nature, eco, and adventure tourism and other forms of tourism, positive and negative impacts, and contemporary issues such as accreditation/certification, and sustainable design.

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.

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.

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.

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

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.

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.

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.

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

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.

Prerequisites: PAC 110 with C- or better and PAC 111 [C-] and TRAL 215 [C-] and TRAL 280 [C-]

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.

TRAL 379. EXPEDITIONS II-LAND. (10 Credits)

Field-based course that develops the knowledge, skills, and dispositions needed to safely and effectively lead and participate in an extended land-based backcountry expedition of three weeks or longer. Includes a service component tied to a relevant local organization.

Prerequisites: (TRAL 277 with C- or better or TOL 377 with C- or better)

TRAL 380. EXPEDITIONS II-WATER. (3 Credits)

Field-based course that develops the knowledge, skills, and dispositions needed to safely and effectively lead and participate in an extended water-based backcountry expedition of one week or longer. Includes a service component tied to a relevant local organization.

Prerequisites: (TRAL 277 with C- or better or TOL 377 with C- or better)

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)

This course is repeatable for 16 credits.

TRAL 406. PROJECTS. (1-16 Credits)

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.

This course is repeatable for 16 credits.

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).

Prerequisites: (AEC 350 with D- or better or ECON 201 with D- or better or ECON 201H with D- or better) and (ST 202 [D-] or ST 202H [D-])

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.

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

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.

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

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).

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.

Prerequisites: TRAL 478 with C- or better or TOL 478 with C- or better

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.

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.

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

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

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.

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.

This course is repeatable for 16 credits.

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.