FOREST RESOURCES (FOR)

FOR 102 Introduction to Forest Management (2 credits)
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. Cooperative: open to WSU degree-seeking students.

FOR 103 Introduction to Computer Applications in Natural Resources (1 credit)
Introduction to basic software programs used in natural resources, including Microsoft Office. Typically Offered: Fall.

FOR 111 Saws and Pumps (1 credit)
Basic operation of chainsaws for use on the fireline and wildland fire pumps. Typically Offered: Summer/Spring.

FOR 145 Career in Fire and Fuels (2 credits)
Introduction to the spectrum of career paths related to fire and fuels. Students will meet professionals from a variety of agencies and levels. Students will work through the application process for selected agencies and may be able to secure meaningful summer work. Typically Offered: Fall.

FOR 152 Careers in Forest Nursery Management and Technology (1 credit)
Students are introduced to a variety of careers in the forest nursery industry through class presentations and guest speakers. Typically Offered: Fall.

FOR 153 Forest Nurseries Tour (1 credit)
May involve field trips. Typically Offered: Fall.

FOR 200 (s) Seminar (1-16 credits)
Credit arranged

FOR 201 Industrial Forest Management and Sawmill Tour (2 credits)
Field tour-based course examining the logging and forest products industries. Course will expose students to timber harvesting and forest product manufacturing processes and careers throughout the Inland Northwest. Introductory scaling, defecting, and merchandizing for harvested timber will also be covered through lecture and field exercises. Typically Offered: Fall.

FOR 202 Leadership and Decision-Making in Fire Management (3 credits)
Survey of contemporary issues related to wildland fire, and the development of skills in conflict resolution, collaborative problem solving, and decision making to help adapt to new situations and incorporating new people and information in the natural resource management process. Typically Offered: Spring.

FOR 203 (s) Workshop (1-16 credits)
Credit arranged

FOR 204 (s) Special Topics (1-16 credits)
Credit arranged

FOR 207 Properties of Artificial Growth Media (1 credit)
Recommended preparation: SOIL 205 The Soil Ecosystem. Typically Offered: Spring.

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.
Prereqs: Instructor Permission

FOR 211 Logging Safety and Emergency Preparedness (2 credits)
Logging safety and emergency preparedness is an integral component of all forest operations due to the inherent risk associated with the logging, trucking, and forest products industries. Course examines the human and environmental components of risk management, worker safety and emergency response, including personal wellness, safety considerations for mechanized logging operations, natural hazard recognition and mitigation, and workplace communications. Industry specific first-aid and CPR training will also be covered. Typically Offered: Fall.

FOR 213 Vegetation Management (3 credits)
Introduction of the various methods for managing vegetation including prescribed fire, wildfire, thinning, mastication, and herbicide. Use case studies to understand when and how to apply these treatments and how these treatments have influenced fire behavior. Typically Offered: Summer/Spring.
Prereqs: REM 210

FOR 220 Forest Biology & Dendrology (3 credits)
Includes identification and classification of important tree species of North American and other important woody plants of the Pacific Northwest and northern Rocky Mountains. Recommended preparation BIOL 114. Typically Offered: Fall.

FOR 221 Principles of Ecology (3 credits)
Cross-listed with 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.
Prereqs: BIOL 102/BIOL 102L or BIOL 114 or BIOL 115 or PLSC 205; or Permission

FOR 226 Wildland-Urban Interface Assessment and Communication (3 credits)
Introduction to the management challenges and strategies in the wildland-urban interface. Includes communication with the public. Typically Offered: Fall.

FOR 230 Forest Operations (3 credits)
Joint-listed: FOR 430. 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). Requires additional project for upper-division credit. Typically Offered: Fall/Spring. Cooperative: open to WSU degree-seeking students.
Prereqs: FOR 102, PHYS 100/PHYS 100L or PHYS 111/PHYS 111L
Prereqs or Coreqs: MATH 144
FOR 231 Low Volume Forest Roads (2 credits)
Joint-listed with: FOR 431
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. Requires additional project for upper-division credit. Typically Offered: Fall (Odd Years).
Coreqs: FOR 230 or Permission
Prereqs or Coreqs: MATH 144

FOR 235 Society and Natural Resources (3 credits)
General Education: 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 per week.

FOR 236 Cable Systems (2 credits)
Joint-listed: FOR 436. 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. Requires additional project for upper-division credit. Typically Offered: Fall (Even Years).
Coreqs: FOR 230 or Permission
Prereqs or Coreqs: MATH 144

FOR 251 Nursery Insects and Disease (2 credits)
Typically Offered: Fall.

FOR 253 Introduction to Fuels Inventory and Sampling (2 credits)
Sampling design and protocols used to measure and report fuel loading, fire behavior fuel model, fuel moisture, and species diversity. Typically Offered: Fall.

FOR 254 Fire Environment (3 credits)
Intermediate fire behavior, fire weather, fire management, and ecology including monitoring of the fire environment. Typically Offered: Spring.
Prereqs or Coreqs: REM 210

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 256 Science Synthesis in Fire Ecology and Management (1 credit)
Synthesis of the current scientific and professional publications related to fuels and fire management. Typically Offered: Fall.

FOR 257 Sustainable Nursery Design and Management (3 credits)
Typically Offered: Spring.

FOR 261 Fire Technology (3 credits)
Applied techniques for using technology to map and model fire. Modeling using programs such as BehavePlus, FireFamilyPlus, and IFTDSS. Mapping using ArcGIS, Avenza, and Lidar with an optional unit on UAS. Typically Offered: Spring.
Prereqs or Coreqs: REM 210

FOR 272 Forest Surveying and Mapping (3 credits)
Methods and techniques for surveying, mapping, and navigation in forested environments using traditional tools and advanced technologies, including field surveying, orienteering, industry relevant GIS resources, and real-time mobile mapping processes and technologies. Typically Offered: Spring.

FOR 274 Forest Measurement and Inventory (3 credits)
Practical techniques for the design and execution of vegetation measurements for the inventory of forests, understory, and fire-fuels. Course offered in fall and summer. Summer offering is an intensive three-week course held at the University of Idaho McCall Field Campus in McCall, Idaho. Field trips occur frequently to provide hands-on training in forest measurement techniques. (Fall, Summer only).
Prereqs or Coreqs: MATH 143 and MATH 144; or SAT math score of 610 or above, or ACT math score of 27 or above

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. Field trips required.
Coreqs: FOR 274 and STAT 251

FOR 284 Fire Policy and Administration (3 credits)
Synthesis of historic and current fire policy and how it is implemented across agencies. Typically Offered: Fall.

FOR 290 Medical Response and Stress Management in Natural Resources (3 credits)
Emergency medical response in remote areas including patient care and extrication. Stress management from traumatic incidents and long-term exposure. Typically Offered: Spring.

FOR 293 Business of Forestry (2 credits)
Joint-listed with: FOR 493
Technical assessment of forestry from a business perspective at the stand and landscape levels, including an examination of factors that affect public and private landowner decision making regarding management of timberland. Course integrates concepts from silviculture, forest management, and natural resource policy into decision making framework. Requires additional project for upper division credit.

FOR 296 Forest Harvesting Practicum (3 credits)
Field-based practicum focused on the planning, implementation, and assessment of manual and mechanized forest operations. Operational considerations for meeting silvicultural prescriptions and maintaining sustainable forest practices will be examined. This course also offers an introduction to the operation and servicing of modern mechanized logging equipment. Classes and field exercises will occur primarily on the University of Idaho Experimental Forest. Typically Offered: Spring.
Prereqs: FOR 211.

FOR 298 Forest Technology Internship (1 credit)
Graded Pass/Fail. Typically Offered: Summer.

FOR 299 (s) Directed Study (1-16 credits)
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.
Prereqs: REM 221/FOR 221 / WLF 220 and FOR 235/NRS 235

FOR 321 Cultural Use of Fire (3 credits)
Survey of historic and current use of fire as a cultural resource in Native American Tribes of the United States. Typically Offered: Fall.

FOR 323 Communication and Facilitative Instruction in Fire Management (2 credits)
Best practices for communication and instruction inside and outside of agencies. Typically Offered: Fall.

FOR 324 Forest Regeneration (3 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 per 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.
Coreqs: FOR 274

FOR 326 Fire Ecology (3 credits)
The global 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. Evolutionary plant adaptations to fire and mechanistic impacts of fire on organisms. Current issues in fire science in the Western US and globally, including readings and discussions of recent scientific literature.
Prereqs: FOR 221 or WLF 220

FOR 330 Terrestrial Ecosystem Ecology (4 credits)
Ecosystem ecology integrates the interactions between organisms and their environment as a complex system, quantifying the biological and physical factors controlling ecosystem processes. Emphasis is on terrestrial ecosystems, particularly carbon, water, and nutrient cycling. Process-based modeling is used to illustrate effects of complex interactions on carbon budgets. Applications include effects of disturbance (fire, pests, climate change, and land management) on ecosystem productivity, biodiversity, and resilience. Two lectures and one lab per week, including field trips.
Prereqs: MATH 143 or MATH 160; PHYS 111 and PHYS 111L; and FOR 221 or WLF 220 or BIOL 213 or PLSC 102

FOR 375 Fundamentals of Geomatics (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 lectures and one 2-hour lab per week. Typically Offered: Fall, Spring.
Prereqs: College Algebra.

FOR 398 (s) Renewable Natural Resources Internship (1-16 credits)
Credit arranged. Supervised field experience with an appropriate public or private agency. Required for cooperative education students. Graded P/F.
Prereqs: Permission of department

FOR 400 (s) Seminar (1-16 credits)
Credit arranged

FOR 403 (s) Workshop (1-16 credits)
Credit arranged

FOR 404 (s) Special Topics (1-16 credits)
Credit arranged

FOR 405 (s) Professional Development (1-16 credits)
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.
Prereqs: permission

FOR 410 Fire Effects and Management (3 credits)
Understanding fire effects is a very important part of fire management. This course will discuss the direct and indirect effects of fire on humans, soils, water, plants, and animals. In addition to learning the concepts surrounding fire effects, students will complete a literature review on an area of interest and will experience fire effects firsthand in the field. Recommended preparation – FOR 221 or WLF 220.

FOR 424 Silviculture Principles and Practices (4 credits)
General Education: 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 hours of lecture and 2 hours of lab per week.
Prereqs: Senior standing and FOR 274, FOR 220 or other plant identification course, FOR 324, FOR 330, or Instructor Permission

FOR 427 Prescribed Burning Lab (3 credits)
General Education: 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).
Prereqs: REM 144 and Senior standing; and Permission
Prereqs or Coreqs: FOR 326

FOR 430 Forest Operations (3 credits)
Joint-listed: FOR 230. 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). Requires additional project for upper-division credit. Typically Offered: Fall/Spring. Cooperative: open to WSU degree-seeking students.
Prereqs: FOR 102, PHYS 100/PHYS 100L or PHYS 111/PHYS 111L
Prereqs or Coreqs: MATH 144
FOR 431 Low Volume Forest Roads (2 credits)
Joint-listed with: FOR 231
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. Requires additional project for upper-division credit. Typically Offered: Fall (Odd Years).
Coreqs: FOR 430 or Permission
Prereqs or Coreqs: MATH 144

FOR 433 Fire and Fuel Modeling (2 credits)
Learn to operate and evaluate contemporary spatial and non-spatial fire and fuel modeling systems and tools (e.g., FireFamilyPlus, Fire Behavior Fuel Models, BehavePlus, LANDFIRE, FlamMap, and IFTDSS). Perform a landscape-scale fire and fuels assessment for an area of your choice and evaluate the modeling results for management applications on fuel treatment effectiveness or potential fire behavior impacts.
Prereqs: FOR 375, GEOG 385, or Permission

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).
Prereqs: FOR 375 or Permission

FOR 436 Cable Systems (2 credits)
Joint-listed: FOR 236. 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. Requires additional project for upper-division credit. Typically Offered: Fall (Even Years).
Coreqs: FOR 430 or Permission
Prereqs or Coreqs: MATH 144

FOR 443 Forest Production Ecology (3 credits)
Joint-listed with FOR 543
Considers how plant production, carbon and energy accumulation are influenced by availability of light, water and nutrient resources. Includes study of use efficiency, allocation, and turnover of captured resources at organ, tree and stand level that are applicable to increased management intensity. Examples emphasize forests but include other wildland and agricultural ecosystems. Stand-level process models are used to synthesize understanding of environmental and management factors controlling forest production. Two 1-hour lectures and one 3-hour lab per week. Requires additional research project and presentation for graduate credit.
Prereqs: FOR 221; SOIL 205, SOIL 206

FOR 443L Forest Production Ecology Lab (1 credit)
Joint listed with FOR 543L. Practical lab activities associated with forest production ecology and companion laboratory with FOR 443. One 3-hour lab per week. Requires additional effort for graduate credit. Typically Offered: Fall. Prereqs or Coreqs: FOR 443.

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.
Prereqs: 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 448 Plant Population Ecology (4 credits)
Ecological aspects of plant form and reproduction; demography and population modeling; species interactions, including competition, mutualism, and herbivory. Typically Offered: Fall. Prereqs: FOR 221 or WLF 220.

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.
Prereqs: FOR 326; and PHYS 100/PHYS 100L or PHYS 111/PHYS 111L

FOR 451 Fuels Inventory and Management (3 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.
Prereqs: 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 with emphasis on wildland watersheds. One day field trip.
**Prereqs:** 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).
**Prereqs:** FOR 220 and FOR 330

FOR 472 Remote Sensing of the Environment (4 credits)
Cross-listed with NRS 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. Typically Offered: Fall. Cooperative: open to WSU degree-seeking students.

FOR 473 ECB Senior Presentation (1 credit)
General Education: Senior Experience
Cross-listed with FISH 473, FSP 473, NRS 473, REM 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).
**Prereqs:** Instructor Permission

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.
**Prereqs:** Junior standing

FOR 490 The Resilient Landscape (3 credits)
General Education: 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).
**Prereqs:** ENGL 102 and Junior standing

FOR 493 Business of Forestry (2 credits)
Joint-listed with : FOR 293
Technical assessment of forestry from a business perspective at the stand and landscape levels, including an understanding of factors that affect public and private landowner decision making regarding management of timberland. Course integrates concepts from silviculture, forest management, and natural resource policy into decision making framework. Requires additional project for upper division credit.
**Prereqs:** Junior or Senior standing

FOR 497 (s) Senior Thesis (1-4 credits, max 4)
Independently plan and conduct a thesis project; write and defend the thesis under supervision of an advisor. 20 GPA or Permission
**Prereqs:** Senior standing and minimum 3

FOR 498 (s) Renewable Natural Resources Internship (1-16 credits)
Credit arranged. Supervised field experience with an appropriate public or private agency. Required for cooperative education students.
**Prereqs:** Permission of department

FOR 499 (s) Directed Study (1-16 credits)
Credit arranged. For the individual student; conferences, library, field, or lab work.
**Prereqs:** Senior standing, GPA

FOR 500 Master's Research and Thesis (1-16 credits)
Credit arranged

FOR 501 (s) Seminar (1-16 credits)
Credit arranged. Major philosophy, management, and research problems of wildlands; presentation of individual studies on assigned topics.
**Prereqs:** Permission

FOR 502 (s) Directed Study (1-16 credits)
Credit arranged

FOR 503 (s) Workshop (1-16 credits)
Credit arranged. Selected topics in the conservation and management of natural resources.
**Prereqs:** Permission

FOR 504 (s) Special Topics (1-16 credits)
Credit arranged

FOR 505 (s) Professional Development (1-16 credits)
Credit arranged

FOR 514 Forest Biometrics (3 credits)
This course provides a broad overview of forest biometrics, including forestry-specific sampling approaches, development of allometric relations, and use of remote sensing datasets.
**Prereqs:** STAT 431 or equivalent

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, alt/years)

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, alt/years)

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.
**Prereqs:** 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/years).
**Prereqs:** general ecology course
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. Credit may be earned in only one of the following: FOR 450 or FOR 557. Prereqs: FOR 375 or Permission

FOR 543 Forest Production Ecology (3 credits)
Joint-listed with FOR 443
Considers how plant production, carbon and energy accumulation are influenced by availability of light, water and nutrient resources. Includes study of use efficiency, allocation, and turnover of captured resources at organ, tree and stand level that are applicable to increased management intensity. Examples emphasize forests but include other wildland and agricultural ecosystems. Stand-level process models are used to synthesize understanding of environmental and management factors controlling forest production. Two 1-hour lectures and one 3-hour lab per week. Requires additional research project and presentation for graduate credit. Prereqs: FOR 221 or REM 221; SOIL 205, SOIL 206

FOR 543L Forest Production Ecology Lab (1 credit)
Joint listed with FOR 443L. Practical lab activities associated with forest production ecology and companion laboratory with FOR 443. One 3-hour lab per week. Requires additional effort for graduate credit. Typically Offered: Fall. Prereqs or Coreqs: FOR 443.

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. Prereqs: FOR 447

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)
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 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 industries, urban and forest ecosystems. Overview of the combustion and emission process, how these emissions impact the 'quality of air', and what models exist to monitor the emissions. 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 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 (1-16 credits)
Credit arranged

FOR 598 (s) Internship (1-16 credits)
Credit arranged

FOR 599 (s) Non-thesis Master's Research (1-16 credits)
Credit arranged. Research not directly related to a thesis or dissertation. Prereqs: Permission

FOR 600 Doctoral Research and Dissertation (1-45 credits)
Credit arranged. Prereqs: admission to the doctoral program in Natural Resources and Department Permission

FOR 601 (s) Seminar (1-16 credits)
Credit arranged

FOR 698 Internship (1-16 credits)