

DEPARTMENT OF FOREST, RANGELAND, AND FIRE SCIENCES

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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, Stillinger Herbarium, numerous laboratories (Fire, Forest Operations, Paleocology, Rangeland Ecology, Renewable Materials, Stable Isotopes) 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 managed 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 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 rec-

ognized 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 Forest Resources. Forestry is "managing and using for human benefit the forest lands and natural resources that occur on and in association with forest lands." These benefits may include values, services, or products such as stable human communities, aesthetics, biodiversity, recreational opportunities, clean water and air, soil protection, forage, fish and wildlife, medicinal and ornamental items, wood products, and many others. One-third of the nation's land area and 40 percent of Idaho's land area are forested. Present-day forest management requires professionals highly trained in an interdisciplinary approach that adapts to scientific developments and sociological and economic constraints while sustaining healthy forest ecosystems.

The B.S. Forest Resources is accredited by the Society of American Foresters, the specialized accrediting body recognized by the Commission on Recognition of Post-secondary Accreditation as the accrediting agency for forestry in the United States.

The B.S. Forest Resources 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. Forest Resources 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
- Forecast potential outcomes of forestry decisions in time and space, while considering risks and uncertainty
- Assess forest, site, and socioeconomic conditions across temporal and spatial scales using appropriate metrics

Bachelor of Science in Rangeland Ecology and Management. 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 Departments 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 Ecology and Management 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.cnr.uidaho.edu/wildlandfire.

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 ecophysiology, 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).

Courses

See the course description section for courses in Forest Resources (For), Rangeland Ecology and Management (REM) and Renewable Materials (RMat).

Forest, Rangeland, and Fire Sciences Undergraduate Curricular Requirements

Forest Resources (B.S.For.Res.)

Students pursuing a B.S. degree in forest resources must receive a grade of C or better in the following indicator courses to register for upper-division courses in forest resources and to graduate with a B.S.For.Res.: Math 143, Stat 251, For 221, and For 274. Students must also have a minimum cumulative grade-point average of 2.00 in forest resource (For) courses to qualify for the B.S. degree in forest resources.

Required course work includes the university requirements (see regulation J-3) and:

Biol 115	Cells and the Evolution of Life (4 cr)
CSS 383	Natural Resource and Ecosystem Service Economics (3 cr)
Econ 202	Principles of Microeconomics (3 cr)
For 102	Introduction to Forest Management (1 cr)
For 235 or CSS 235	Society and Natural Resources (3 cr)
Ent 469	Introduction to Forest Insects (2 cr)
For 274	Forest Measurement and Inventory (3 cr)
For 320	Dendrology (4 cr)
For 324	Forest Regeneration (3 cr)
For 330	Forest Soil and Canopy Processes (4 cr)
For 373	Forestry Sampling Methods (2 cr)
For 375	Introduction to Spatial Analysis for Natural Resource Management (3 cr)
For 424	Forest Dynamics and Management (4 cr)
For 430	Forest Operations (3 cr)
For 462	Watershed Science and Management (3 cr)
For 430	Forest Operations (3 cr)
For 468	Forest and Plant Pathology (2 cr)
For 484	Forest Policy and Administration (2 cr)
Math 143	Pre-calculus Algebra and Analytic Geometry (3 cr)*
Math 144	Analytic Trigonometry (1 cr)
NR 101	Exploring Natural Resources (1 cr)
Soil 205, 206	The Soil Ecosystem and Lab (4 cr)
Stat 251	Statistical Methods (3 cr)
One of the following (4 cr):	
Biol 116	Organisms and Environments (4 cr)
PISc 205	General Botany (4 cr)
One of the following (4 cr):	
Chem 101	Introduction to Chem I (4 cr)
Chem 111	Principles of Chem I (4 cr)

One of the following (3 cr):

Engl 313 Business Writing (3 cr)
Engl 317 Technical Writing (3 cr)

One of the following (3 cr):

For 221 Ecology (3 cr)
REM 221 Ecology (3 cr)

One of the following (4 cr):

Phys 100, Phys 100L Fundamentals of Physics and Lab (4 cr)
Phys 111, Phys 111L General Physics I and Lab (4 cr)

Restricted Electives (11 cr):

AgEc 477 Law, Ethics, and the Environment (3 cr)
Biol 213 Principles of Biological Structure and Function (4 cr)
Biol 421 Advanced Evolutionary Biology (3 cr)
CSS 486 Public Involvement in Natural Resource Management (3 cr)

CSS 490 Wilderness and Protected Area Management (3 cr)

Fish 314 Fish Ecology (3 cr)

Fish 415 Limnology (4 cr)

Fish 430 Riparian Ecology and Management (3 cr)

For 326 Fire Ecology and Management (3 cr)

For 427 Prescribed Burning Lab (3 cr)

For 431 Low Volume Forest Roads (2 cr)

For 436 Cable Systems (2 cr)

For 472 or REM 472 Remote Sensing of the Environment (4 cr)

For 497 Senior Thesis (2-4 cr)

Geog 301 Meteorology (3 cr)

Geog 385 GIS Primer (3 cr)

Geol 111, Geol 111L Physical Geology for Science Majors (4 cr)

Math 160 Survey of Calculus (4 cr)**

Math 170 Analytic Geometry and Calculus I (4 cr)**

PolS 364 or Politics of the Environment (3 cr)

CSS 364

REM 407 GIS Applications in Fire Ecology and Management (2 cr)

REM 410 Principles of Vegetation Measurement and Assessment (2 cr)

REM 411 Ecological Monitoring and Analysis (2 cr)

REM 429 Landscape Ecology (3 cr)

REM 440 Wildland Restoration Ecology (2 cr)

REM 459 Rangeland Ecology (2 cr)

REM 460 Integrating GIS and Field Studies in Rangelands (2 cr)

RMat 321 Renewable Materials Anatomy and Properties (3 cr)

RMat 444 Primary Products Manufacturing (3 cr)

Soil 446 Soil Fertility (1-3 cr)

Soil 454 Soil Development and Classification (3 cr)

Stat 431 Statistical Analysis (3 cr)

WLF 314 Wildlife Ecology I (3 cr)

WLF 316 Wildlife Ecology II (3 cr)

WLF 440 Conservation Biology (3 cr)

Courses to total 120 credits for this degree

*Note: A SAT math score of 610 or above, or ACT math score of 27 or above can be used to satisfy the Math 143 and Math 144 requirements.

**Note: Either Math 160 or Math 170 may be used as a restricted elective, but not both.

Fire Ecology and Management (B.S.Fire.Ecol.Mgmt.)

Students pursuing a B.S. degree in fire ecology and management must receive a grade of C or better in the following indicator courses to register for upper-division courses in the fire core and to graduate with a B.S.Fire.Ecol.Mgmt.: Math 143, Stat 251, REM 244, either For 274 or REM 411, and either For 221 or REM 221. Students must also have a minimum cumulative grade-point average of 2.00 in Forest Resource and Rangeland Ecology and Management courses to qualify for the B.S. degree in Fire Ecology and Management.

Required course work includes the university requirements (see regulation J-3) and:

Biol 115 Cells and the Evolution of Life (4 cr)
CSS 383 Natural Resource and Ecosystem Service Economics (3 cr)
Econ 202 Principles of Microeconomics (3 cr)

For 235 Society and Natural Resources (3 cr)
For 274 Forest Measurement and Inventory (3 cr)
For 326 Fire Ecology and Management (3 cr)
For 330 Forest Soil and Canopy Processes (4 cr)
For 375 Introduction to Spatial Analysis for Natural Resource Management (3 cr)

For 427 Prescribed Burning Lab (3 cr)

For 433 Fire and Fuel Modeling (2 cr)

For 435 or For 535 Remote Sensing of Fire (3 cr)

For 450 Fire Behavior (2 cr)

For 484 Forest Policy and Administration (2 cr)

Geog 301 Meteorology (3 cr)

NR 101 Exploring Natural Resources (1 cr)

Phys 100, Phys 100L Fundamentals of Physics and Lab (4 cr)

REM 244 Wildland Fire Management (2 cr)

REM 459 Rangeland Ecology (2 cr)

Soil 205 The Soil Ecosystem (3 cr)

Soil 206 The Soil Ecosystem Lab (1 cr)

Stat 251 Statistical Methods (3 cr)

One of the following (4 cr):

Biol 116 Organisms and Environments (4 cr)

PISc 205 General Botany (4 cr)

One of the following (4 cr):

Chem 101 Introduction to Chemistry I (4 cr)

Chem 111 Principles of Chemistry I (4 cr)

One of the following (3 cr):

Engl 313 Business Writing (3 cr)

Engl 317 Technical Writing (3 cr)

One of the following (3 cr):

For 221 Ecology (3 cr)

REM 221 Ecology (3 cr)

One of the following groups of courses (4 cr):

Group A:

Math 143 Pre-calculus Algebra and Analytic Geometry (3 cr)

Math 144 Analytic Trigonometry (1 cr)

or

Group B:

Math 160 Survey of Calculus (4 cr)

One of the following courses (3 cr):

Comm 332 Communication and the Small Group (3 cr)

CSS 287 Foundations of Conservation Leadership and Management (3 cr)

CSS 387 Environmental Communication Skills (3 cr)

CSS 481 Conservation Leadership (3 cr)

CSS 486 Public Involvement in Natural Resource Management (3 cr)

One of the following courses (3-4 cr):

For 320 Dendrology (4 cr)

REM 252 Wildland Plant Identification Field Studies (3 cr)

REM 341 Systematic Botany (3 cr)

Ecology (5-6 cr):

Ent 469 Introduction to Forest Insects (2 cr)

REM 429 Landscape Ecology (3 cr)

REM 440 Wildland Restoration Ecology (3 cr)

REM 450 Global Environmental Change (3 cr)

WLF 314 Wildlife Ecology I (3 cr)

WLF 440 Conservation Biology (3 cr)

Applied Tools and Technology (3-4 cr):

Geog 385 GIS Primer (3 cr)

Geog 401 Climatology (3 cr)

REM 411 Ecological Monitoring and Analysis (2 cr)

Natural Resources Management, Planning and Policy (6 cr):

CSS 385 Conservation Management and Planning I (4 cr)

CSS 490 Wilderness and Protected Area Management (3 cr)

For 324 Forest Regeneration (3 cr)

For 424 Forest Dynamics and Management (4 cr)

For 430 Forest Operations (3 cr)

For 454 or For 554 Air Quality and Smoke Management (3 cr)

For 462 Watershed Science and Management (3 cr)

REM 456 Integrated Rangeland Management (3 cr)

Courses to total 120 credits for this degree

Rangeland Ecology and Management (B.S.Rangeland Ecol.-Mgt.)

Required course work includes the university requirements (see regulation J-3) and:

First and Second Years

Biol 115	Cells and the Evolution of Life (4 cr)
Chem 275	Carbon Compounds (3 cr)
Comm 101	Fundamentals of Public Speaking (2 cr)
Econ 202	Principles of Microeconomics (3 cr)
For 235 or CSS 235	Society and Natural Resources (3 cr)
NR 101	Exploring Natural Resources (1 cr)
REM 151	Rangeland Principles (2 cr)
REM 152	Rangeland Ecosystem Exploration (1 cr)
Soil 205	The Soil Ecosystem (3 cr)
Soil 206	The Soil Ecosystem Lab (1 cr)
Stat 251	Statistical Methods (3 cr)

One of the following (4 cr):

Biol 213	Principles of Biological Structure and Function (4 cr)
PLSc 205	General Botany (4 cr)

One of the following (4 cr):

Chem 101	Introduction to Chem I (4 cr)
Chem 111	Principles of Chem I (4 cr)

One of the following (3-4 cr):

Math 143	Pre-calculus Algebra and Analytic Geometry (3 cr)
Math 160	Survey of Calculus (3-4 cr)

One of the following (3 cr):

For 221	Ecology (3 cr)
REM 221	Ecology (3 cr)

Third and Fourth Years

CSS 383	Natural Resource and Ecosystem Service Economics (3 cr)
For 375	Introduction to Spatial Analysis for Natural Resource Management (3 cr)
REM 252	Wildland Plant Identification Field Studies (3 cr)
REM 341	Systematic Botany (3 cr)
REM 410	Principles of Vegetation Measurement and Assessment (2 cr)
REM 411	Ecological Monitoring and Analysis (2 cr)
REM 440	Wildland Restoration Ecology (3 cr)
REM 456	Integrated Rangeland Management (3 cr)
REM 459	Rangeland Ecology (2 cr)
REM 460	Integrating GIS and Field Studies in Rangelands (2 cr)
Soil 454	Pedology (3 cr)

One of the following (3 cr):

AVS 474	Beef Cattle Science (3 cr)
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One of the following (3 cr):

Engl 313	Business Writing (3 cr)
Engl 317	Technical Writing (3 cr)

One of the following (3 cr):

Fish 430	Riparian Ecology and Management (3 cr)
For 462	Watershed Science and Management (3 cr)

Students must also complete 12 credits of advisor approved electives in emphasis areas that include: Restoration Ecology, Field Botany, Spatial Ecology, Watershed Science, Wildland Fire Management, Invasive Plant Management, Wildlife Habitat Management, Tribal Land Management, Rangeland Economics, Natural Resource Communication, and Environmental Consulting.

Courses to total 122 credits for this degree

Renewable Materials (B.S.Renew.Mat.)

The Renewable Materials degree program is designed to fill the growing demand for professionals in the manufacture, marketing, and utilization of sustainable natural materials. Interdisciplinary coursework and project-based learning opportunities lead to a variety of career directions, 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.

Required course work includes the university requirements (see regulation J-3) and one of the following options:

Acct 201	Introduction to Financial Accounting (3 cr)
Acct 202	Introduction to Managerial Accounting (3 cr)
Biol 102, Biol 102L	Biology and Society and Lab (4 cr)
BLaw 265	Legal Environment of Business (3 cr)
Comm 101	Fundamentals of Public Speaking (2 cr)
CSS 383	Natural Resource and Ecosystem Service Economics (3 cr)
Econ 202	Principles of Microeconomics (3 cr)
For 235 or CSS 235	Society and Natural Resources (3 cr)
For 375	Introduction to Spatial Analysis for Natural Resource Management (3 cr)
NR 101	Exploring Natural Resources (1 cr)
Phys 111	General Physics I (3 cr)
RMat 100	Introduction to Renewable Materials (2 cr)
RMat 321	Properties of Renewable Materials (3 cr)
RMat 436	Biocomposites (3 cr)
RMat 438	Introduction to Lignocellulosic Chemistry (1 cr)
RMat 444	Primary Products Manufacturing (3 cr)
RMat 450	Biomaterials Deterioration and Protection (2 cr)
RMat 491	Biomaterial Product and Process Development Lab (2 cr)
RMat 495	Product Development and Brand Management (3 cr)
RMat 498	Renewable Natural Resources Internship (1 cr)
Stat 251	Statistical Methods (3 cr)

One of the following (4 cr):

Chem 101	Introduction to Chemistry I (4 cr)
Chem 111	Principles of Chemistry I (4 cr)

One of the following (3 cr):

Chem 275	Carbon Compounds (3 cr)
Chem 277	Organic Chemistry I (3 cr)

One of the following (3-4 cr):

Engl 313	Business Writing (3 cr)
Engl 317	Technical Writing (3 cr)

One of the following (3 cr):

For 221	Ecology (3 cr)
REM 221	Ecology (3 cr)

One of the following (4 cr):

Math 160	Survey of Calculus (4 cr)
Math 170	Analytic Geometry and Calculus I (4 cr)

Restricted Electives (21 cr):

Acct 482	Enterprise Accounting (3 cr)
Arch 154	Introduction to Architectural Graphics (3 cr)
Arch 266	Materials and Methods (3 cr)
Arch 462	Building Technology II - Concrete (2 cr)
Arch 463	Environmental Control Systems I (3 cr)
Arch 464	Environmental Control Systems II (3 cr)
BAE 485	Fundamentals of Bioenergy and Bioproducts (3 cr)
BAE 492	Biofuels (3 cr)
BAE 494	Thermochemical Technologies for Biomass Conversion (3 cr)
Bus 101	Introduction to Business Enterprises (3 cr)
Bus 190	Integrated Business and Value Creation (3 cr)
Bus 301	Financial Resources Management (3 cr)
Bus 311	Introduction to Management (3 cr)
Bus 321	Marketing (3 cr)
Bus 350	Managing Information (3 cr)
Bus 351	Introduction to Electronic Commerce (3 cr)
Bus 370	Process Management (3 cr)
Bus 378	Project Management (3 cr)
Bus 414	Entrepreneurship (3 cr)
Bus 415	New Venture Creation (3 cr)
Bus 424	Pricing Strategy and Tactics (3 cr)
Bus 456 or Stat 456	Quality Management (3 cr)
Econ 272	Foundations of Economic Analysis (4 cr)
For 430	Forest Operations (3 cr)
For 431	Low Volume Forest Roads (2 cr)
For 436	Cable Systems (2 cr)
LArc 251	Introduction to Principles of Site Design (3 cr)
MSE 434	Fundamentals of Polymeric Materials (3 cr)
RMat 365	Wood Building Technology (3 cr)

RMat 538 Lignocellulosic Biomass Chemistry (3 cr)
Stat 301 Probability and Statistics (3 cr)

Courses to total 120 credits for this degree

Ecology and Conservation Biology (B.S.Ecol.-Cons.Biol.)

For information on an undergraduate major in ecology and conservation biology, see the Natural Resources section.

Forest, Rangeland, and Fire Sciences Academic Minor Requirements

Fire Ecology and Management Minor

Fire Core (5 cr):

For 326 Fire Ecology and Management (3 cr)
REM 244 Wildland Fire Management (2 cr)

One of the following (2-3 cr):

For 427 Prescribed Burning Laboratory (3 cr)
For 433 Fire and Fuel Modeling (2 cr)
For 450 Fire Behavior (2 cr)

Ecology (2-4 cr):

For 330 Forest Soil and Canopy Processes (4 cr)
REM 429 Landscape Ecology (3 cr)
REM 440 Wildland Restoration Ecology (3 cr)
REM 459 Rangeland Ecology (2 cr)
REM 460 Integrating GIS and Field Studies in Rangelands (2 cr)
WLF 314 Wildlife Ecology I (3 cr)

Applied Tools and Technology (3 cr):

For 435 Remote Sensing of Fire (3 cr)
Geog 301 Meteorology (3 cr)
Geog 385 GIS Primer (3 cr)
Geog 401 Climatology (3 cr)
Geog 475 Intermediate GIS (3 cr)

Management, Planning, & Policy (6 cr):

CSS 490 Wilderness and Protected Area Management (3 cr)
For 324 Forest Regeneration (3 cr)
For 424 Forest Dynamics and Management (4 cr)
For 430 Forest Operations (3 cr)
For 462 Watershed Science and Management (3 cr)
For 484 Forest Policy and Administration (2 cr)
REM 456 Integrated Rangeland Management (3 cr)

Courses to total 20 credits for this minor, with at least 12 credits in courses numbered 400 or above.

Forest Operations Minor

Acct 201 Introduction to Financial Accounting (3 cr)
For 430 Forest Operations (3 cr)
For 431 Low Volume Forest Roads (2 cr)
For 436 Cable Systems (2 cr)
RMat 100 Introduction to Renewable Materials (2 cr)
RMat 321 Properties of Renewable Materials (3 cr)
RMat 444 Primary Products Manufacturing (3 cr)

Courses to total 18 credits for this minor

Forest Resources Minor

Courses from the following to total 18 credits:

For 274 Forest Measurement and Inventory (3 cr)
For 320 Dendrology (4 cr)
For 324 Forest Regeneration (3 cr)
For 326 Fire Ecology and Management (3 cr)
For 330 Forest Soil and Canopy Processes (4 cr)
For 373 Forestry Sampling Methods (2 cr)
For 375 Introduction to Spatial Analysis for Natural Resource Management (3 cr)
For 424 Forest Dynamics and Management (4 cr)
For 430 Forest Operations (3 cr)
For 462 Watershed Science and Management (3 cr)
For 468 Forest and Plant Pathology (2 cr)

Courses to total 18 credits for this minor

Rangeland Ecology and Management Minor

Note: At least 12 credits in courses numbered 300 or higher are required to satisfy the requirements of this minor.

REM 151 Rangeland Principles (2 cr)
REM 252 Wildland Plant Identification Field Studies (3 cr)
REM 459 Rangeland Ecology (2 cr)
REM 460 Integrating GIS and Field Studies in Rangelands (2 cr)

One of the following (3 cr):

For 221 Ecology (3 cr)
REM 221 Ecology (3 cr)

Six credits from the following courses (6 cr):

REM 410 Principles of Vegetation Measurement and Assessment (2 cr)
REM 411 Ecological Monitoring and Analysis (2 cr)
REM 429 Landscape Ecology (3 cr)
REM 440 Wildland Restoration Ecology (3 cr)
REM 452 Western Wildland Landscapes (2 cr)
REM 456 Integrated Rangeland Management (3 cr)

One of the following courses (or a course not chosen above) (2-3 cr):

AVS 474 Beef Cattle Science (3 cr)
Fish 430 Riparian Ecology and Management (3 cr)
For 326 Fire Ecology and Management (3 cr)
For 462 Watershed Management (3 cr)
PISc 338 Weed Control (3 cr)
PISc 410 Invasive Plant Biology (3 cr)
REM 244 Wildland Fire Management (2 cr)
Soil 454 Pedology (3 cr)
WLF 314 Wildlife Ecology I (3 cr)

Courses to total 20 credits for this minor

Renewable Materials Minor

For students in business, engineering, forestry, or vocational education who wish to gain specific background and knowledge related to the forest products industry.

For 430 Forest Operations (3 cr)
RMat 321 Properties of Renewable Materials (3 cr)
RMat 444 Primary Products Manufacturing (3 cr)
Electives in renewable materials (9 cr)

Courses to total 18 credits for this minor

Forest, Rangeland, and Fire Sciences Undergraduate Academic Certificate Requirements

Fire Ecology, Management and Technology Undergraduate Academic Certificate

Note: A grade of 'B' or higher is required in all coursework for this academic certificate.

Fire Ecology Course Group (3 cr):

For 326 Fire Ecology and Management (3 cr)
For 426 Global Fire Ecology and Management (3 cr)
For 526 Fire Ecology (3 cr)

Ecology Course Group (2-4 cr):

For 330 Forest Soil and Canopy Processes (4 cr)
For 531 Invasion Biology (3 cr)
REM 429 Landscape Ecology (3 cr)
REM 440 Wildland Restoration Ecology (3 cr)
REM 459 Rangeland Ecology (2 cr)
REM 460 Integrating GIS and Field Studies in Rangelands (2 cr)

Fuels and Fuels Management Course Group (2-3 cr):

For 427 Prescribed Burning Lab (3 cr)
For 433 Fire and Fuel Modeling (2 cr)
For 450 Fire Behavior (2 cr)
For 451 Fuels Inventory and Management (3 cr)

Applied Tools and Analysis Course Group (3 cr):

For 375 Introduction to Spatial Analysis for Natural Resource Management (3 cr)
For 435 or For Remote Sensing of Fire (3 cr)

535

For 472 or REM Remote Sensing of the Environment (4 cr)

472

For 570 Advanced Remote Sensing Measurement Methods (3 cr)

For 572 Spatial and Biophysical Modeling (3 cr)

Geog 475 Intermediate GIS (3 cr)

REM 407 GIS Application in Fire Ecology and Management (2 cr)

Management, Planning and Policy Course Group (2-4 cr):

CSS 490 Wilderness and Protected Area Management (3 cr)

CSS 573 Planning & Decision Making for Watershed Management (3 cr)

For 424 Forest Dynamics and Management (4 cr)

For 430 Forest Operations (3 cr)

For 454 Air Quality and Smoke Management (3 cr)

For 462 Watershed Science and Management (3 cr)

For 484 Forest Policy and Administration (2 cr)

For 529 Forest Ecosystem Analysis (3 cr)

For 585 Natural Resources Policy Analysis (2 cr)

REM 456 Integrated Rangeland Management (3 cr)

WLF 492 Wildlife Management (4 cr)

Electives to total 15 for the certificate

Forest, Rangeland, and Fire Sciences

Graduate Degree Programs

Candidates must fulfill the requirements of the College of Graduate Studies and of the College of Natural Resources. Graduate programs are offered in many forest and rangeland specialization areas including Ecology and Biogeosciences of Forest and Rangeland Ecosystems: ecosystem processes/modeling, biometrics, biogeochemistry, hydrology and ecophysiology, 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; 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; 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; 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.

Master of Science. The M.S. degree is available with a major in natural resources. Thesis and non-thesis options are offered. (A) Thesis option: General M.S. requirements apply. However, the thesis may be comprised of a manuscript(s) in a form acceptable for publication in a refereed journal, while otherwise fulfilling requirements of the Graduate College. (B) Non-thesis option: General M.S. requirements apply. A written and/or oral examination that covers graduate course work must be taken during the final semester in residence. At least one professional paper is required and will be evaluated by the candidate's supervisory committee.

Doctor of Philosophy. The Ph.D. degree is available with a major in natural resources. General Ph.D. requirements apply; see the NR section for details.

FOREST RESOURCES COURSES

Anthony S. Davis, Dept. Head, Dept. of Forest, Rangeland, and Fire Sciences (204 CNR Bldg. 83844-1133; phone 208/885-7952; fores@uidaho.edu).

Prerequisite: Courses in this subject field that are numbered above 299 are not open to undergraduate students on academic probation.

For 102 Introduction to Forest Management (1 cr)

Intro to forestry, current management issues, timber and non-timber resources, educational and professional opportunities.

For 200 (s) Seminar (cr arr)

For 221 Ecology (3 cr)

Fundamental principles of ecology. Major topics covered in the course include the physical environment, how organisms interact with each other and their environment, evolutionary processes, population dynamics, communities, energy flow and ecosystems, human influences on ecosystems, and the integration and scaling of ecological processes through systems ecology. Recommended preparation: introductory botany and zoology

Prereq: Biol 102/102L, 115, 116, or PISc 205; or Permission

For 235 Society and Natural Resources (3 cr)

Same as CSS 235. An exploration of how people use, value, manage, impact, and are affected by natural resources; course emphasizes social and economic realities and political and legal processes in a context of current and historical natural resource issues. Two lectures and one 1-hr small discussion group meeting a week.

For 255 Nursery Irrigation and Fertilization (1 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 (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 299 (s) Directed Study (cr arr)

For 310 Indigenous Culture and Ecology (3 cr, max 9)

Students will explore how both endemic plant and animal species and native culture have been impacted by non-native species. A roughly 10 day field trip to remote communities requires active and effective participation, hands-on projects are conducted in those communities based on preparatory materials, and a there is a major presentation for Idaho stakeholders upon completion of the field trip.

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 116 or PISc 205

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). (Spring only)

Prereq: For 274, For 330, Soil 205 and Soil 206

For 325 Numerical Analysis for Fire Managers (4 cr)

The assembly, summarizing and display of fire management data, including fuels inventories, fire occurrence, behavior, and weather, as well as environmental and other effects of fire. Students will learn to formulate testable hypotheses from data, develop predictive equations and correlations, create probability-weighted decision matrices, and draw supportable conclusions from analyses. Intensive off-campus short course with pre-work and homework. Course is only open to students enrolled in the US Technical Fire Management program. (Fall only)

Prereq: 1 year of high school math and a minimum 5 years of experience in natural resource 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 (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 373 Forestry Sampling Methods (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. (Fall only)

Coreq: For 274 and Stat 251

For 375 Introduction to Spatial Analysis for Natural Resource Management (3 cr)

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 (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 (cr arr)

For 403 (s) Workshop (cr arr)

For 404 (s) Special Topics (cr arr)

For 424 Forest Dynamics and Management (4 cr)

Integrated methods and techniques for sustainable management of forest ecosystems including, stand and disturbance dynamics, exercises in forest assessment, thinning, harvesting, silviculture prescriptions, forest modeling and communicating management guidelines. Major integrative final project required. Course includes field labs and lectures; on average 3-hrs of lectures and 2-hrs of lab per week. (Fall only)

Prereq: Senior standing and For 274, For 320, For 324 and For 330

For 425 Forest and Soil Nutrient Cycling (3 cr)

Forest nutrient management requires an understanding of biogeochemical cycles relevant to forest ecosystems including inputs of plant nutrients from the atmosphere and lithosphere, accumulation by vegetation, soil cycling, processes, and losses to the atmosphere and hydrosphere. Two 1-hr lectures and with a 3-hr lab.

Prereq: For 330 and Soil 205

For 426 Global 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 (3 cr)

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 244, and Senior standing; and Permission

Coreq: For 326

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 (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 (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 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 (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/yrs)

Prereq or Coreq: Math 144

Coreq: For 430 or Permission

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 244 and Junior Standing; or Instructor Permission.

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 (3 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 244 and For 274 or REM 411

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

Assessment of the controls and drivers of emission processes and impacts on air quality from agricultural, prescribed, and wildfires. 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, collaborative process for implementing smoke management plans. Additional work required for graduate credit.

Prereq: For 326

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. (Fall only)

Prereq: Math 143; and Phys 100 or Phys 111, or high school equivalent.

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 (4 cr)

Same as 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: Phys 100 or Phys 112. Cooperative: open to WSU degree-seeking students.

For 483 Senior Project Presentation (1 cr)

Same as CSS/Fish/REM/WLF 483. Reporting and presenting the senior project (thesis or internship); taken after or concurrently with 485 or 497.

For 484 Forest Policy and Administration (2 cr)

Evaluation of land and forest problems and policies in the U.S.; analysis of current conditions and policies; historical development of governmental and private agencies concerned with the administration of forest conservation program. Recommended Preparation: FOR 235.

Prereq: Junior standing

For 485 Ecology and Conservation Biology Senior Project (1-3 cr, max 3)

See WLF 485.

For 497 (s) Senior Thesis (2-4 cr, max 4)

Independently plan and conduct a thesis project; write and defend the thesis under supervision of an advisor.

Prereq: Senior standing and minimum 3.20 GPA or Permission

For 498 (s) Renewable Natural Resources Internship (cr arr)

Supervised field experience with an appropriate public or private agency. Required for cooperative education students.

Prereq: Permission of department

For 499 (s) Directed Study (cr arr)

For the individual student; conferences, library, field, or lab work.

Prereq: Senior standing, GPA 2.5, and Permission

For 500 Master's Research and Thesis (cr arr)**For 501 (s) Seminar (cr arr)**

Major philosophy, management, and research problems of wildlands; presentation of individual studies on assigned topics.

Prereq: Permission

For 502 (s) Directed Study (cr arr)**For 503 (s) Workshop (cr arr)**

Selected topics in the conservation and management of natural resources.

Prereq: Permission

For 504 (s) Special Topics (cr arr)**For 515 Physical Hydrology (3 cr)**

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/yrs)

For 516 Current Literature in the Hydrologic Effects of Forest Management (1 cr)

Evaluation and discussion of how management activities affect hydrologic processes and flow regimes in forested watersheds. Seminar based on primary literature. (Spring, Alt/yrs)

For 526 Fire Ecology (3 cr)

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/yrs)

Prereq: General ecology course

For 529 Forest Ecosystem Analysis (3 cr)

Forest ecosystem processes and analysis from the leaf to the landscape scale; techniques for measuring forest ecosystem attributes; integration with forest management. Field trip required. (Fall only)

For 531 Invasion Biology (3 cr)

An introduction to the biology of invasive species, covering plants, animals, and microbial invasives. The course will review relevant readings from the primary literature, especially those dealing with the current state of our knowledge of invasives, their ecology, control, and implications for public policy. (Spring only)

Prereq: Basic introductory genetics class and ecology

For 535 Remote Sensing of Fire (3 cr)

See For J435/J535.

For 540 Conservation Genetics (3 cr)

See WLF 540.

For 541 Stable Isotope Theory and Methods (3 cr)

Theory and practice of measuring stable isotope ratios of biologically important elements; training in the use of isotope mass spectrometers. Cooperative: open to WSU degree-seeking students. (Fall Alt/yrs)

For 542 Conservation Genetics Lab (1 cr)

See WLF 549.

For 551 Current Literature in Forest Ecology/Tree Physiology (1 cr, max arr)

Review recent articles in forest ecology and physiology journals. Students choose, critically review, and discuss the articles to develop critical-thinking skills and confidence in their knowledge of the literature. Graded P/F.

For 552 Current Literature in Remote Sensing (1 cr, max arr)

Review recent articles in remote sensing 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 J454/J554 Air Quality and Smoke Management (3 cr)

See For J454/J554.

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 556 Phylogenetics Reading Group (1 cr, max arr)

Review recent articles in phylogenetics and systematics 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 570 Advanced Remote Sensing Measurement Methods (3 cr)

Development of remote sensing methods to measure vegetation attributes from individual trees, to stands, to regional scales. Includes, LIDAR and hyperspectral data, non-traditional accuracy assessment, land-use/land-cover change assessment, linear and non-linear mixture models, autocorrelation, time series analysis, and application of object-orientated approaches. (Spring, alt/yrs)

Prereq: For 472 or Geog 483

For 572 Spatial and Biophysical Modeling (3 cr)

Development of concepts, techniques, and methods for the fusion of remote sensing, GIS and biogeochemical modeling techniques for analyzing energy and material pathways and cycles; review latest methods for temporal and spatial scaling of datasets and models to develop and test hypotheses for understanding forest ecosystem structure and function.

For 584 Natural Resource Policy Development (3 cr)

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.

Prereq: Undergraduate course in natural resource policy or political science or Permission

For 585 Natural Resources Policy Analysis (2 cr)

Theories of policy analysis, natural resource policy formulation, and applications for developing policy-relevant information. (Alt/yrs)

Prereq: Undergraduate course in natural resource policy or political science or Permission

For 597 (s) Practicum (cr arr)**For 598 (s) Internship (cr arr)****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 (cr arr)

Prereq: Admission to the doctoral program in "natural resources" and Permission of department

RANGELAND ECOLOGY AND MANAGEMENT COURSES

Anthony S. Davis, Dept. Chair, Dept. of Forest, Rangeland, and Fire Sciences (205B CNR Bldg. 83844-1135; phone 208/885-6536).

Prerequisite: Courses in this subject field that are numbered above 299 are not open to undergraduate students on academic probation.

REM 151 Rangeland Principles (2 cr)

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.

REM 152 Rangeland Ecosystem Exploration (1 cr)

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 (cr arr)

REM 203 (s) Workshop (cr arr)

REM 204 (s) Special Topics (cr arr)

REM 221 Ecology (3 cr)

Fundamental principles of ecology. Major topics covered by the course include the physical environment, how organisms interact with each other and their environment, evolutionary processes, population dynamics, communities, energy flow and ecosystems, human influences on ecosystems, and the integration and scaling of ecological processes through systems ecology. Computer-based materials are used extensively for guided independent learning of ecology. An online version of this course is offered as a separate section. Course information: EcologyOnline.net. Recommended Preparation: Introductory botany, zoology and good working knowledge of Windows-based computer systems.

Prereq: Biol 102/102L, 115, or 116; or Permission

REM 244 Wildland Fire Management (2 cr)

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 252 Wildland Plant Identification Field Studies (3 cr)

Develop skills to identify, classify, and collect rangeland plants in the field. Focus 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 7 to 9-day field trip. Required for REM majors. (Spring only)

REM 280 Introduction to Wildland Restoration (2 cr)

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 (cr arr)

REM 340 Ethnobotany (2 cr)

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 cr)

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 115; and Biol 213 or PISc 205

REM 353 Rangeland Plant Identification and Ecology (3 cr)

Classification, description, and identification of the most important rangeland and riparian plants in North America; particular reference to important ecological roles of these plants. Recommended Preparation: For 221 or REM 221. (Fall only).

REM 360 Rangeland Entomology (2 cr)

Much of the world's population depends upon the resources available from rangeland habitats. Rangeland resources are not only an economic asset, but they also serve a multitude of ecological functions. Students will be introduced to the complex community of insects that inhabit rangeland ecosystems and will be better able to understand the roles played by insects in rangeland systems and the impact that selected management practices may have on their ability to fulfill those roles. Recommended Preparation: Stat 251 and REM 221. (Fall only)

REM 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

REM 400 (s) Seminar (cr arr)

REM 402 GIS Applications in Natural Resources (2 cr)

Course reviews basic GIS concepts emphasizing hands-on experience and independent problem solving. Topics include GIS/GPS integration, habitat inventory, site suitability studies, risk assessment, sources of spatial data, map accuracy, etc. ArcView software and extensions will be used in exercises. (Fall only)

REM 403 (s) Workshop (cr arr)

REM 404 (s) Special Topics (cr arr)

REM J407/J510 GIS Application in Fire Ecology and Management (2 cr)

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 cr)

On-line course designed to give an overview of vegetation measurement techniques for grasslands, shrublands, woodlands, and forests. Students will gain a solid understanding of how to assess and monitor vegetation attributes relative to wildlife habitat, livestock forage, fire fuel characteristics, watershed function, and many other wildland values. Recommended Preparation: A basic statistics course and understanding of how to use computer spreadsheets such as Excel. (Fall only)

REM 411 Ecological Monitoring and Analysis (2 cr)

Field and data analysis course where students collect, analyze, and report ecological data related to scientific research, wildlife habitat, fire, grazing, and land management practices. Class field trips required. Recommended preparation: Ability to use excel.

Prereq: Stat 251 or Permission

Prereq or Coreq: REM 410

REM 429 Landscape Ecology (3 cr)

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 cr)

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 450 Global Environmental Change (3 cr)

Major global environmental changes addressed using an interdisciplinary approach. Topics may include processes and principles of ecosystems, biogeochemical cycles, impacts and mitigation of climatic change, atmospheric chemistry, feedbacks between climate and various earth system processes, and trends in global biodiversity.

Prereq: Math 143 or Stat 251

REM 452 Western Wildland Landscapes (2 cr)

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 cr)

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 cr)

Application of ecological principles in rangeland management; stressing response and behavior of range ecosystems to various kinds and intensity of disturbance and management practice. Web only [www.cnr.uidaho.edu/range459bunting/]. Recommended Preparation: courses in general ecology (e.g., REM 221), technical writing (e.g., Engl 317), and vegetation assessment (e.g., REM 411 or For 274) or Permission. (Fall only)

REM 460 Integrating GIS and Field Studies in Rangelands (2 cr)

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 cr)

See For 472. Cooperative: open to WSU degree-seeking students.

REM J480/J580 Ecological Restoration (3 cr)

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 cr)

See For 483.

REM 485 Ecology and Conservation Biology Senior Project (1-3 cr, max 3)

See WLF 485.

REM J495/J595 Teaching Practicum (1-3 cr, max arr)

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 (cr arr)

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 col-

lection 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 (cr arr)

REM 499 (s) Directed Study (cr arr)

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 (cr arr)

REM 501 (s) Seminar (cr arr)

Major philosophy, management, and research problems of wildlands; presentation of individual studies on assigned topics.

Prereq: Permission

REM 502 (s) Directed Study (cr arr)

REM 503 (s) Workshop (cr arr)

Selected topics in the conservation and management of natural resources.

Prereq: Permission

REM 504 (s) Special Topics (cr arr)

REM 507 Landscape and Habitat Dynamics (3 cr)

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 J407/J510 GIS Application in Fire Ecology and Management (2 cr)

See REM J407/J510.

REM 530 Stream Ecology (3 cr)

See Fish 530.

REM 551 Rangeland Vegetation Ecology (3 cr)

Ecological concepts of the nature, dynamics, and distribution of plant communities; secondary successional processes, soil-vegetation relations, and development of vegetation-classification schemes for better land management. Cooperative: open to WSU degree-seeking students. (Spring, Alt/odd yrs)

Prereq: Plant ecology and Permission

REM 556 Foraging Ecology of Herbivores (2 cr)

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 cr)

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 cr)

See REM J480/J580.

REM 595 Teaching Practicum (1-3 cr, max arr)

See REM J495/J595.

REM 597 (s) Practicum (cr arr)

REM 598 (s) Internship (cr arr)

REM 599 (s) Non-thesis Master's Research (cr arr)

Research not directly related to a thesis or dissertation.

Prereq: Permission

REM 600 Doctoral Research and Dissertation (cr arr)

*Prereq: Admission to the doctoral program in "natural resources" and
Permission of department*

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