DEPARTMENT OF FOREST, RANGELAND, AND FIRE SCIENCES

The Department of Forest, Rangeland, and Fire Sciences (FRFS, www.uidaho.edu/frfs) offers four undergraduate degrees: Bachelor of Science in Forest Resources; Bachelor of Science in Fire Ecology and Management; Bachelor of Science in Rangeland Ecology and Management; and Bachelor of Science in Renewable Materials. While graduate degrees are administered through the College of Natural Resources, students can select a specialization within FRFS that would lead to either a Master of Science in Natural Resources (thesis and non-thesis options); or a Doctor of Philosophy in Natural Resources (see Forest, Rangeland, and Fire Sciences Graduate Degree Programs for more information). Students seeking an advanced degree of the professional nature should explore the Master of Natural Resources program, for which faculty in FRFS serve as mentors.

Undergraduate and graduate students in the Department of Forest, Rangeland, and Fire Sciences are provided with an opportunity to learn from globally-recognized faculty. Using a mix of teaching methods, students are exposed to both the scientific background and hands-on practice needed to become leaders in their chosen field. Extensive opportunities exist for students to develop as practitioners and scientists through partnership with our Experimental Forest, Pitkin Forest Nursery, numerous laboratories (Fire, Forest Operations, Paleoecology, Rangeland Ecology, Renewable Materials, Seedling Quality) and regional cooperative units.

Department faculty and administration strive to provide graduates with diverse opportunities for personal growth while maintaining curricula that ensure competency upon entering the workforce or continuing into advanced study. Students are provided with courses that expand critical thinking skills and understanding of concepts rather than rote learning of facts and principles. Class sizes are manager to appropriate student to faculty ratios for the subject matter to be taught effectively. Courses emphasize the dynamic nature of forest, rangeland, and fire sciences and technologies by teaching new concepts and methods and incorporating new knowledge as it emerges. Field and lab-based study is also an integral part of all curricula. The faculty and staff of the college encourage and assist students in finding seasonal professional employment and opportunities for involvement in student clubs and professional organizations. Faculty members seek to provide research opportunities for students that advance science in the broad fields of study in which they have expertise.

Bachelor of Science in Forestry

The B.S. Forestry curriculum provides students with an interdisciplinary education founded on the principles of science-based stewardship. Students are given an opportunity to strengthen their understanding of ecology, forest ecosystem processes, social sciences, remote sensing and geographic information systems, silviculture, pest management, forest operations, and other specialties by selective use of elective credits. Graduates with a professional forestry degree are employed by a wide range of federal and state forestry and natural resource agencies; private forestland companies, such as Potlatch, Forest Capital, Weyerhaeuser; consulting companies that work with private non-industrial forest landowners and others that do environmental assessments and monitoring of forest lands; and non-governmental agencies that manage and/or are interested in forest ecosystem land management.

Specific learning outcomes associated with the B.S. Forestry include developing the ability to:

- Communicate effectively by listening actively, formulating, articulating, and explaining ideas clearly using oral and written techniques
- Demonstrate critical thinking and problem-solving skills
- Demonstrate skills in working with teams of people, including effective leadership of groups working toward a common goal
- Develop and apply scientific knowledge (i.e. ecological, social, and economic) to evaluate and justify forest management decisions
- Access, evaluate and appropriately use scientific literature, technologies, and expert advice when considering critical resource issues and management alternatives

We provide a range of educational opportunities for wildland fire managers and others interested in a career in wildland fire research with a focus on solving real world problems through an interdisciplinary approach that focuses on educating current and future fire professional leaders. The BS in Fire Ecology and Management has recently been recognized by the national Association for Fire Ecology as a leading program in the US.

A fire ecology and management academic minor, and academic certificates in fire ecology, management, and technology are also available.

Bachelor of Science in Fire Ecology and Management

The College of Natural Resources has provided over 35 years of leadership in fire education. We offer more courses focused on fire than any other natural resources school in the country. Our courses and degree programs are developed to help students understand fundamental concepts, the science behind issues, and the skills to become leaders in fire and natural resource management. Our fire research program attracts top graduate students and collaborates both with the leading fire scientists and innovative effective fire managers. Our research and outreach efforts provide useful, timely and sound science to address fire ecology and management issues across the state, region and nation.

We provide a range of educational opportunities for wildland fire managers and others interested in a career in wildland fire research with a focus on solving real world problems through an interdisciplinary approach that focuses on educating current and future fire professional leaders. The BS in Fire Ecology and Management has recently been recognized by the national Association for Fire Ecology as a leading program in the US.

A fire ecology and management academic minor, and academic certificates in fire ecology, management, and technology are also available.
Bachelor of Science in Rangeland Conservation

The term RANGELAND was invented in the United States to describe the extensive, unforested lands dominating the western half of the continent. Rangelands around the world are known by many names including prairie, plains, grassland, shrubland, savanna, steppe, desert, semi-desert, sward, tundra, and alpine. These lands form about half of the earth’s land surface. Idaho is 48% rangeland. Limited precipitation, generally sparse vegetation, sharp climatic extremes, highly variable soils, frequent salinity, and diverse topography characterize the kind of land called RANGELAND. Rangelands produce a wide variety of goods and services desired by society, including livestock forage, wildlife habitat, water, mineral resources, wood products, wild-land recreation, open space, and natural beauty. The geographic extent and many important resources of rangelands make their proper use and management vitally important to people everywhere.

Rangeland managers enjoy careers with a variety of private organizations and government agencies. State and federal land management agencies, such as the US Forest Service, Bureau of Land Management, and State Department of Lands, hire rangeland professionals to oversee the management of public rangelands. Wildlife management agencies also hire range managers to maintain and improve wildlife habitat. Private land owners employ range consultants and managers to oversee livestock operations, enhance hunting programs, maintain forage resources and control weeds. Biological assessment companies require the careful measurement and assessment of vegetation resources; therefore they often hire rangeland professionals. A growing number of rangeland professionals work as natural resource facilitators to bring rangeland stakeholders together to craft plans for environmental stewardship. Internships are also available. Over 85% of the graduates of the B.S. Rangeland Conservation program at the University of Idaho in the last 10 years have secured careers in natural resource management or advanced to graduate school.

Bachelor of Science in Renewable Materials

Renewable materials are those that can be replaced by biological means, such as sustainably-managed forests or residues from agricultural food crops, and offer environmental benefits as well as useful products for society. Renewable and biodegradable materials typically consume less energy in their preparation, and can be reused, recycled or composted at the end of their useful life. Wood is a primary renewable, recyclable and biodegradable material in the U.S. and the world and is used to produce over 5,000 different products for shelter, packaging, and chemicals. Renewable, bio-based energy sources reduce greenhouse gas emissions and contribute to energy self-reliance.

The B.S. Renewable Materials curriculum prepares students for a wide range of careers in the manufacture, marketing, and utilization of sustainable, renewable materials. Interdisciplinary coursework and project-based learning opportunities lead to a choice of several career tracks including procurement of timber and other renewable materials; production management, marketing and distribution of bio-based products; green building materials selection, construction and design; and bio-based energy production systems. This degree program is accredited by the Society of Wood Science and Technology. The undergraduate curriculum is structured, but still allows students to follow specific interests through course selection from restricted and unrestricted electives in the areas of architecture, business, entrepreneurship, forest operations, and agriculture.

Fire Ecology, Management and Technology Academic Certificate

This 15-credit certificate program is designed for traditional and non-traditional students who would like to receive more depth in the concepts, science and tools currently used in fire ecology and management, or for those seeking educational requirements required for federal employment. After completing this certificate program students will be able to apply sound science to solving complex issues facing fire management. Many of our students combine this certificate with other degrees.

Students who wish to complete the certificate program may register for courses online. We strongly recommend that you contact us at fire@uidaho.edu to talk to an advisor who will help you develop an individualized program of study to help meet your educational needs. Note that there is an additional fee for all online courses and for some campus-based courses and that there is no additional fee for part-time non-resident students who are taking online courses.

University of Idaho Academic Certificate Requirements: Course work must not be more than five years old unless it is being used in conjunction with the completion of a graduate degree; Up to six of the required credits may consist of course work completed at another regionally accredited institution. For more information please contact us or visit the following website: www.uidaho.edu/cnr/frfs.

Graduate Programs

Graduate programs are offered in many specialization areas across five general topic areas in which FRFS faculty are conducting research:

1. Ecology and Biogeosciences of Forest and Rangeland Ecosystems: ecosystem processes/modeling, biometrics, biogeochemistry, hydrology and ecohydrology, remote sensing and geospatial ecology, landscape ecology, community ecology, population ecology, ecosystem ecology, disturbance ecology, paleoecology, restoration ecology, ecophysiology, global environmental change, conservation biology/genetics, and molecular plant systematic;
2. Forest Sciences and Management: forest mensuration, forest regeneration, forest ecosystem management, tree physiology, forest pathology, forest policy, forest operations, silviculture, forest ecology, and forest genetics;
3. Renewable Materials: procurement of timber and other renewable materials; production management, marketing and distribution of bio-based products; green building materials selection, construction and design; and bio-based energy production systems;
4. Fire Sciences and Management: fire effects and recovery, fire behavior, fuels management, biophysical controls of fire and fire regimes, air quality and smoke management, fire history, and fire ecology; and
5. Rangeland Sciences and Management: grazing behavior and management, invasive plant management, livestock-wildlife relations, rangeland and habitat management, rangeland riparian management, and rangeland ecology.
Admission to the graduate program is based on: evidence of ability to complete graduate-level work as discerned from undergraduate transcripts, the applicant’s statement of career objectives, and letters of recommendation; the compatibility of the student’s educational and career objectives with faculty expertise and departmental objectives; and availability of graduate faculty to act as major advisor for an applicant. The GRE is required. An undergraduate degree related to our programs is also recommended but an applicant may be accepted with the understanding that certain course deficiencies may be required by the student’s advisory committee.

Students can transfer up to 12 approved credits taken as a non-degree seeking student into a MS or PhD program in the College of Natural Resources with permission of the departmental graduate committee. Students who are considering transferring non-degree credits into a CNR graduate program should request early advising from the appropriate department.

Further information can be obtained from the department head (208-885-7952).

Randall H. Brooks, Interim Department Head (204 CNR Bldg. 83844-1133; phone 208-885-7952; frfs@uidaho.edu).

ABATZOGLOU, Crystal K; 2010; Associate Professor in Forest, Rangeland and Fire Sciences; Affiliate Faculty in Geography; Ph.D.; Ph.D.; 2010; Clark University.

APOSTOL, Kent G; 2011; Adjunct Professor of Forest, Rangeland, and Fire Sciences; Ph.D.; 1993; University of Alberta.

*COLEMAN, Mark; 2008; Professor of Forest, Rangeland and Fire Science; Director of the Intermountain Forest Tree Nutrition Cooperative; Ph.D.; 1988; University of Washington.

*DAVIS, Anthony S; 2007; Adjunct Faculty in Forest, Rangeland and Fire Sciences; Ph.D.; 2006; Purdue University.

*EITEL, Jan U; 2012; Research Assistant Professor of Forest, Rangeland, and Fire Sciences; Affiliate Faculty of Curriculum and Instruction; Ph.D.; 2008; University of Idaho.

ELLIOt, William J; 2014; Adjunct Faculty of Forest, Rangeland, and Fire Sciences; Adjunct Faculty in Biological Engineering; Ph.D.; 1988; Iowa State University.

ENGLUND, Karl; 2015; Adjunct Faculty of Forest, Rangeland, and Fire Sciences; Ph.D.; 2001; Washington State University.

FLINT, Stephan D; 2009; Adjunct Instructor of Forest, Rangeland, and Fire Sciences; M.S.; Utah State University; 1977.

GARRITY, Steven R; 2014; Adjunct Faculty of Forest, Rangeland, and Fire Sciences; Ph.D.; 2010; University of Idaho.

*GESSLER, Paul E; 1997; Professor of Forest, Rangeland, and Fire Sciences; Affiliate Associate Professor of Environmental Science; Ph.D.; 1996; Australian National University.

*GORMAN, Thomas M; 1987; Professor of Forest Products; Affiliate Professor of Architecture and Civil Engineering; Associate Dean of Outreach, College of Natural Resources; Ph.D.; 1987; SUNY at Syracuse.

HANN, Wendel J; 1988; Adjunct Associate Professor of Forest, Rangeland, and Fire Sciences; Ph.D.; 1982; University of Idaho.

HEWARD, Heather L; 2015; Senior Instructor in Forest, Rangeland and Fire Sciences; M.S.; University of Idaho.

Hudak, Andrew; 2018; Adjunct Professor of Forest, Rangeland and Fire Sciences; Ph.D.; 2001; University of Idaho.

*HUDIBURG, Tara W; 2014; Assistant Professor of Forest, Rangeland, and Fire Sciences; Ph.D.; 2012; Oregon State University.

*HULET, April; 2015; Assistant Professor of Forest, Rangeland and Fire Sciences; Ph.D.; 2012; Brigham Young University.

JAIN, Theresa; 2018; Adjunct Professor of Forest, Rangeland and Fire Sciences; Ph.D.; 2001; University of Idaho.

*KAVANAGH, Kathleen L; 1999; Professor of Forest, Rangeland, and Fire Sciences; Affiliate Associate Professor of Environmental Science; Ph.D.; 1993; Oregon State University.

*KEEFE, Robert F; 2012; Assistant Professor of Forest, Rangeland, and Fire Sciences; Ph.D.; 2011; University of Idaho.

*KIMSEY JR., Mark James; 2015; Research Assistant Professor of Forest Resources; Ph.D.; 2006; University of Idaho.

*KLISKEY, Andrew D; 2013; Professor of Forest, Rangeland, and Fire Sciences; Ph.D.; 1992; University of Otago.

*LAUNCHBAUGH, Karen L; 1996; Professor of Forest, Rangeland, and Fire Sciences; Ph.D.; 1992; Utah State University.

*LINK, Timothy E; 2001; Professor of Forest, Rangeland, and Fire Sciences; Ph.D.; 2001; Oregon State University.

MARSHALL, Hans-Peter; 2011; Adjunct Professor of Forest Ecology and Biogeosciences; Ph.D.; 2005; University of Colorado.

*MCDONALD, Armando G; 2001; Professor of Forest Products; Affiliate Professor of Chemical and Materials Engineering; Affiliate Faculty in the School of Food Science; Ph.D.; 1993; York University.

MILLER, Carol; 2004; Adjunct Assistant Professor of Forest, Rangeland, and Fire Sciences; Ph.D.; 1998; Colorado State University.

*MORGAN, Penelope; 1986; Professor of Fire Ecology and Forest Ecology; Ph.D.; 1984; University of Idaho.

*NELSON, Andrew S; 2015; Assistant Professor of Forest, Rangeland and Fire Sciences; Ph.D.; 2013; University of Maine.

NELSON, Ross F; 2009; Adjunct Professor of Forest, Rangeland, and Fire Sciences; Ph.D.; 1994; Virginia Polytechnic Institute.

*NEWCOMBE, A. George; 1999; Professor of Forest, Rangeland, and Fire Sciences; Affiliate Professor in Plant Sciences; Ph.D.; 1988; University Guelph.

NEWINGHAM, Beth A; 2014; Adjunct Faculty of Forest, Rangeland, and Fire Sciences; Ph.D.; 2002; University of Montana.

OTTMAR, Roger D; 2008; Adjunct Professor of Forest, Rangeland, and Fire Sciences; Ph.D.; 2008; University of Idaho.
PAGE-DUMROESE, Deborah; 2015; Adjunct Faculty in Forest, Rangeland and Fire Sciences; Ph.D.; 1988; University of Idaho.

PARSONS, Russell A; 2009; Adjunct Assistant Professor of Forest Resources; Ph.D.; 2007; University of Montana.

PEDRON, Lucio; 2003; Adjunct Assistant Professor of Forest, Rangeland, and Fire Sciences; Ph.D.; 2000; Lesgaft Institute.

PICKFORD, Stewart G; 2008; Adjunct Professor of Forest, Rangeland, and Fire Sciences; Ph.D.; 1972; University of Washington.

PINTO, Jeremiah R; 2011; Adjunct Assistant Professor of Forest Ecology and Biogeosciences; Ph.D.; 2009; University of Idaho.

*PREGITZER, Kurt; 2010; Professor of Forest, Rangeland, and Fire Sciences; Dean, College of Natural Resources; Ph.D.; 1981; University of Michigan.

REGO, Francisco C; 2009; Adjunct Professor of Forest, Rangeland, and Fire Sciences; Ph.D.; 1986; University of Idaho.

REHFELDT, Gerald E; 1967; Adjunct Professor of Forest Genetics; Ph.D.; 1967; University of Wisconsin.

*ROBBERECHT, Ronald; 1983; Professor of Forest, Rangeland, and Fire Sciences; Affiliate Professor of Environmental Science, and of Bioinformatics and Computational Biology; Ph.D.; 1981; Utah State University.

ROSE, Cathy L; 2002; Adjunct Assistant Professor of Forest, Rangeland, and Fire Sciences; Ph.D.; 1991; Oregon State University.

ROSS-DAVIS, Amy L; 2015; Adjunct Faculty of Forest, Rangeland, and Fire Science; Ph.D.; 2006; Purdue University.

RUPP, Richard; 2014; Adjunct Faculty of Forest, Rangeland, and Fire Sciences; Ph.D.; 1986; Washington State University.

SALA, Osvaldo E; 2013; Adjunct Faculty of Forest, Rangeland, and Fire Sciences; Ph.D.; 1982; Colorado State University.

SCHWANDT, John W; 1986; Adjunct Assistant Professor of Forest, Rangeland, and Fire Sciences; Ph.D.; 1979; University of Idaho.

SHAW, Nancy L; 1997; Adjunct Associate Professor of Forest, Rangeland, and Fire Sciences; Ph.D.; 1992; Oregon State University.

*SMITH, Alistair M; 2004; Professor in Forest, Rangeland, and Fire Sciences; Director, Forest and Rangeland Measurements Laboratory; Ph.D.; 2004; University of London.

*STRAND, Eva; 2000; Associate Professor in Forest, Rangeland, and Fire Sciences; Remote Sensing and GIS Lab Administrator, College of Natural Resources; Ph.D.; 2007; University of Idaho.

STRINGHAM, Tamzen; 2011; Adjunct Professor of Forest Ecology and Biogeosciences; Ph.D.; 1996; Oregon State University.

TALHELM, Alan; 2015; Adjunct Faculty in Forest, Rangeland and Fire Sciences; Ph.D.; 2007; Michigan Technological University.

TAYLOR, Robert V; 2011; Adjunct Associate Professor of Forest, Rangeland, and Fire Sciences; Ph.D.; 1999; University of New Mexico.

*VIERLING, Lee A; 2004; Professor of Forest, Rangeland, and Fire Sciences; Department Head, Natural Resources and Society, College of Natural Resources; Ph.D.; 1999; University of Colorado.

WELTZ, Mark A; 2009; Adjunct Professor of Forest, Rangeland, and Fire Sciences; Ph.D.; 1986; Texas A&M University.

WOLCOTT, Michael P; 2015; Adjunct Faculty of Forest, Rangeland, and Fire Sciences; Ph.D.; 1989; Virginia Polytechnic Institute.

WORAPONG, Jeerapun; 2009; Affiliate Assistant Professor of Forest Resources; Ph.D.; 2001; Montana State University.

ZHANG, Jianwei; 2004; Adjunct Assistant Professor of Forest, Rangeland, and Fire Sciences; Ph.D.; 1994; University of Idaho.

ZHANG, Jianwei; 2004; Adjunct Assistant Professor of Forest, Rangeland, and Fire Sciences; Ph.D.; 1991; Oregon State University.

Majors

- Forestry (B.S.Forestry) ([https://catalog.uidaho.edu/colleges-related-units/natural-resources/forest-rangeland-fire-sciences/forestry-bsforestry](https://catalog.uidaho.edu/colleges-related-units/natural-resources/forest-rangeland-fire-sciences/forestry-bsforestry))
- Ecology and Conservation Biology (B.S.Ecol.Cons.Biol.) - For information on an undergraduate major in ecology and conservation biology, see the Natural Resources ([https://catalog.uidaho.edu/colleges-related-units/natural-resources](https://catalog.uidaho.edu/colleges-related-units/natural-resources)) section.

Minors

- Ecology Minor ([https://catalog.uidaho.edu/colleges-related-units/natural-resources/forest-rangeland-fire-sciences/ecology-minor](https://catalog.uidaho.edu/colleges-related-units/natural-resources/forest-rangeland-fire-sciences/ecology-minor))
- Forest Operations Minor ([https://catalog.uidaho.edu/colleges-related-units/natural-resources/forest-rangeland-fire-sciences/fire-ecology-management-minor](https://catalog.uidaho.edu/colleges-related-units/natural-resources/forest-rangeland-fire-sciences/fire-ecology-management-minor))
- Forest Resources Minor ([https://catalog.uidaho.edu/colleges-related-units/natural-resources/forest-rangeland-fire-sciences/fire-ecology-management-minor](https://catalog.uidaho.edu/colleges-related-units/natural-resources/forest-rangeland-fire-sciences/fire-ecology-management-minor))

Certificates

- Restoration Ecology Undergraduate Academic Certificate ([https://catalog.uidaho.edu/colleges-related-units/natural-resources/](https://catalog.uidaho.edu/colleges-related-units/natural-resources/))
Forest, Rangeland, and Fire Sciences Graduate Program

- Forest, Rangeland, and Fire Science (M.S.) ([https://catalog.uidaho.edu/colleges-related-units/natural-resources/forest-rangeland-fire-sciences/forest-rangeland-fire-science-ms](https://catalog.uidaho.edu/colleges-related-units/natural-resources/forest-rangeland-fire-sciences/forest-rangeland-fire-science-ms))
- Forest, Rangeland, and Fire Science (Ph.D.) ([https://catalog.uidaho.edu/colleges-related-units/natural-resources/forest-rangeland-fire-sciences/forest-rangeland-fire-science-phd](https://catalog.uidaho.edu/colleges-related-units/natural-resources/forest-rangeland-fire-sciences/forest-rangeland-fire-science-phd))

Forest Resources

FOR 102 Introduction to Forest Management
For 102 Introduction to Forest Management (1 cr)
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
FOR 200 (s) Seminar (cr arr).

FOR 203 (s) Workshop

FOR 204 (s) Special Topics

FOR 210 Winter Harvesting
For 210 Winter Harvesting (1 cr)
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 230 Society and Natural Resources
For 230 Society and Natural Resources (3 cr)
Gen Ed: Social Science
Same as 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
For 255 Nursery Irrigation and Fertilization (1 cr)
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
For 274 Forest Measurement and Inventory (3 cr)
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
For 275 Forestry Resource Sampling (2 cr)
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
For 299 (s) Directed Study (cr arr).

FOR 310 Indigenous Culture and Ecology
For 310 Indigenous Culture and Ecology (3 cr, 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
For 320 Dendrology (4 cr)
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
For 324 Forest Regeneration (3 cr)
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
For 326 Fire Ecology and Management (3 cr)
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
For 330 Forest Soil and Canopy Processes (4 cr)
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 100/100L or Phys 111/111L; and For 221 or REM 221.

FOR 375 Introduction to Spatial Analysis for Natural Resource Management
For 375 Introduction to Spatial Analysis for Natural Resource Management (3 cr)
Same as 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
For 398 (s) Renewable Natural Resources Internship (cr arr)
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
For 400 (s) Seminar (cr arr).

FOR 403 (s) Workshop
For 403 (s) Workshop (cr arr).

FOR 404 (s) Special Topics
For 404 (s) Special Topics (cr arr).

FOR 405 (s) Professional Development
For 405 (s) Professional Development (cr arr)
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: perm.

FOR 424 Silviculture Principles and Practices
For 424 Silviculture Principles and Practices (4 cr)
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
For 426 Fire Ecology and Management (3 cr)
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
For 427 Prescribed Burning Lab (3 cr)
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 period 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
For 430 Forest Operations (3 cr)
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 100/100L or Phys 111/111L
Prereq or Coreq: Math 144.

FOR 431 Low Volume Forest Roads
For 431 Low Volume Forest Roads (2 cr)
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/yrs)
Prereq or Coreq: Math 144
Coreq: For 430 or Permission.
FOR 433 Fire and Fuel Modeling

For 433 Fire and Fuel Modeling (2 cr)
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

For J435/J535 Remote Sensing of Fire (3 cr)
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

For 436 Cable Systems (2 cr)
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

For 444 Prescribed Fire For Ecologically-Based Management (2-3 cr)
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

For J447/J547 Woody Plant Physiology (3 cr)
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

For 450 Fire Behavior (2 cr)
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 100/100L or Phys 111/111L
Coreq: For 433.

FOR 451 Fuels Inventory and Management

For 451 Fuels Inventory and Management (2 cr)
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

For J454/J554 Air Quality, Pollution, and Smoke (3 cr)
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

For 462 Watershed Science and Management (3 cr)
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 or Phys 111, or high school equivalent.

FOR 468 Forest and Plant Pathology

For 468 Forest and Plant Pathology (2 cr)
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 485 or 497. Serves as the senior capstone course for Ecology and Conservation Biology (ECB).

Prereq: Instructor Permission.
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 552 Current Literature in Environmental Remote Sensing
For 552 Current Literature in Environmental Remote Sensing (1 cr, max arr).
Same as 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
For 554 Air Quality, Pollution, and Smoke (3 cr)
See For J454/J554.

FOR 555 Current Topics: Regeneration/Restoration
For 555 Current Topics: Regeneration/Restoration (1 cr, max arr)
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
For 557 Advanced Fire Behavior (3 cr)
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
For 584 Natural Resource Policy Development (3 cr)
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
For 587 Wildland Fire Policy (2 cr)
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
For 597 (s) Practicum (cr arr).

FOR 598 (s) Internship
For 598 (s) Internship (cr arr).

FOR 599 (s) Research
For 599 (s) Non-thesis Master’s Research (cr arr)
Research not directly related to a thesis or dissertation. 
Prereq: Permission.

FOR 600 Doctoral Research and Dissertation
For 600 Doctoral Research and Dissertation (cr arr)
Prereq: admission to the doctoral program in “natural resources” and Permission of department.

FOR 601 (s) Seminar
For 601 (s) Seminar (cr arr).

Rangeland Ecology and Management
REM 144 Wildland Fire Management
3 credits
Introduction to wildland fire management including fire behavior, fuels, fire prevention and suppression, fire policy and fire ecology. Includes discussion of current fire management issues.

REM 151 Rangeland Principles
3 credits
Rangelands are vast landscapes that cover most of western North America and the earth. Students will examine the ecological principles that cause these grasslands, shrublands, woodlands and deserts to change or stay the same. How humans use and manage these ecosystems will also be explored. The modern challenges of rangeland management must be met with broad thinking and new, sustainable practices to maintain and restore rangelands and the human communities that rely on them. Course requires in-class projects and field experience(s).

REM 152 Rangeland Ecosystem Exploration
1 credit
Students will explore the climates, plants, animals, and human communities of rangeland throughout North America and the globe. The grasslands, shrublands, woodlands, and deserts that are collectively called rangelands include extensive challenges and opportunities for management and conservation. Students will individually explore these ecosystems through photos, ecosystem descriptions, videos, and internet-based tools. In discussions and presentations, students will collectively share their findings about these incredible rangeland ecosystems. (Fall only)

REM 200 (s) Seminar
Credit arranged.

REM 203 (s) Workshop
Credit arranged.

REM 204 (s) Special Topics
Credit arranged.

REM 221 Principles of Ecology
3 credits
Cross-listed with FOR 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.

REM 252 Wildland Plant Identification
3 credits
Develop skills to identify and classify major rangeland plants. Focus is on identification of grasses, forbs, and shrubs. Discussions will also encompass the ecological roles of wildland plants and the ecosystem classification. This course includes a 1-day field trip. Required for REM majors. (Spring only)
REM 280 Introduction to Wildland Restoration
2 credits

History and overview of the ecological, social, and economic aspects of wildland restoration using case studies. Students will explore approaches and philosophies towards restoring and rehabilitating wildlands that have been damaged through natural forces and human activities such as wildfire, overgrazing, cultivation, and weed invasion.

REM 299 (s) Directed Study
Credit arranged.

REM 340 Ethnobotany
2 credits
Course covers the relationships between humans and plants and the ecology of important native wildland plants of western North America. Course focus is on the natural ecology, identification and cultural attributes (historical and present) of 50 to 75 important native wildland plant species found in forestland, rangeland and other wildland settings in the Northwest U.S. Recommended preparation: plant identification course. (Spring only)

REM 341 Systematic Botany
3 credits
Phylogenetic approach to understanding plant systematics and evolution with a primary focus on the flora of the Pacific Northwest. Includes identification of important plant families and the use of dichotomous keys for species identification. (Spring only)

Prereq: BIOL 114 or BIOL 115; and BIOL 213 or PLSC 205.

REM 398 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.

REM 400 (s) Seminar
Credit arranged.

REM 403 (s) Workshop
Credit arranged.

REM 404 (s) Special Topics
Credit arranged.

REM 405 (s) Professional Development
Credit arranged.

REM 407 GIS Application in Fire Ecology and Management
2 credits
Joint-listed with REM 510
Introduces applications of GIS in fire ecology, research, and management including incident mapping, fire progression mapping, GIS overlay analysis, remote sensing fire severity assessments, fire atlas analysis and the role of GIS in the Fire Regime Condition Class concept and the National Fire Plan. Additional assignment/projects required for graduate credit. (Spring only)

Prereq: FOR 375 or GEOG 385; or Permission.

REM 410 Principles of Vegetation Measurement and Assessment
2 credits
This course introduces theory and application of quantitative and qualitative methods for measuring and monitoring vegetation in grasslands, shrublands, woodlands, and forests. Students will gain a solid understanding of how to measure and evaluate vegetation attributes and design and implement monitoring programs relative to wildlife habitat, livestock forage, fire fuel characteristics, watershed function, and many other wildland values. Class field trip required. Recommended Preparation: A basic understanding of how to use computer spreadsheets such as Excel. Students are encouraged to also enroll in REM 411 which builds on the principles of REM 410 for wildland habitat assessment. (Fall only)

Prereq: STAT 251 or permission.

REM 411 Ecological Monitoring and Analysis
2 credits
This course integrates field sampling with quantitative and theoretical concepts related to scientific research, wildlife habitat, and land management practices. Students collect, analyze, and report on ecological data in various formats, and learn specific protocols used by professionals to assess wildlife habitat. Class field trips required. Recommended preparation: REM 252 and REM 253, REM 341, or other plant identification class; ability to use excel. Co-enrollment in REM 410 is recommended.

Prereq: STAT 251 or Permission.

REM 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 period per week.

Recommended Preparation: Familiarity with spreadsheet programs and problem solving using computers. (Spring only)

Prereq: FOR 221 or REM 221.

REM 440 Wildland Restoration Ecology
3 credits
Cross-listed with NRS 440
Ecological principles and management practices involved in restoring and rehabilitating wildland ecosystems after disturbance or alteration to return damaged ecosystems to a productive and stable state. (Spring only)

Prereq: FOR 221, or REM 221, or equivalent general ecology course.

REM 452 Western Wildland Landscapes
2 credits
Survey of wildland plant communities of western North America, focusing on their natural history, including the effects of use by human beings, based on their physical, climatic, and biological characteristics. (Spring only)

Prereq: FOR 221 or REM 221; or Permission.

REM 456 Integrated Rangeland Management
3 credits
Management strategies for integrating grazing with other natural resource values such as wildlife, water, timber, recreation, and aesthetics; emphasis on herbivore ecology including ecological impacts of grazing, ways to manage grazing, and nutritional relationships between plants and free-ranging ungulates on rangeland, pastureland, and forest ecosystems. One 4 to 5 day field trip. Recommended Preparation: REM 151. (Spring only)

Prereq: ENGL 313 or ENGL 317.
REM 459 Rangeland Ecology
2 credits
Application of ecological principles in rangeland management; stressing response and behavior of range ecosystems to various kinds and intensity of disturbance and management practice. Recommended Preparation: courses in general ecology (e.g., REM 221), technical writing (e.g., ENGL 317), and vegetation assessment (e.g., REM 410 or FOR 274) or Permission. (Fall only)

REM 460 Integrating GIS and Field Studies in Rangelands
1 credit
Topics related to changing knowledge and technology related to GIS and spatial analysis relevant to ecology of grasslands, shrublands and woodlands. Min. six integrated GIS labs; one five-day field trip. Required for REM majors. (Fall only)
Coreq: REM 459.

REM 472 Remote Sensing of the Environment
3-4 credits
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.

REM 473 ECB Senior Presentation
1 credit
Gen Ed: Senior Experience
Cross-listed with FISH 473, FOR 473, NRS 473, RMAT 473, and WLF 473
Reporting and presenting the senior project (thesis or internship); taken after or concurrently with 485 or 497. Serves as the senior capstone course for Ecology and Conservation Biology (ECB).
Prereq: Instructor Permission.

REM 480 Ecological Restoration
3 credits
Joint-listed with REM 580
Planning and implementing restoration projects in conjunction with land agencies and stakeholders. Includes service-learning projects. Field trip(s) required. Additional literature review, reports, discussion and/or a class project are required for students pursuing this as a 500-level course.
Prereq: REM 440 or Permission.

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

REM 495 Teaching Practicum
1-3 credits, max arranged
Gen Ed: Senior Experience
Joint-listed with REM 595
Provides students with peer teaching experience and assisting an instructor. May include classroom activities, grading assignments, developing materials, and/or participating in field trips. Students who take this course as the graduate level, as REM 595, will be asked to do additional work related to developing a teaching philosophy, developing assessment, or experimenting with specific pedagogical approaches with the faculty supervisor.
Prereq: Permission.

REM 497 Senior Research and Thesis
Credit arranged
A research investigation, selected and designed jointly by the student and professor, during which the student has the opportunity to learn research techniques of experimental design, proposal writing, data collection and analysis, scientific writing, and publication; at completion, the student will produce a publishable journal manuscript and/or a conference presentation.
Prereq: Senior standing and Permission.

REM 498 (s) Internship
Credit arranged
Supervised field experience where students define specific topics and skills in rangeland management they wish to gain, develop a learning plan, and present a final report of knowledge gained or project outcomes. The internships will be overseen by an on-site field supervisor and a faculty mentor. Instructor permission required.

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

REM 500 Master’s Research and Thesis
Credit arranged.

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

REM 502 (s) Directed Study
Credit arranged.

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

REM 504 (s) Special Topics
Credit arranged.

REM 505 (s) Professional Development
Credit arranged.

REM 507 Landscape and Habitat Dynamics
3 credits
Students explore landscape change occurring a variety of spatial and temporal scales, including global change, succession, disturbance events, and change induced by humans. Via scientific readings, models and spatial analysis students will learn how to quantify landscape change and how a change in environmental conditions and disturbance regimes may affect the composition of landscapes, specifically plant and animal habitats. Recommended Preparation: courses in ecology, statistics, and GIS. (Spring, alt/yrs)
Prereq: Permission.
REM 510 GIS Application in Fire Ecology and Management
2 credits
Joint-listed with REM 407
Introduces applications of GIS in fire ecology, research, and management including incident mapping, fire progression mapping, GIS overlay analysis, remote sensing fire severity assessments, fire atlas analysis and the role of GIS in the Fire Regime Condition Class concept and the National Fire Plan. Additional assignment/projects required for graduate credit. (Spring only)
**Prereq:** FOR 375 or GEOG 385; or Permission.

REM 556 Foraging Ecology of Herbivores
2 credits
Synthesis of foraging behavior concepts including nutritive quality of forages, digestive and metabolic constraints, and diet and habitat selection. Cooperative: open to WSU degree-seeking students. (Fall, alt odd yrs)

REM 560 Ecophysiology
3 credits
Functional responses and adaptations of individual species to their environment, emphasizing the physiological mechanisms that influence the interactions between organisms and the major environmental factors (e.g., solar radiation, energy balance, temperature, water and nutrients, climate), and how this affects the interactions among species and their growth and survival (e.g., competition, herbivory, and allelopathy). The interactive learning materials are compatible only with computers that are 100% compatible with the Windows operating system and the browser, Internet Explorer. (Fall only)
**Prereq:** A course in general ecology (i.e. REM 221) and general botany, or Permission [www.EcologyOnline.net].

REM 580 Ecological Restoration
3 credits
Joint-listed with REM 480
Planning and implementing restoration projects in conjunction with land agencies and stakeholders. Includes service-learning projects. Field trip(s) required. Additional literature review, reports, discussion and/or a class project are required for students pursuing this as a 500-level course.
**Prereq:** REM 440 or Permission.

REM 595 Teaching Practicum
1-3 credits, max arranged
Joint-listed with REM 495
Provides students with peer teaching experience and assisting an instructor. May include classroom activities, grading assignments, developing materials, and/or participating in field trips. Students who take this course as the graduate level, as REM 595, will be asked to do additional work related to developing a teaching philosophy, developing assessment, or experimenting with specific pedagogical approaches with the faculty supervisor.
**Prereq:** Permission.

REM 597 (s) Practicum
Credit arranged.

REM 598 (s) Internship
Credit arranged.

REM 599 (s) Non-thesis Master's Research
Credit arranged
Research not directly related to a thesis or dissertation.
**Prereq:** Permission.

REM 600 Doctoral Research and Dissertation
Credit arranged
**Prereq:** Admission to the doctoral program in "natural resources" and Permission of department.

**Renewable Materials**

RMAT 100 Intro to Renewable Resources
2 credits
Overview of renewable building materials and bio-energy industries. Discovery laboratory in the use of renewable and recycled waste stream materials to create useful products. One lecture and one three-hour lab a week. (Spring only)

RMAT 203 (s) Workshop
Credit arranged.

RMAT 204 (s) Special Topics
Credit arranged.

RMAT 299 (s) Directed Study
Credit arranged.

RMAT 321 Properties of Renewable Materials
3 credits
Physiology, structure and physical and mechanical properties of woody and other renewable plant materials. (Fall only)

RMAT 400 (s) Seminar
Credit arranged.

RMAT 401 Undergraduate Research
1-3 credits
Directed undergraduate research at the upper division level.
**Prereq:** Junior or senior standing.

RMAT 403 (s) Workshop
Credit arranged.

RMAT 404 (s) Special Topics
Credit Arranged.

RMAT 405 (s) Professional Development
Credit Arranged
Credit earned in this course will not be accepted toward grad degree programs.
**Prereq:** Permission.

RMAT 410 Wood Properties, Processes, and Uses
1-2 credits
Joint-listed with RMAT 510
Open to non-majors only. Physical, mechanical, and chemical properties of wood and wood products; timber harvesting technologies; and issues in use of wood products. Additional projects/assignments reqd for grad cr. Graded P/F. Five days of workshop, including field trip.

RMAT 436 Biocomposites
3 credits
Joint-listed with RMAT 536
Raw material, processes, properties, and their applications for a number of natural fiber and wood composites made of veneers, particles and fibers. Additional projects and assignments reqd for grad cr. Two half day field trips. Two lectures and one 3-hr lab a week. RMAT 536 only. Cooperative: Open to WSU degree-seeking students. (Fall only)
**Prereq:** CHEM 101 and RMAT 321; and CHEM 275 or CHEM 277.
RMAT 438 Introduction to Lignocellulosic Chemistry  
1 credit  
The chemistry of lignocellulosic fiber (natural fiber and wood) formation and structure. Two lectures a week for the first half of the semester. This course meets concurrently with RMAT 538. (Spring only)  
Prereq: CHEM 101 or CHEM 111; and CHEM 275 or CHEM 277.  

RMAT 444 Primary Products Manufacturing  
3 credits  
Raw materials, procurement, production methods, drying product specifications, and grading for primary products made from renewable materials including lumber, plywood, poles, and energy products; plant layout, machines, and systems analysis; plant tours. Two lec and one 5-hr lab a wk. (Spring only)  
Prereq: RMAT 321.  

RMAT 450 Biomaterials Deterioration and Protection  
2 credits  
Agents that cause deterioration of biomaterials; green building durability issues and design considerations; preservative systems and alternative control methods; and environmental considerations. Recommended preparation: RMAT 321 (Fall only)  

RMAT 473 ECB Senior Presentation  
1 credit  
Gen Ed: Senior Experience  
Cross-listed with FISH 473, FOR 473, NRS 473, REM 473, and WLF 473  
Reporting and presenting the senior project (thesis or internship); taken after or concurrently with 485 or 497. Serves as the senior capstone course for Ecology and Conservation Biology (ECB).  
Prereq: Instructor Permission.  

RMAT 491 Biomaterial Product and Process Development Lab  
2 credits  
Lab to accompany RMAT 495. One 3-hr lab per week. (Spring only)  
Prereq: ECON 201 or ECON 202, and RMAT 495.  

RMAT 495 Product Development and Brand Management  
3 credits  
Gen Ed: Senior Experience  
Cross-listed with MKTG 495  
This course examines product development strategy and the management of brands. Topics will include strategic intent of product development, the process of product development (ideation through post product launch evaluation), market and financial feasibility of product development, trends in product development, and managing brands (strategic brand management and managing brand equity).  
Prereq: ECON 201, 202, or 272; and BUS 321.  
Coreq: BUS 321.  

RMAT 498 Renewable Natural Resources Internship  
Credit arranged  
Supervised field experience with an appropriate public agency or private company. Graded P/F. (Summer only)  
Prereq: Permission of advisor.  

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

RMAT 500 Master's Research and Thesis  
Credit arranged.  

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

RMAT 502 (s) Directed Study  
Credit arranged.  

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

RMAT 504 (s) Special Topics  
Credit arranged.  

RMAT 505 (s) Professional Development  
Credit arranged  
Credit earned in this course will not be accepted toward graduate degree programs.  
Prereq: Permission.  

RMAT 510 Wood Properties/Processes/Uses  
1-2 credits  
Joint-listed with RMAT 410  
Open to non-majors only. Physical, mechanical, and chemical properties of wood and wood products; timber harvesting technologies; and issues in use of wood products. Additional projects/assignments reqd for grad cr. Graded P/F. Five days of workshop, including field trip.  

RMAT 536 Biocomposites  
3 credits  
Joint-listed with RMAT 436  
Raw material, processes, properties, and their applications for a number of natural fiber and wood composites made of veneers, particles and fibers. Additional projects and assignments reqd for grad cr. Two half day field trips. Two lectures and one 3-hr lab a week. RMAT 536 only: Cooperative: Open to WSU degree-seeking students. (Fall only)  
Prereq: CHEM 101 and RMAT 321; and CHEM 275 or CHEM 277.  

RMAT 538 Lignocellulosic Biomass Chemistry  
3 credits  
The chemistry of lignocellulosic fiber (natural fiber and wood) formation, agricultural/natural fiber and wood structure and reactions of lignocellulosic compounds. Two lec and one 3-hr lab a wk. Cooperative open to WSU degree-seeking students (Spring only).  
Prereq: CHEM 101 and RMAT 321; and CHEM 275 or CHEM 277.  

RMAT 552 Wood and Fiber Science  
3 credits  
Cell physiology and formation, anatomy, chemistry, and physical and mechanical properties. Factors that impact material quality and performance. (Spring only)  
Prereq: Graduate Standing.  

RMAT 557 (s) Practicum  
Credit arranged.  

RMAT 597 (s) Practicum  
Credit arranged.  

RMAT 598 (s) Internship  
Credit arranged.  

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