NATURAL RESOURCES MANAGEMENT (NRM)

NRM F101 Natural Resources Conservation and Policy
3 Credits
Offered Fall
Conservation of natural resources including history, ecological and social foundations. Examines principles of sustained yield, carrying capacity, supply and demand, and world population growth as applied to agriculture, range, forest, wildlife, fisheries, recreation, minerals and energy management. A wide range of perspectives is presented to help students develop a personal philosophy toward natural resources. Prepare a multiple resource observation plan for an undeveloped area on campus. Optional all-day field trips take place the first two Saturdays of the semester.
Prerequisites: Placement in WRTG F111X.
Lecture + Lab + Other: 3 + 0 + 0

NRM F102 Practicum in Natural Resources Management
1-2 Credits
Practical experience in natural resources management. Supervised individual study on a farm, in a greenhouse, managed forest, agency or business, or another approved location.
Prerequisites: Natural Resource Management majors only and permission of instructor.
Lecture + Lab + Other: 1-2 + 0 + 0

NRM F106 Orientation to Natural Resource Management
1 Credit
Offered Spring
Overview of career opportunities in natural resources. Includes discussions with research faculty and upper class students involved in various aspects of resource management issues.
Lecture + Lab + Other: 1 + 0 + 0

NRM F111 Introduction to Sustainability Science
3 Credits
Offered Spring
Sustaining the health, wellbeing, and productivity of social-ecological systems requires integrated assessments of social, economic, and ecological sustainability challenges. Meeting these challenges often requires action plans that move from understanding theory to the implementation of new policies and facilitation of behavioral change. This course introduces the principles that form the basis of sustainability science, with an emphasis on natural resource management issues.
Prerequisite: NRM F101; placement in WRTG F111X.
Lecture + Lab + Other: 3 + 0 + 0

NRM F150 Plant Propagation I: Seeds and Seed Germination (a)
1 Credit
Principles and practices of plant propagation useful in horticulture, botany, forestry, agronomy, revegetation and land reclamation projects and plant research. Emphasis on seed and fern spore biology, seed dormancy mechanisms, germination techniques, and the seed industry of Alaska native and economically useful plants.
Recommended: a high school course in biology.
Lecture + Lab + Other: 1 + 0 + 0

NRM F151 Plant Propagation II: Vegetative Propagation (a)
1 Credit
Principles and practices of plant propagation useful in horticulture, botany, forestry, agronomy, revegetation and land reclamation projects and plant research. Course will cover methods of vegetative propagation including cuttings; layering; grafting; bulb, corn and tuber propagation; and micro propagation through tissue culture. Emphasis will be on Alaska native and economically useful plants.
Recommended: basic course in high school biology.
Lecture + Lab + Other: 1 + 0 + 0

NRM F152 Plant Propagation Practicum (a)
1 Credit
Methods of plant propagation useful in horticulture, botany, forestry, agronomy, revegetation and land reclamation projects and plant research. The practicum will emphasize hands on applications of propagation methods for commercial, educational and research applications. Emphasis will include horticultural seed production, landscape seeding and restoration practices, intermittent mist propagation systems, spore propagation and commercial micro-propagation (tissue culture).
Prerequisites: NRM F150 and F151.
Lecture + Lab + Other: 0 + 0 + 3

NRM F154 Wild and Cultivated Berries of Alaska
1 Credit
Introduction to cultivated fruit crops and Alaska wild berries. Course includes plant biology, management of wild berry stands, field cultivation and uses of fruits including strawberries, blueberries, currants, gooseberries, cloudberries, raspberries and more.
Recommended: High school biology; or completion of master gardener program.
Lecture + Lab + Other: 1 + 0 + 0

NRM F161 Wilderness Leadership Education
3 Credits
Offered Summer As Demand Warrants
Introduction to outdoor education. Includes both theoretical and practical exposure to quality judgment and decision-making, environmental education techniques and leadership development in the wilderness setting. Provides detailed exposure to the Wilderness Education Association's 18 essential components of wilderness leadership and backcountry safety. The field portion of the course includes detailed instruction in and mentored experience with modern backcountry travel techniques. Successful completion earns certification in the Wilderness Stewardship Program. Field program requires travel through rough un-trailed terrain with heavy packs and average strength and stamina. No use of alcohol, tobacco, illegal drugs or firearms.
Prerequisites: Permission of instructor.
Recommended: BIOL F104X, NRM F101 and physical geography.
Lecture + Lab + Other: 3 + 0 + 0

NRM F204 Public Lands Law and Policy
3 Credits
Offered Palmer: Even-numbered Years
Background on selected federal lands management legislation and agency policies affecting resources conservation, development and preservation.Offered Fairbanks: Spring.
Prerequisites: Sophomore class standing.
Lecture + Lab + Other: 3 + 0 + 0
NRM F210  Principles of Sustainable Agriculture  (a)  3 Credits  Offered Spring  Development of a basic understanding of sustainable agriculture concepts including exposure to economic, social, and environments principles and ideas of sustainable agricultural practices. Agroecology is introduced as a backdrop for the development of sustainable techniques for soil, plant, and animal agriculture. Throughout the semester, sustainable agriculture concepts and principles will be related to current issues such as population growth, resource use and availability, and changing social structures and preferences.  Prerequisites: NRM F101.  Lecture + Lab + Other: 3 + 0 + 0

NRM F211  Introduction to Applied Plant Science  3 Credits  Offered Fall  Basic principles and requirements for plant growth and development with special attention to the production and management of field and greenhouse grown crops.  Lecture + Lab + Other: 2 + 3 + 0

NRM F212  Greenhouse Management  3 Credits  Offered Spring  The greenhouse as a controlled environment for research, education and commercial production of plants; the physical environment; environmental controls and monitors; plant cultivation techniques and crop scheduling useful in plant science and commercial production.  Lecture + Lab + Other: 3 + 0 + 0

NRM F220  Introduction to Animal Science  3 Credits  Offered Fall  Introduction to the various disciplines that form the study of animal science. Topics include animal nutrition, physiology of reproduction and lactation, genetics and animal breeding, animal behavior, environmental physiology, animal health and welfare. Information is presented as it applies to traditional and non-traditional livestock species with emphasis on applications pertinent to Alaska.  Prerequisites: NRM F210.  Lecture + Lab + Other: 3 + 0 + 0

NRM F240  Natural Resources Measurement and Inventory  3 Credits  Offered Fall  Techniques and instrumentations used to measure and inventory natural resources, including land, timber, range, wildlife, water and recreation resources.  Prerequisites: MATH F151X.  Lecture + Lab + Other: 2 + 3 + 0

NRM F251  Silvics and Dendrology  4 Credits  Offered Spring  Ecological requirements and characteristics of tree species of the Northern forest and western North American forest. Silvical characteristics including range, climate, soils, shade tolerance, growth and principal enemies. Family and species characteristics for identification on sight or with a key. Field trips required.  Prerequisites: BIOL F115X; BIOL F116X; NRM F375.  Lecture + Lab + Other: 3 + 3 + 0

NRM F277  Introduction to Conservation Biology  3 Credits  Offered Spring  Introduction to the basic ecological, genetic, management, legal and historical developments in conservation biology and focused efforts to manage biological diversity resources, with a status review of important habitats and endangered species.  Prerequisites: BIOL F115X; BIOL F116X.  Lecture + Lab + Other: 3 + 0 + 0

NRM F290  Resource Management Issues at High Latitudes  2 Credits  Offered Spring  Broad perspective of high latitude resource management issues. On-site analyses of resource management needs, opportunities and/or conflicts in agriculture, forestry, mining, seafood, petroleum, recreation and tourism. Includes 10 day field trip at the end of spring semester. Students must provide own sleeping gear, rain gear and hiking boots. Students must be able to hike forest trails and camp under conditions of inclement weather. May be repeated for credit with instructor's permission.  Prerequisite: Permission of instructor.  Lecture + Lab + Other: 2 + 0 + 0

NRM F300  Internship in Natural Resources Management  1-3 Credits  Offered As Demand Warrants  Supervised pre-professional experience in a business or agency (public or private). Open to students majoring or minoring in natural resources management only. Course may be repeated for credit up to a maximum of 6 credits.  Prerequisites: NRM F101; junior standing with 3.0 GPA; permission of instructor; an approved internship plan.  Lecture + Lab + Other: 0 + 0 + 3-10

NRM F300P  Internship in Natural Resources Management  1-3 Credits  Supervised pre-professional experience in a business or agency (public or private). Open to students majoring or minoring in natural resources management only. Course may be repeated for credit up to a maximum of 6 credits.  Prerequisites: NRM F101, junior standing, 3.0 GPA, permission of instructor, and an approved internship plan.  Lecture + Lab + Other: 0 + 0 + 1-3

NRM F303X  Environmental Ethics and Actions  3 Credits  Offered Spring  Exploration of the history of modern Western views of the relationship between people and nature, alternative foundations for an environmental ethic (utilitarianism, spiritual activity, rights-based and respect-based ethics) and practices of such ethics in business, profession and general lifestyle today.  Prerequisites: Junior standing; placement in WRTG F111X.  Attributes: UAF GER Ethics Req  Lecture + Lab + Other: 2 + 0 + 0

NRM F312  Introduction to Range Management  3 Credits  Offered Fall  Even-numbered Years  Applied ecological treatment of soil, plant and grazing animal relationships on uncultivated lands. Origin of the discipline, management practices and important rangelands of North America; emphasis on Alaska's rangelands and grazers.  Prerequisites: BIOL F115X; BIOL F116X; BIOL F239.  Lecture + Lab + Other: 3 + 0 + 0
NRM F313  Introduction to Plant Pathology  
4 Credits  
Offered Spring Odd-numbered Years  
Plant pathology; non-parasitic and parasitic causes of plant diseases; methods of plant infestation and mechanism of plant defenses; epidemiology and disease control.  
Prerequisites: BIOL F115X; BIOL F116X.  
Recommended: BIOL F239.  
Lecture + Lab + Other: 3 + 3 + 0  

NRM F338  Introduction to Geographic Information Systems  
3 Credits  
Offered Fall  
Geographic data concepts including mapping systems, data sources, editing data, GIS analysis and computer mapping. Introduction to global positioning systems. GIS applications in natural resources management.  
Prerequisites: Knowledge of PCs or Unix workstations desirable.  
Cross-listed with GEOG F338.  
Lecture + Lab + Other: 2 + 3 + 0  

NRM F361  Advanced Wilderness Leadership Education  
3 Credits  
Offered Summer, As Demand Warrants  
The natural environment, concentrating on outdoor leadership, environmental ethics, minimum impact camping, forest and Arctic natural history, and adaptable judgment and decision-making. Includes hiking through boreal forest and along tundra ridges, river crossing, glacier ascent, and skills to do these activities safely. Other mediums of travel could include sea kayaks, canoes or rock climbing. Three lecture sessions will preview a demanding educational field program of 5-15 days requires travel through rough un-trailed terrain with heavy packs or boats and average strength and stamina. No use of alcohol, tobacco, illegal drugs or firearms.  
Prerequisites: NRM F101; NRM F161; permission of instructor.  
Recommended: NRM F366 and NRM F464.  
Lecture + Lab + Other: 3 + 0 + 0  

NRM F365  Principles of Outdoor Recreation Management  
3 Credits  
Offered Fall Even-numbered Years  
Theories, practices, economics and problems fundamental to the use of land and related natural resources for recreation. The course focuses on human dimension related issues faced by recreation managers and research to address those issues.  
Prerequisites: NRM F101; STAT F200X; junior standing.  
Lecture + Lab + Other: 3 + 0 + 0  

NRM F366  Survey Research in Natural Resources Management  
3 Credits  
Offered Spring  
Research methods to support research and planning in recreation and human dimensions of natural resources management. Course topics include quantitative theories and concepts that have been applied to study human dimensions of natural resource management, study design, survey development and administration, sampling and data analysis.  
Prerequisites: NRM F101; STAT F200X.  
Lecture + Lab + Other: 2 + 3 + 0  

NRM F369  GIS and Remote Sensing for Natural Resources  
3 Credits  
Offered Spring Even-numbered Years  
Introduces the principles and terminology of natural resources, ecosystem management and landscape ecology while developing analytical skills using spatial technologies consisting of geographic information systems, remote sensing, and global positioning systems.  
Prerequisites: NRM F338.  
Recommended: NRM F312.  
Lecture + Lab + Other: 1.5 + 1.5 + 0  

NRM F370  Introduction to Watershed Management  
3 Credits  
Offered Fall  
The hydrologic cycle and the influence of land management techniques on water quantity, quality and timing. Water yield, soil erosion and non-point pollution, snowpack management, and land use alternatives.  
Prerequisites: NRM F101.  
Lecture + Lab + Other: 2 + 3 + 0  

NRM F375  Natural Resource Ecology  
3 Credits  
Offered Spring  
Basic ecology concepts, including physical (wind, temperature, water, etc.), biotic (population and community dynamics), genetic successional and landscape dynamics will be covered. Basic physiological characteristics of trees, succession, vegetation classification, and related concepts. Stand structure, diversity, competition, growth, forest-soil interactions, biomass, nutrient distribution and dynamics, energy relations, ecology of disturbances. Incorporation of these ecological principles into management plans.  
Prerequisites: NRM F240.  
Lecture + Lab + Other: 3 + 0 + 0  

NRM F380  Soils and the Environment  
(W)  
3 Credits  
Offered Fall  
Soil development and classification; physical and chemical properties; biological activity; water movement and nutrient cycling in natural and manipulated ecosystems.  
Prerequisites: CHEM F105X; WRTG F211X; WRTG F212X, WRTG F213X or WRTG F214X.  
Lecture + Lab + Other: 2 + 3 + 0  

NRM F403  Environmental Decision-Making  
(O, W)  
3 Credits  
Offered Fall  
Analysis of philosophical/ethical, economic, scientific and political foundations of diverse natural resource management perspectives.  
Prerequisites: COJO F131X or COJO F141X; NRM F101; junior standing.  
Lecture + Lab + Other: 3 + 0 + 0  

NRM F407  Environmental Law  
3 Credits  
Offered Spring Odd-numbered Years  
The role of common law theory in regulatory, statutory and constitutional interpretation in the field of environmental protection, including air and water pollution, toxic/hazardous substances and land-use regulation.  
Prerequisites: Junior or senior class standing.  
Lecture + Lab + Other: 3 + 0 + 0
NRM F410  Numerical Methods for Natural Resources Management
4 Credits
Offered Fall
Teaches the most up-to-date numerical methods for natural resources managers and researchers. Labs cover important computer skills to help students excel in modern natural resources management.
Recommended: MATH F314.
Lecture + Lab + Other: 3 + 3 + 0

NRM F430  Resource Management Planning
3 Credits
Offered Spring
Application of planning and conflict resolution principles to natural resources management. Examines plans prepared in response to current Alaska resource disputes, including wolf, brown bear, boreal forest and recreation river plans. Includes public involvement, consensus building, the basic steps in the planning process and resource dispute simulations. Review resource management plans and develop plans for a local resource management issue.
Prerequisites: Senior standing.
Stacked with NRM F630.
Lecture + Lab + Other: 3 + 0 + 0

NRM F435  GIS Analysis
4 Credits
Offered Spring
GIS analysis of natural resources including spatial query, attribute query, vector, grid, image, topographic and network analysis techniques.
Cross-listed with GEOG F435.
Lecture + Lab + Other: 3 + 3 + 0

NRM F440  Silviculture
3 Credits
Offered Fall Even-numbered Years
Provides an understanding of the science and art of forest stand management. Silviculture is the theory and practice of controlling forest establishment, composition, structure and growth of forests. For persons in land management, including timber, woodlot, wildlife habitat, streamside and aesthetics.
Prerequisites: NRM F251; NRM F375 or BIOL F371; junior standing.
Lecture + Lab + Other: 2 + 3 + 0

NRM F450  Forest Management
3 Credits
Offered Spring Odd-numbered Years
Forest land management for production of goods and services; relation of timber production to other forest land uses. Sustained yield, allowable cut, information needs, valuation and decision making.
Prerequisites: ECON F235X; NRM F251; NRM F240; Junior standing.
Lecture + Lab + Other: 3 + 0 + 0

NRM F452  Forest Health and Protection
3 Credits
Offered Spring Even-numbered Years
Principles and practical management systems for protecting forests from fire, insects and diseases. Factors in managing forest ecosystems and problems and techniques important in high latitude forests, especially in Alaska.
Prerequisites: BIOL F115X; BIOL F116X; BIOL F239; NRM F251; NRM F375 or BIOL F371.
Lecture + Lab + Other: 3 + 0 + 0

NRM F453  Harvesting and Utilization of Forest Products
3 Credits
Offered Fall Odd-numbered Years
Manual and mechanized timber harvesting systems including timber cutting, yarding and transport processes. Technology of processing wood into various products including lumber, plywood, veneer, pulp and energy. Introduction to supply and demand of forest products from a world, state and local perspective. Labs include visits to local forest products companies, chainsaw safety and wood identification.
Prerequisites: NRM F101.
Lecture + Lab + Other: 2 + 3 + 0

NRM F454  Comparative Farming and Sustainable Food Systems
3 Credits
Offered Fall
Principles of food systems geography and food security. Cross-cultural examination of dietary traditions, poverty, hunger, equity and food access and distribution. Comparison of multiple varieties and scales of agricultural systems in the context of social, ecological and economic sustainability. Considers Alaskan and other high-latitude food systems, including country food, wild game harvest and rural to urban nutrition transition.
Prerequisites: WRTG F211X, WRTG F212X, WRTG F213X or WRTG F214X; junior standing.
Cross-listed with GEOG F454 and CCS F454.
Lecture + Lab + Other: 3 + 0 + 0

NRM F461  Interpretive Services
3 Credits
Offered As Demand Warrants
Naturalist and other visitor programs in outdoor recreation areas: philosophy, planning and development of interpretive programs; resources, agencies, users, interpretive media and program evaluation.
Prerequisites: Junior standing.
Lecture + Lab + Other: 3 + 0 + 0

NRM F464  Wilderness Management
3 Credits
Offered Spring
Wilderness ecology and land management practices on lands designated as wilderness. Plus, visitor management regimes are analyzed. Both national and international views of wilderness are presented.
Prerequisites: A basic course in ecology; resource management.
Cross-listed with GEOG F464.
Lecture + Lab + Other: 3 + 0 + 0

NRM F466  Environmental Soil Chemistry
3 Credits
Offered Spring Odd-numbered Years
Basic principles of soil chemical processes. Covers soil solution chemistry; precipitation/dissolution and soil colloids; soil solid phase; soil acidity/alkalinity; adsorption and ion exchange; reduction/oxidation reactions; and kinetics of soil chemical processes. In the lab students will operate equipment for soil chemical analysis, experience computer simulation models for soil chemistry and become familiar with the terms and approaches for writing technical reports.
Prerequisites: CHEM F105X; CHEM F106X; NRM F380.
Lecture + Lab + Other: 2 + 3 + 0
NRM F470   Terrestrial Carbon Management
3 Credits
Offered Spring
Climate change and its relationship to carbon dynamics have become elements of natural resource management options for landowners within the state and across the country and the globe. The course will present a broad scale description of the direction for forest carbon management and proposed methods for inventorying and documenting carbon dynamics attached to industry and down to the landowner.
Prerequisites: BIOL F371 or NRM F375.
Lecture + Lab + Other: 3 + 0 + 0

NRM F480   Soil Management for Quality and Conservation
3 Credits
Offered Fall Odd-numbered Years
Managing soil in disturbed and natural ecosystems to reduce soil losses and maintain or improve soil quality. Methods for maintaining soil quality, preserving soil against loss from erosion, remediating contaminated soil and reclaiming degraded soils.
Prerequisites: NRM F380.
Lecture + Lab + Other: 3 + 0 + 0

NRM F483   Research Design, Writing and Presentation Methods
(O, W, n)
3 Credits
Offered Fall
This course is designed as a capstone research and professional development course for geography, natural resources management and geoscience majors. Students will focus on designing an individual research project and proposal. This course will provide real world active learning assignments that seek to integrate the knowledge and skills gained through undergraduate work, and prepares students for graduate and professional level projects. The course will focus on scientific writing, and the oral, written and graphical presentation of data and research results.
Prerequisites: COJO F131X or COJO F141X; WRTG F211X, WRTG F212X, WRTG F213X or WRTG F214X; junior standing.
Lecture + Lab + Other: 3 + 0 + 0

NRM F484   Senior Thesis in Natural Resources Management
(W) 2 Credits
Problem-solving with emphasis on writing and analysis. Individual project under the guidance of faculty sponsor involving formulation of a question in natural resources management and preparation of a formal, comprehensive written report. Final thesis and presentation.
Prerequisites: NRM F483 or GEOG F483 and permission of instructor.
Lecture + Lab + Other: 2 + 0 + 0

NRM F485   Soil Biology
(n) 3 Credits
Offered Fall Even-numbered Years
Major groups of organisms in the soil and their interrelationships; the major biological processes which take place in the soil and their significance to soil productivity, plant growth and environmental quality; and methodology for studying soil organisms and soil biological processes.
Prerequisites: A course in biology or microbiology and a course in soils.
Lecture + Lab + Other: 3 + 0 + 0

NRM F488   Land Management of Ecosystems (a)
3 Credits
Offered Spring As Demand Warrants
Natural resource topics related to the management of the terrestrial environment in regions such as the Pacific Northwest, Hawaii and the circumpolar North. A basic understanding of the ecology of a specific region is presented prior to a spring break field trip designed to give the student a broad understanding of important topics affecting the management of important natural resources in the selected region.
Prerequisites: NRM F211; NRM F277; NRM F375 or BIOL F371.
Stacked with NRM F688.
Lecture + Lab + Other: 3 + 0 + 40

NRM F489   Alaska Soil Geography Field Trip (a) 1 Credit
Offered Summer; As Demand Warrants
Soil geography along an ecological transect in selected areas of Alaska. Hands-on experiences with soil morphology and exploration of the relationships between soil genesis and other ecological factors including vegetation, geology, landform, climate and hydrology. Includes discussion of soil classification and land use interpretations. Students must provide their own camp gear, be able to walk on uneven or rocky ground and be physically fit for field work.
Prerequisites: NRM F380, or a course in soils.
Stacked with NRM F689.
Lecture + Lab + Other: 1 + 0 + 0

NRM F601   Research Methods in Natural Resources Management 2 Credits
Offered Fall
Introduction for graduate students to the research methods employed in the various fields of resource management, including agriculture, forestry, ecology and social sciences. Designed to acquaint students with the relationship between theory and research, the nature of scientific inquiry, approaches to research, the sequence of steps involved in scientific investigation and the presentation of research results.
Prerequisites: Graduate standing.
Lecture + Lab + Other: 2 + 0 + 0

NRM F613   Resilience Internship 2 Credits
Offered Fall
Students of the Resilience and Adaptation Program participate in internships to broaden their interdisciplinary training, develop new research tools and build expertise outside their home disciplines. Internships are for eight to ten weeks of full time commitment and take place during the student’s first summer in the program. In autumn students meet to discuss their internship experiences and make public presentations.
Prerequisites: ANTH F667, BIOL F667, ECON F667 or NRM F667; ANTH F668, BIOL F668, ECON F668 or NRM F668.
Cross-listed with ANTH F617; BIOL F613; ECON F613.
Lecture + Lab + Other: 2 + 0 + 0
NRM F616  Ecological Background for Resilience and Adaptation  (a)  
1 Credit  
Offered Fall  
Provides the ecological background that is necessary for understanding the role of ecology in complex systems involving interactions among biological, economic, and social processes. Designed for incoming students of the Resilience and Adaptation Program (RAP), who have not received training in ecology.  
Prerequisites: Graduate standing.  
Cross-listed with BIOL F616.  
Lecture + Lab + Other: 1 + 0 + 0  

NRM F630  Resource Management Planning  
3 Credits  
Offered Spring  
Application of planning and conflict resolution principles to natural resource management. Examines plans prepared in response to current Alaska resource disputes, including wolf, brown bear, boreal forest and recreation river plans. Includes public involvement, consensus building, the basic steps in the planning process and resource dispute simulations. Review resource management plans and develop plans for a local resource management issue.  
Prerequisites: Graduate standing.  
Stacked with NRM F430.  
Lecture + Lab + Other: 3 + 0 + 0  

NRM F637  Evolution of Conservation Concepts and Policy  
3 Credits  
Offered Fall Even-numbered Years  
Resource policy issues development and implementation including forestry, mining, fisheries, oil, wildlife and other topics as demand warrants. Focus on policy issues involved in management of Alaska’s resources.  
Prerequisites: Graduate standing or permission of instructor.  
Cross-listed with ECON F637.  
Lecture + Lab + Other: 3 + 0 + 0  

NRM F638  GIS Programming  
3 Credits  
Offered Spring Odd-numbered Years  
GIS programming for ArcView, Arc/Info and ArcGIS. Programming techniques for customizing GIS, efficient batch processing, and development of custom tools for GIS display and analysis.  
Prerequisites: NRM F338.  
Lecture + Lab + Other: 3 + 0 + 0  

NRM F641  Natural Resource Applications of Remote Sensing  
3 Credits  
Offered Spring Even-numbered Years  
Application of remote sensing for inventory and analysis of natural resources. Topics include aerial photography applications and digital remote sensing, including image display, rectification, classification and accuracy assessment.  
Prerequisites: NRM F338.  
Lecture + Lab + Other: 3 + 0 + 0  

NRM F647  Global to Local Sustainability  
3 Credits  
Offered Fall  
Explores the basic principles that govern resilience and change of ecological and social systems. Principles are applied across a range of scales from local communities to the globe. Working within and across each of these scales, students address the processes that influence ecological, cultural and economic sustainability, with an emphasis on northern examples.  
Prerequisites: Graduate standing in a natural science, social science, humanities or interdisciplinary program at UAF.  
Cross-listed with ANTH F647; BIOL F647; ECON F647.  
Lecture + Lab + Other: 3 + 0 + 0  

NRM F649  Integrated Assessment and Adaptive Management  
3 Credits  
Offered Spring  
An interdisciplinary exploration of the theoretical and practical considerations of integrated assessment and adaptive management. Students survey concepts important in understanding societal and professional-level decision-making. Students work as individuals and as a team to undertake case studies with relevance to integrated assessment and adaptive management. Collectively, the class builds a portfolio of cases and conducts an integrated assessment. Note: In case of enrollment limit, priority will be given to graduate students in the Resilience and Adaptation Program in order for them to be able to meet their core requirements.  
Prerequisites: Graduate student standing in a natural science, social science, humanities or interdisciplinary program at UAF or another university.  
Recommended: ANTH F647; BIOL F647; ECON F647; NRM F647; ANTH F667; BIOL F667; ECON F667; NRM F667.  
Cross-listed with ANTH F649; BIOL F649; ECON F649.  
Lecture + Lab + Other: 3 + 0 + 0  

NRM F651  Advanced Silviculture  
3 Credits  
Offered Spring Odd-numbered Years  
Examines biological and environmental aspects of silviculture. Addresses stand manipulation from the “silvicultural system” approach and includes regeneration, vegetation management, stand tending, “harvest” with considerations for biodiversity, “old-growth,” wildlife habitat and timber production. Ecological classification, landscape management and pre-harvest silvicultural prescriptions will be addressed. Must be able to participate in one weekend field trip.  
Prerequisites: Graduate standing.  
Lecture + Lab + Other: 3 + 0 + 0  

NRM F655  Sustainable Livelihoods and Community Well-being  
3 Credits  
Offered Fall  
Review the basic principles that govern the sustainability of systems and look at the cultural practices and individual behaviors that enhance or degrade sustainable livelihoods and community well-being. Emphasis is on understanding the historical context of ideas about sustainability, on understanding the nature and magnitude of the social, economic and ecological dimensions of contemporary change, and the “best practices” currently in place for communities to respond effectively to change.  
Prerequisites: Graduate standing.  
Cross-listed with NRM F656 and GEOG F656.  
Lecture + Lab + Other: 3 + 0 + 0
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<tr>
<td>NRM F665</td>
<td>Advanced Outdoor Recreation</td>
<td>3</td>
<td>Fall Even-numbered Years</td>
<td>Evaluation of contemporary outdoor recreation management models and the linkage between management programming and visitor response. Development of a synthesized model and testing with contemporary problems.</td>
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<td><strong>Prerequisites:</strong> Graduate standing.</td>
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<td>NRM F666</td>
<td>Survey Research in Human Dimensions of Natural Resources</td>
<td>3</td>
<td>Fall Even-Numbered Years</td>
<td>Social science concepts applied to survey-based human dimensions research. Survey research methods including operationalizing research questions into measurable variables, designing survey instruments, assessing reliability and validity, sampling and data analysis.</td>
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<td>NRM F667</td>
<td>Resilience Seminar I</td>
<td>1</td>
<td>Fall</td>
<td>Provides a forum for new students of the Resilience and Adaptation graduate program to explore issues of interdisciplinary research that are relevant to sustainability. A considerable portion of the seminar is student-directed, with students assuming leadership in planning seminar activities with the instructor.</td>
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<td><strong>Prerequisites:</strong> Must be enrolled in the Resilience and Adaptation graduate program.</td>
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<td></td>
<td><strong>Recommended:</strong> ANTH F647, BIOL F647, ECON F647 or NRM F647 (taken concurrently).</td>
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<td><strong>Cross-listed with:</strong> ANTH F667; BIOL F667; ECON F667.</td>
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<td><strong>Lecture + Lab + Other:</strong> 2 + 0 + 0</td>
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<td>NRM F668</td>
<td>Resilience Seminar II</td>
<td>1</td>
<td>Spring</td>
<td>Provides a forum for new students of the Resilience and Adaptation graduate program to explore issues of interdisciplinary research relevant to sustainability. The seminar provides support to each student planning his/her summer internship and preparing and presenting a thesis research prospectus.</td>
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<td><strong>Prerequisites:</strong> ANTH F647, BIOL F647, ECON F647 or NRM F647; ANTH F667, BIOL F667, ECON F667 or NRM F667.</td>
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<td><strong>Cross-listed with:</strong> ANTH F668; BIOL F668; ECON F668.</td>
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<td><strong>Lecture + Lab + Other:</strong> 2 + 0 + 0</td>
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<tr>
<td>NRM F670</td>
<td>Biometeorology</td>
<td>3</td>
<td>Fall Odd-numbered Years</td>
<td>Radiation and energy balance relationships for natural and modified surfaces; physical environment in relation to biology and ecology of plants and animals; implications for resource and environmental management.</td>
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<td><strong>Prerequisites:</strong> Biological or physical science background; graduate standing.</td>
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<td><strong>Lecture + Lab + Other:</strong> 3 + 0 + 0</td>
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<tr>
<td>NRM F672</td>
<td>Nutrient Cycling</td>
<td>3</td>
<td>Spring Odd-numbered Years</td>
<td>Examination of physical, chemical and biological processes controlling nutrient element recycling, availability and retention in natural and managed ecosystems.</td>
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<td><strong>Prerequisites:</strong> CHEM F106X; NRM F375 or BIOL F371; NRM F380.</td>
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<td><strong>Lecture + Lab + Other:</strong> 3 + 0 + 0</td>
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<td>NRM F675</td>
<td>Theoretical Forest Ecosystem Science</td>
<td>3</td>
<td>Spring Even-numbered Years</td>
<td>Theoretical concepts of forest ecosystem dynamics including theoretical developments in the description of plant growth, ecosystem productivity, decomposition and plant carbon allocation. Development of a model using the basic theoretical constructs.</td>
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<td><strong>Prerequisites:</strong> Undergraduate major in biological sciences or renewable resources including at least one course in ecology, one approved college-level mathematics course and graduate standing.</td>
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<td><strong>Lecture + Lab + Other:</strong> 3 + 0 + 0</td>
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<tr>
<td>NRM F685</td>
<td>Soil Microbiology and Biochemistry</td>
<td>3</td>
<td>As Demand Warrants</td>
<td>Current topics in soil microbiology and biochemistry. Based on readings from the primary literature and discussions in class. Each student will be expected to lead at least one discussion, write a research proposal and present the proposal to class.</td>
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<td><strong>Prerequisites:</strong> At least one course in soil science; one course in microbiology.</td>
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<td><strong>Lecture + Lab + Other:</strong> 3 + 0 + 0</td>
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<tr>
<td>NRM F688</td>
<td>Land Management of Ecosystems (a)</td>
<td>3</td>
<td>As Demand Warrants</td>
<td>Natural resource topics related to the management of the terrestrial environment in regions such as the Pacific Northwest, Hawaii and the circumpolar North. A basic understanding of the ecology of a specific region is presented prior to a spring break field trip designed to give the student a broad understanding of important topics affecting the management of important natural resources in the selected region.</td>
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<td><strong>Prerequisites:</strong> NRM F211; NRM F277; NRM F375 or BIOL F371.</td>
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<td><strong>Stacked with NRM F488.</strong></td>
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<td><strong>Lecture + Lab + Other:</strong> 3 + 0 + 40</td>
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<td>NRM F689</td>
<td>Alaska Soil Geography Field Trip (a)</td>
<td>1</td>
<td>As Demand Warrants</td>
<td>Soil geography along an ecological transect in selected areas of Alaska. Hands-on experiences with soil morphology and exploration of the relationships between soil genesis and other ecological factors including vegetation, geology, landform, climate and hydrology. Includes discussion of soil classification and land use interpretations. Students must provide their own camp gear, be able to walk on uneven or rocky ground and be physically fit for field work.</td>
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<td><strong>Prerequisites:</strong> NRM F380, or a course in soils.</td>
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<td><strong>Stacked with NRM F489.</strong></td>
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<td><strong>Lecture + Lab + Other:</strong> 1 + 0 + 0</td>
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</table>
NRM F692  Graduate Seminar
1-3 Credits
Topics in natural resources management and geography explored through readings, student presentations, group discussions and guest speakers.

Prerequisites: Graduate standing.
Cross-listed with GEOG F692.
Lecture + Lab + Other: 1-3 + 0 + 0

NRM F698  Non-thesis Research/Project
1-9 Credits
Lecture + Lab + Other: 0 + 0 + 0

NRM F699  Thesis
1-12 Credits
Lecture + Lab + Other: 0 + 0 + 0

NRM F699A  Thesis
1-12 Credits
Lecture + Lab + Other: 1-12 + 0 + 0

NRM F699B  Thesis
1-12 Credits
Lecture + Lab + Other: 1-12 + 0 + 0

NRM F699C  Thesis
1-12 Credits
Lecture + Lab + Other: 1-12 + 0 + 0