### FOREST RESOURCES (FOR)

#### FOR 102 Introduction to Forest Management
1 credit
Intro to forestry, current management issues, timber and non-timber resources, educational and professional opportunities. Includes regional field trips ranging in length from one afternoon to one weekend.

#### FOR 200 (s) Seminar
Credit arranged.

#### FOR 203 (s) Workshop
Credit arranged.

#### FOR 204 (s) Special Topics
Credit arranged.

#### FOR 210 Winter Harvesting
1 credit
This is an introduction to chainsaw safety and operation, precision timber falling, and winter harvesting methods taught as an intermediate-level forestry field practicum during the final week of winter break. All day classes take place on the University of Idaho Experimental Forest. Safety instruction covers methods taught in state and federal land agencies and other popular faller safety programs.

**Prereq:** Instructor Permission.

#### FOR 221 Principles of Ecology
3 credits
Cross-listed with REM 221 and WLF 220.
Principles of ecology and their relevance to management of natural resources. Major topics include plant and wildlife population, community, ecosystem, and landscape level processes and how these processes interact with the environment. Exploration of how ecosystems are affected by humans and global change. Introduction to the types of questions asked by ecologists, the principal concepts and theories that guide ecological inquiry, and the methods that are used to answer ecological questions. Both terrestrial and aquatic systems are considered.

**Prereq:** BIOL 102/BIOL 102L or BIOL 114 or BIOL 115 or PLSC 205; or Permission.

#### FOR 235 Society and Natural Resources
3 credits
*Gen Ed: Social Science*
Cross-listed with NRS 235.
An exploration of how people use, value, manage, impact, and are affected by natural resources; course emphasizes social and economic realities and political and legal processes in a context of current and historical natural resource issues. Two lectures and one 1-hr small discussion group meeting a week.

#### FOR 255 Nursery Irrigation and Fertilization
1 credit
An introduction to nursery irrigation and fertilization practices commonly found in forest tree seedling and native plant nurseries. This course aims to provide some of the important theory behind the practices used every day in successful crop production. The course will be taught by faculty and staff at the UI Pitkin Forest Nursery and managed as part of the annual Position Description process. The course is developed and is presently offered online.

#### FOR 274 Forest Measurement and Inventory
3 credits
Practical techniques for the design and execution of vegetation measurements for the inventory of forests, shrublands, and fire-fuels. Three one-hour lectures and one three-hour lab per week. (Fall only)

**Prereq:** MATH 143; or SAT math score of 610 or above, or ACT math score of 27 or above.

**Prereq or Coreq:** MATH 144.

#### FOR 275 Forestry Resource Sampling
2 credits
Principles and practice of natural resource inventory, forest sampling and data analysis techniques, LIDAR, forest growth, and quantitative decision support. Lab analysis examples and use of Excel and statistical packages are integrated into lectures.

**Coreq:** FOR 274 and STAT 251.

#### FOR 299 (s) Directed Study
Credit arranged.

#### FOR 310 Indigenous Culture and Ecology
3 credits, max 9
This course is designed to explore the challenge for Indigenous and mainstream science of balancing traditional and modern world cultures at odds with one another through an understanding of multiple ways of knowing with respect to natural resources and ecological understanding. The course covers a range of themes including decolonizing methodologies, Indigenous research methodologies, and Indigenous statistics. Case-studies, collaborations with local tribes, and field trips are used to explore course themes.

**Prereq:** REM 221/FOR 221/ WLF 220 and FOR 235/NRS 235.

#### FOR 320 Dendrology
4 credits
Phylogenetic approach to understanding the systematics, morphology, geography, and ecology of the major species of North American woody plants. Includes identification and classification of important tree species of North American and other important woody plants of the Pacific Northwest and northern Rocky Mountains. Three lectures and two 1.5-hour labs a week; two 1-day field trips.

**Prereq or Coreq:** BIOL 114 or PLSC 205.

#### FOR 324 Forest Regeneration
4 credits
Natural and artificial regeneration of forest ecosystems; reproduction methods; selection of seed source and stock type; nursery cultural practices; tree improvement; site preparation methods to establish regeneration. One lecture and one 2-hr lab a week. Two all day field trips. A semester-long project requires time spent weekly in a nursery to regularly monitor plant development under varied environmental conditions (approximately 45 hours over the 18-week spring semester in addition to lectures, labs and out-of-class studying). Cooperative: open to WSU degree-seeking students.

**Prereq:** FOR 274, SOIL 205 and SOIL 206

**Coreq:** FOR 330.
FOR 326 Fire Ecology and Management
3 credits
Credit may only be earned in FOR 326 or FOR 426, but not both. The study of wildfire as a biophysical and ecological process, including controls of wildfires, ecological effects of wildfires, fire history, and fire in the context of global environmental change. Current issues in fire management in the Western US and globally, including readings and discussions of recent scientific literature. One-day field trip with data collection and formal lab write up. (Fall only).
Prereq: FOR 221 or REM 221.

FOR 330 Forest Soil and Canopy Processes
4 credits
Above- and below-ground biophysical processes that determine how forest ecosystems function. Emphasis is on interactions affecting forest productivity including soil nutrient cycles, light energy, water and nutrient acquisition. Process modeling is used to illustrate effects of complex interactions on carbon budgets. Applications include effects of environmental stress and disturbance such as forest management, fire, pests and global climate change. Builds from general ecology (FOR 221/REM 221) by exploring processes controlling forest production, and establishes a foundation to address forest management questions in FOR 324 and FOR 424. Two lec and one 4-hr lab a week, including several field trips.
Prereq: SOIL 205; and MATH 143 or MATH 160; and PHYS 100/PHYS 100L or PHYS 111/PHYS 111L; and FOR 221 or REM 221.

FOR 375 Introduction to Spatial Analysis for Natural Resource Management
3 credits
Cross-listed with NRS 375. Methods and techniques for obtaining quantitative and qualitative geospatial information from aerial and satellite images, maps, and the Global Positioning System for input into geographic information systems. Analysis of geospatial data for mapping, monitoring and planning associated with all aspects of natural resource management. Two lec and one 2-hr lab a wk.
Prereq: College Algebra.

FOR 398 (s) Renewable Natural Resources Internship
Credit arranged
Supervised field experience with an appropriate public or private agency. Req'd for cooperative education students. Graded P/F.
Prereq: Permission of department.

FOR 400 (s) Seminar
Credit arranged.

FOR 403 (s) Workshop
Credit arranged.

FOR 404 (s) Special Topics
Credit arranged.

FOR 405 (s) Professional Development
Credit arranged
Professional education and enrichment of forestry personnel. Credit earned in this course will not be accepted toward graduate degree programs but may be used for undergraduate programs.
Prereq: permission.

FOR 424 Silviculture Principles and Practices
4 credits
Gen Ed: Senior Experience
Theory underlying silvicultural practices to control forest composition and growth, including forest stand dynamics, tree growth and quality, and growth-density relationships. Study of intermediate stand treatments and reproduction methods. Final project required involving field data collection and forest modeling to develop and mark silvicultural prescriptions. 3-hrs of lecture and 2-hrs of lab per week.
Prereq: Senior standing and FOR 274, FOR 320 or other plant identification course, FOR 330, or instructor permission.

FOR 426 Global Fire Ecology and Management
3 credits
Credit may only be earned in FOR 326 or FOR 426, but not both. This course is only available to distance education students. Integrated fire-related ecological effects of fire on vegetation, soils, and air quality; natural and changing role of fire in forests, woodlands, shrublands and rangelands; influence of global change including climate and invasive species; fire as a management tool; application to current issues. (Fall only)
Prereq: FOR 221 or REM 221; and Instructor Permission.

FOR 427 Prescribed Burning Lab
3 credits
Gen Ed: Senior Experience
Planning, conducting and evaluating prescribed burns designed to accomplish natural resource management objectives. Sampling, models and analysis used in writing required fire use plan. 5 days of field trips; some on Saturdays. (Fall only)
Prereq: REM 144, and Senior standing; and Permission
Prereq or Coreq: FOR 326.

FOR 429 Landscape Ecology
3 credits
Cross-listed with FOR 429
Ecological relationships and conservation issues for biotic communities across the landscape, including spatial and temporal dynamics and patterns, and importance of landscapes in maintenance of ecosystem diversity and function. One or more field trips; one 2-3 hour lab per week. Recommended Preparation: Familiarity with spreadsheet programs and problem solving using computers. (Spring only)
Prereq: FOR 221 or REM 221.

FOR 430 Forest Operations
3 credits
Overview of the primary equipment and harvesting systems used in modern forest operations, including field design, layout, and administration of timber sales, logging production and cost estimation, laws, and certification. A brief introduction to quantitative forest planning methods is also provided. There are 2-3 early morning trips and one Saturday field lab (Fall only)
Prereq: PHYS 100/PHYS 100L or PHYS 111/PHYS 111L
Prereq or Coreq: MATH 144.

FOR 431 Low Volume Forest Roads
2 credits
Design and field layout of access roads for forest management, through a combination of field labs and use of modern, GIS-based forest road engineering software. Field study includes design of at least one current industry or agency forest road design project. There are 2-3 early morning trips and one Saturday field lab. (Fall, Alt/yr)
Prereq or Coreq: MATH 144
Coreq: FOR 430 or Permission.
FOR 433 Fire and Fuel Modeling
2 credits
Learn to use and critically evaluate spatial fire behavior prediction systems, with attention to assumptions, uncertainty, sensitivity, and probability analysis. Topics include fuels classification systems, scale considerations, thematic mapping, and GIS overlay analysis, and how to access on-line geospatial data and decision-support tools. Read and discuss primarily literature on quantitative spatial analysis in fire science, engage in hands-on laboratory exercises, and prepare written reports comparing management alternatives with regards to fire behavior, fire effects, and ecological departure.  
Prereq: FOR 375, GEOG 385, or Permission  
Coreq: FOR 450 .

FOR 435 Remote Sensing of Fire
3 credits
Joint-listed with FOR 535  
The course describes the state of the art algorithms and methods used for mapping and characterizing fire from satellite observations. The course will link the physical aspects of fire on the ground with the quantities that can be observed from remote sensing, and present an overview of the different aspects of environmental fire monitoring. The course will be accompanied by weekly lab sessions focused on the processing of satellite data from sensors used operationally for fire monitoring. This course assumes that you are familiar with the fundamental concepts of mathematics and physics, understand basic remote sensing techniques, and can use maps and GIS data layers. For graduate credit, additional literature review and a class project including evaluation of new, advanced technologies is required. (Spring)  
Prereq: FOR 375 or Permission .

FOR 436 Cable Systems
2 credits
Overview of the major cable logging systems. Trigonometry and physical mechanics of cable systems, including analysis of forces, tensions, and payload capacity. Field layout and analysis of cable corridors using small yarders on the UI Experimental Forest using integrated field planning and GIS-based cable system design software. There are 2-3 early morning trips and one Saturday field lab. (Fall, Alt/yr)
Prereq or Coreq: MATH 144  
Coreq: FOR 430 or Permission .

FOR 444 Prescribed Fire For Ecologically-Based Management
2-3 credits
Learn about prescribed burning in support of ecologically-based management through reading, discussion and participating in hands-on service learning, planning, conducting and monitoring prescribed burns, reading and discussing local ecology and management, working collaboratively, and developing skills in fire management. Course requires travel as well as pre, during and post-travel writing, discussion and presentations.  
Prereq: REM 144 and Junior Standing; or Instructor Permission.

FOR 447 Woody Plant Physiology
3 credits
Joint-listed with FOR 547  
Examine woody plant interactions with their environment and tolerance or avoidance of stress. This course covers quantitative analysis of environmental biophysics, gas exchange, water relations and nutrition in woody plants. Students will also learn to use all of the major methods/equipment used in woody plant physiology research. Includes two weekly 1-hour lectures and one weekly 3-hour lab. Students registered for 500-level credit must complete a research project and presentation in addition to the requirements for the 400-level credit.

FOR 450 Fire Behavior
2 credits
Understand the physical and chemical processes controlling combustion and fire behavior. Gain in-depth knowledge of commonly-used, point-scale fire behavior models and tools, including key assumptions and limitations. Critically review and discuss scientific literature, current topics, and case studies. Lab sessions include designing and undertaking small-scale fire behavior experiments, developing simple quantitative models, and a field trip.  
Prereq: FOR 326, and PHYS 100/PHYS 100L or PHYS 111/PHYS 111L  
Coreq: FOR 433 .

FOR 451 Fuels Inventory and Management
2 credits
Tools, quantitative analysis, and approaches for inventory and management of fuels for wildland fires over large, diverse areas in forests, woodlands, shrubland, and grasslands. Critically review and synthesize relevant scientific literature.  
Prereq: FOR 375, REM 144 and FOR 274 or REM 411 .

FOR 454 Air Quality, Pollution, and Smoke
3 credits
Joint-listed with FOR 554  
Assessment of the controls and drivers of emission processes and impacts on air quality from fires, industry, and other natural sources. Overview of the combustion and emission process, how these emissions impact the 'quality of air', and what models exist to monitor the emission. Other topics to include: recent EPA and other guidelines for smoke management planning, attainment issues, atmospheric transport and deposition processes. Additional work required for graduate credit.

FOR 462 Watershed Science and Management
3 credits
Influence of land management practices on hydrologic processes, water quality, and riparian habitat w/emphasis on wildland watersheds. One day field trip.  
Prereq: MATH 143; and PHYS 100/PHYS 100L or PHYS 111/PHYS 111L, or high school equivalent.

FOR 468 Forest and Plant Pathology
2 credits
A survey of plant diseases. Emphasis on forest trees and other woody plants. Organisms that cause diseases. Strategies to minimize negative effects. Symbiotic roles of microbes in plants. Two hours of lecture, and two hours of lab per week, in addition to multiple field trips (as weather allows) to observe diseases and their effects. (Spring only)  
Prereq: FOR 320 and FOR 330 .

FOR 472 Remote Sensing of the Environment
3-4 credits
Cross-listed with NRS 472 and REM 472  
Current airborne and satellite systems, data acquisition on ground and from remote locations, instrumentation, imagery interpretation and digital analysis, applications for natural resource science and management. Two 75-minute lectures and one two-hour lab per week. Recommended Preparation: MATH 143. Cooperative: open to WSU degree-seeking students.
FOR 473 ECB Senior Presentation  
1 credit  
Gen Ed: Senior Experience  
Cross-listed with FISH 473, NRS 473, REM 473, RMAT 473, and WLF 473  
Reporting and presenting the senior project (thesis or internship); taken after or concurrently with FOR 485 or FOR 497. Serves as the senior capstone course for Ecology and Conservation Biology (ECB).  
Prereq: Instructor Permission.  

FOR 483 Senior Project Presentation  
1 credit  
Cross-listed with FISH 483, NRS 483, REM 483, and WLF 483  
Reporting and presenting the senior project (thesis or internship); taken after or concurrently with FOR 485 or FOR 497.  

FOR 484 Forest Policy and Administration  
2 credits  
Cross-listed with NRS 484  
Evaluation of land and forest problems and policies in the U.S.; analysis of current conditions and policies; historical development of governmental and private agencies concerned with the administration of forest conservation program. Recommended Preparation: FOR 235.  
Prereq: Junior standing.  

FOR 485 Ecology and Conservation Biology Senior Project  
1-3 credits, max 3  
Cross-listed with FISH 485, NRS 485, and WLF 485  
Scholarly work; learning objectives include development and formal proposal of a specific project and conducting the project or research with the guidance of a faculty mentor.  

FOR 490 The Resilient Landscape  
3 credits  
Gen Ed: Senior Experience  
Cross-listed with LARC 480.  
A capstone course addressing the concept of trade-offs in coupled social ecological technological systems, where landscapes and the communities they support are adaptive and evolving but the ideal is rarely attainable. This is a reading, critical thinking and discussion course with assessment based on class participation in a term project, problem solving, verbal and written communication, collegiality and collaboration (Spring only).  
Prereq: ENGL 102 and Junior standing.  

FOR 497 (s) Senior Thesis  
1-4 credits  
Independently plan and conduct a thesis project; write and defend the thesis under supervision of an advisor.  
Prereq: Senior standing and minimum 3.20 GPA or Permission.  

FOR 498 (s) Renewable Natural Resources Internship  
Credit arranged  
Supervised field experience with an appropriate public or private agency. Required for cooperative education students.  
Prereq: Permission of department.  

FOR 499 (s) Directed Study  
Credit arranged  
For the individual student; conferences, library, field, or lab work.  
Prereq: Senior standing, GPA 2.5, and Permission.  

FOR 500 Master's Research and Thesis  
Credit arranged.  

FOR 501 (s) Seminar  
Credit arranged  
Major philosophy, management, and research problems of wildlands; presentation of individual studies on assigned topics.  
Prereq: Permission.  

FOR 502 (s) Directed Study  
Credit arranged.  

FOR 503 (s) Workshop  
Credit arranged  
Selected topics in the conservation and management of natural resources.  
Prereq: Permission.  

FOR 504 (s) Special Topics  
Credit arranged.  

FOR 505 (s) Professional Development  
Credit arranged.  

FOR 515 Physical Hydrology  
3 credits  
A quantitative treatment of the physical processes that control water fluxes in the environment. Specific emphasis on evaporation, transpiration, snow processes and soil water flow. (Fall only, Alt/yr)  

FOR 516 Current Literature in the Hydrologic Effects of Forest Management  
1 credit  
Evaluation and discussion of how management activities affect hydrologic processes and flow regimes in forested watersheds. Seminar based on primary literature. May take only once. (Spring only, Alt/yr)  

FOR 522 Belowground Processes  
3 credits  
Belowground Processes considers current advancements in understanding of root growth and development, water and nutrient acquisition, rhizosphere functions, soil microbial community composition and functions, organic matter decomposition, and symbiotic associations between plants and microbes. Examples focus mainly on forest and wildland terrestrial ecosystems. Students learn various techniques for studying belowground processes and apply them in self-directed, hypothesis-driven projects. Offered every other year during fall semester.  
Prereq: Graduate standing or instructor permission.  

FOR 526 Fire Ecology  
3 credits  
Fire-related ecology of plant and animal species in wildlands; effects of fire occurrence and suppression on physical environment, landscapes, and processes in both natural and managed ecosystems. Two days of field trips. (Alt/yr)  
Prereq: general ecology course.  

FOR 529 Ecosystem Analysis and Modeling  
3 credits  
Terrestrial ecosystem processes, analysis, and modeling from the leaf to the landscape scale; techniques for measuring and modeling ecosystem attributes; integration with land management and climate change impacts. Field trip required. (Fall only)
FOR 531 Invasion Biology  
3 credits  
An introduction to the biology of invasive species, covering plants, animals, and microbial invaders. The course will review relevant readings from the primary literature, especially those dealing with the current state of our knowledge of invasives, their ecology, control, and implications for public policy. (Spring)  
Prereq: Basic introductory genetics class and ecology.

FOR 535 Remote Sensing of Fire  
3 credits  
Joint-listed with FOR 435  
The course describes the state of the art algorithms and methods used for mapping and characterizing fire from satellite observations. The course will link the physical aspects of fire on the ground with the quantities that can be observed from remote sensing, and present an overview of the different aspects of environmental fire monitoring. The course will be accompanied by weekly lab sessions focused on the processing of satellite data from sensors used operationally for fire monitoring. This course assumes that you are familiar with the fundamental concepts of mathematics and physics, understand basic remote sensing techniques, and can use maps and GIS data layers. For graduate credit, additional literature review and a class project including evaluation of new, advanced technologies is required. (Spring)  
Prereq: FOR 375 or Permission.

FOR 546 Science Synthesis and Communication  
3 credits  
This course is an online course only. Critically review science literature and write both brief and in-depth syntheses to address applied questions in science and management. Learn best practices for summarizing and communicating science effectively. Discuss challenges for application of science in management. Examples will focus on wildland fire science and management.

FOR 547 Woody Plant Physiology  
3 credits  
Joint-listed with FOR 447  
Examine woody plant interactions with their environment and tolerance or avoidance of stress. This course covers quantitative analysis of environmental biophysics, gas exchange, water relations and nutrition in woody plants. Students will also learn to use all of the major methods/equipment used in woody plant physiology research. Includes two weekly 1-hour lectures and one weekly 3-hour lab. Students registered for 500-level credit must complete a research project and presentation in addition to the requirements for the 400-level credit.

FOR 551 Current Literature in Forest Ecology/Tree Physiology  
1 credit, max arranged  
Review recent articles in Forest Ecology and Physiology journals. Students choose, critically review, and discuss the articles to develop critical-thinking skills and confidence in their knowledge of the literature. Graded P/F.

FOR 552 Current Literature in Environmental Remote Sensing  
1 credit, max arranged  
Cross-listed with NRS 552  
Review, present, and discuss recent articles related to remote sensing of the environment. Students choose, critically review, and discuss the articles to develop critical-thinking skills, remote sensing research strategies, and confidence in their knowledge of the literature. Graded P/F.

FOR 554 Air Quality, Pollution, and Smoke  
3 credits  
Joint-listed with FOR 454  
Assessment of the controls and drivers of emission processes and impacts on air quality from fires, industry, and other natural sources. Overview of the combustion and emission processes, how these emissions impact the ‘quality of air’, and what models exist to monitor the emission. Other topics to include: recent EPA and other guidelines for smoke management planning, attainment issues, atmospheric transport and deposition processes. Additional work required for graduate credit.

FOR 555 Current Topics: Regeneration/Restoration  
1 credit, max arranged  
Review recent articles pertaining to natural and artificial regeneration of native plants, including nursery production, restoration practices, and post-disturbance treatments. Students choose, critically review, and discuss the articles to develop critical-thinking skills and confidence in their knowledge of the literature. Graded P/F. Recommended Preparation: FOR 324, FOR 424, and FOR 551.

FOR 557 Advanced Fire Behavior  
3 credits  
Credit may be earned in only one of the following: FOR 450 or FOR 557. This course is an online course only. Understand the processes that control fire behavior in forest and rangelands, including combustion, emissions and heat release, and related fire effects. Use theory and advanced knowledge with scientific literature and case studies to critically assess the assumptions and limitations of limitations of surface and crown fire models, including the varying influences of fuels, terrain, and environmental conditions.

FOR 584 Natural Resource Policy Development  
3 credits  
This course is an online course only. The development of natural resource policy with emphasis on the policy process at the federal level in the U.S.; the role of and interrelationships between staff, committees, agencies and elected officials; the relationship of science and scientists with policy and politicians in the development of natural resource policy, including preparation of testimony related to natural resource science and policy issues; implementation of policy within the natural resource agencies and judicial interpretation of major natural resource policies in the U.S. Recommended Preparation: An upper-division course in natural resource and/or environmental policy (Spring only).

FOR 587 Wildland Fire Policy  
2 credits  
This course is an online course only. Relationships between fire science and management and the federal laws and regulations that affect fire management in wildland ecosystems; the politics of wildland fire; and the effects of wildland fire on wildland-urban interface (WUI) communities. Recommended preparation is an upper division course in natural resource, environmental policy, or FOR 584. (Fall only)

FOR 597 (s) Practicum  
Credit arranged.

FOR 598 (s) Internship  
Credit arranged.

FOR 599 (s) Research  
Credit arranged  
Research not directly related to a thesis or dissertation.  
Prereq: Permission.
FOR 600 Doctoral Research and Dissertation
Credit arranged
Prereq: admission to the doctoral program in "natural resources" and Permission of department.

FOR 601 (s) Seminar
Credit arranged.