NEW DEGREE PROGRAM REQUEST
(UA Regulation 10.04.02)

Ph.D. Program in Natural Resources and Sustainability

Submitted to the

University of Alaska Board of Regents

by the Faculties of the

UAF School of Natural Resources and Agricultural Sciences

and

UAF School of Management

February 20, 2008

NEW DEGREE PROGRAM REQUEST

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I. COVER MEMORANDUM

A. Name of Persons Preparing Request

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B. Brief Program Description

Alaska and the Circumpolar North face increasingly complex challenges in use and management of natural resources. These challenges require the education and training of high-level professionals with skills for considering the interaction of social and natural systems and informing the development and implementation of practices and policies that enhance natural resource management. The proposed Ph.D. in Natural Resources and Sustainability (NRS) at the University of Alaska Fairbanks would prepare future leaders as academic researchers, educators, agency and industry professionals and analysts of non-governmental organizations and communities for careers at the frontiers of science in the management of natural resources and environment. The program objectives and its curriculum center around three thematic areas of study, i) resource economics, ii) resource policy and sustainability science, iii) forest and agricultural sciences. In the proposed Ph.D. program, each student draws on a common set of core courses, and with his/her graduate committee, develops a program of coursework and research that produces a unique intellectual contribution to the applied field of Natural Resource and Sustainability. Students elect to focus on one of the three thematic areas or they choose to integrate themes to develop their areas of knowledge and dissertation research.

The proposed Ph.D. program builds on existing resources at UAF and directly complements and supports the mission of several funded university and national initiatives. The Ph.D. program would require the addition of only one new course and no new faculty. It would complement the *Resilience and Adaptation Program* at UAF, which is funded by NSF -IGERT and focused on Ph.D. education and training in the integration of social and natural science to address questions of sustainability in the North. Students of the program would be eligible for support through the newly funded EPSCoR (Phase 3) “Resilience and Vulnerability of a Rapidly Changing North,” which is now being launched and for the next three years will fund approximately 22 graduate students per year. The EPSCoR program emphasis is on building the research capacity at UA to

integrate social, biological, and physical sciences. Other initiatives and current research projects relevant to this Ph.D. program include The Alaska Center for Climate Assessment and Policy, part of NOAA's national Regional Integrated Science Assessment program; the newly funded Scenarios Network for Alaska Planning project at UAF, which is funded by UA and part of a circumpolar IPY program, and the Center for Global Change at IARC, which funds graduate student research on global change. Our research indicates that at least 37 current UAF undergraduates would consider applying for this program if it were offered and, at least 30 current UAF graduate students, most in the UAF Indisciplianry Ph.D. Studies program, would consider transferring into this program if it were available. Likewise 46 current UAF graduate students indicated that they would have considered applying had the program been available at the time of their application. The program therefore builds on the existing strengths of the university to fill a needed niche in Ph.D. studies.

Program objectives are:

1. Educate and train scholars at the Ph.D. level with in-depth and integrated knowledge in research and management of natural resources.
2. Develop leaders who will direct the use and management of natural resources in Alaska and other northern latitude settings.
3. Create a nationally recognized program in the natural resources and sustainability that will contribute to science and inform public decisions.
4. Contribute to the sustainable development of Alaska's rural and urban environments.

C. Approval Signature

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Doug Reynolds
Chair, SOM Curriculum Council at UAF

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Susan Todd
Chair, SNRAS Curriculum Council at UAF

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Carol Lewis,
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Mark Herrmann ,
Interim Dean, School of Management

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Jon Genetti
President, UAF Faculty Senate

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Larry Duffy
Interim Dean, Graduate School

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Steve Jones
Chancellor, UAF

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Mark Hamilton
President, University of Alaska

II. IDENTIFICATION OF PROGRAM

A. Description of the Program

1. Program Title

Ph.D. in Natural Resources and Sustainability

2. Credential Level of Program

Doctor of Philosophy, Ph.D.

3. Admission Requirements and Prerequisites

Selection of Ph.D. applicants will be based on undergraduate and post-baccalaureate GPA, general GRE scores, letters of recommendation, Statement of Intent, and, for some positions, suitable field or laboratory experience. In addition to these criteria, applicants are evaluated on their publications, professional presentations, and previous teaching and research experience. Most students applying for admission to the Ph.D. program should already have an advanced degree in a relevant field, but exceptional students with a bachelor's degree sometimes are admitted directly to the Ph.D. program.

Applicants must comply with University Requirements for a doctoral degree and admission to graduate studies as detailed in the UAF Catalog. Applicants must provide a Statement of Intent indicating why the student wishes to pursue a Ph.D. in Natural Resources and Sustainability at UAF, their research interests, and their professional goals and objectives. Applicants are to include a professional vitae, and three professional letters of references with their application.

4. Course Descriptions (for required core and recommended elective courses).

The core courses of the degree program are provided first. This is followed by a presentation of courses by thematic area.

- **Required Core Courses**

  Beyond the core requirements, individual student programs will be determined by student graduate committees in consultation with students and tailored to the student's academic interest.

  NRM/ECON 694 (TBD) (1 credit) Spring, Fall: NRS PhD Seminar
  New Course, Format 1 syllabus is attached
  New course in which all first-year/second semester Ph.D. students of the program participate, to explore emerging resource and environmental policy issues of Alaska and the circumpolar north. Students are required to enroll in this course for one additional semester later in their program (as determined by their committee).

NRM/ECON/BIO/ANTH 647 (3 credits) Fall: Regional Sustainability
Explores the concepts and key issues of sustainability, resilience, and adaptation of human-environment relations as they pertain to natural resource and environmental management, policy, and economics. Required course year 1 of student's program.

NRM/ECON/ BIO/ANTH 649 (3 credits) Spring: Adaptive Management and Integrated Assessment
Methods in the analysis of social and ecological dynamics for policy making are investigated. Required Course year 1 of student's program

- **Other Relevant courses by Thematic Area**

These are provided as an indication of the breadth and depth of courses available to students within each of the thematic areas. They are neither required nor is this a comprehensive list, and students are encouraged to cross thematic areas or select courses in other related disciplines in their course selection.

Natural Resource and Environmental Economics

ECON 601 (3 Credits) Fall, Microeconomic Theory *I*
Analysis of consumer and producer theory, price determination and welfare economics.

ECON 602 (3 Credits) Alt. Fall: Economic Modeling
Economic Modeling takes a hands-on approach to applied microeconomics and resource modeling. Students are given an opportunity to extend their training in economic theory and econometrics to model real life problems in the areas of renewable and exhaustible resources, non-market valuation and environmental economics. Special emphasis will be given to the use of econometric analyses.

ECON 603 (3 Credits) Spring: Macroeconomic Theory I
Analysis of the underlying causes of unemployment, economic instability, inflation and economic growth.

ECON 623 (3 Credits) Fall: Mathematical Economics
Mathematical techniques including matrix algebra, differential and integral calculus. Particular attention is given to static and comparative statics analysis and dynamic models. (

ECON 626 (3 Credits) Spring: Econometrics
Introduction to econometric theory. Single equation and multiple equation system estimation, including inference and hypothesis testing and results of assumption violation.

ECON 635, (3 Credits) Fall: Renewable Resource Economics
The theory, methods of analysis and current literature of natural resource economics and policy for fisheries, forests and wildlife. Topics include externalities, property rights, public goods, benefit-cost analysis, amenity values and other non-market resource services and environmental policy.

ECON 636 (3 Credits) Spring: Non-Renewable Resource Economics
Exploration of issues relating to the mineral and energy markets. The analysis of energy and mineral use over time, capital investment problems and world market dynamics are explored. Topics include futures markets, present value, energy value and entropy.

STAT 605 (3 Credits) Alt. Spring: Spatial Statistics
Stochastic processes and variograms. Geostatistics including kriging and spatial design of experiments. Point processes including model selection and K-functions. Lattice process models and image analysis. Computer intensive statistical methods.

STAT 611 (3 Credits), Alt. Spring: Time Series
An applied course in time series and repeated measure analysis. Autoregression and moving average models. Estimation of parameters and tests. Prediction. Spectral analysis. Analysis of repeated measures data.

FISH 694 (3 Credits), Alt Spring: Bioeconomic Modeling and Fisheries Management
An introduction to analytic and computational models of discrete-time representations of bioeconomic systems, including comparative static and optimal control perspectives of optimizing for unitary and multiple criteria subject to deterministic and stochastic processes. Particular attention will be given to models of exploited populations of fish and shellfish. (Next offered 2008-09.)

FISH 694 (3 Credits), Alt Spring: Quantitative Analysis for Marine Policy Decisions
An introduction to the practical application of applied mathematical programming, operations research, simulation, risk analysis, adaptive management, and other decision theoretic tools to regulatory decision-making for natural resources and the assessment of environmental damages. (Next offered 2007-08.)

Resource Policy and Sustainability Science

NRM 601 (3 credits) Fall: Research Methods in Natural Resources Management
Introduction for graduate students to the research methods as 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, the approaches to research, the sequence of steps involved in scientific investigation and the presentation of research results.

BIOL 602 (3 credits) Fall: Research Design
An introduction to the philosophy, performance, and evaluation of hypothetical/deductive research in the natural sciences, with emphasis on hypothesis formulation and testing. Each student will develop a research proposal.

NRM 630 (3 Credits) Fall: Resource Management Planning
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.

NRM 631 (3 Credits) ADW: Resource Planning Practicum
Application of principles and processes through group projects focused on Alaska land or resource problems.

NRM 632 (3 credits) Spring: Literature of Science and the Environment
Reading, analysis and discussion of classic and contemporary works in science, natural history and environmental literature. Some semesters all of the readings will follow one theme; other semesters a variety of fiction, poetry, oral tradition and nonfiction will be considered. Readings are selected from a spectrum of opinion on the relationship of people to the natural world and both analytical and creative writing are required.

NRM/ECON 637 (3 Credits) Spring: Natural Resource Policy
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.

NRM 640 (3 credits) Spring: Simulation and Modeling in Natural Resource Management
Introduction to and discussion of the use of simulation and modeling in natural resource management. Emphasis on concepts, strategies and case studies

NRM 648 (3 credits) Spring: Integrative Modeling of Natural and Social Systems.
Provides a modeling approach to structuring knowledge from natural and social scientific disciplines so that relevant aspects of a complex societal problem are considered for the purpose of making management and policy decisions. Designed to help graduate students use models to integrate understanding about interactions among natural and social systems for the purpose of managing biological and human resources. (Prerequisite: STAT 200 or equivalent, graduate standing in a natural science, social science, humanities or interdisciplinary program at UAF or another university, or permission of instructor. The course is designed to fit into the sequence of the Resilience and Adaptation program's core courses. It is open to other graduate students interested in and prepared to conduct interdisciplinary studies relating to regional sustainability.

NRM 663 (3 credits) Fall: Wilderness Concepts

Discovery of wilderness concepts, including the history and evolution of wilderness thought, the contemporary meaning of wilderness, and survey of economic and noneconomic wilderness values for individuals and society.

NRM 665 (3 credits) Fall: Advanced Outdoor Recreation
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.

NRM 681 (3 Credits) Fall: Natural Area Protection and Management
An examination of the emergence of programs to identify, protect and maintain natural diversity and natural areas as a major factor in public and private resource management in the U.S. and Canada. Topics will include conservation biology principles, evolution and operating principles of natural area programs, natural area data management, natural area system administration.

NRM 693 (3credits) Alt Spring: Legal Topics in Natural Resources Law
Introduction to legal concepts and legal research techniques using the context of the Endangered Species Act as a framework. The goals of the course are to gain a basic understanding of how to find and use the law to better understand major legal themes that shape natural resource issues.

NORS 647 (3 Credits) Spring: U.S. Environmental Politics
Explores the basic principles that govern resilience and change of ecological and social systems. The principles are applied at the level of populations, communities, regions and 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 Alaska examples.

NORS 648/PS488 (3 Credits) Fall: Environmental Politics of the Circumpolar North
Overview of how environmental politics and policy as a field of study relates to the Arctic region. Analysis of various threats to the northern environment, focusing on the policy making institutions at selected Arctic rim nations, as well as strategies to deal with environmental problems in an international context.

NORS 654 (3 Credits) Spring: International Law and the Environment
International environmental law. International case law regulating the sea, airspace, outer space and the polar regions. Includes comprehensive international regulatory legal instruments to protect the environment (e.g. the United Nations Framework Convention on Climate Change), and the doctrines, principles and rules of international law that are basic to an understanding of international legal regimes and the environment.

NORS 655/PS 455 (3 Credits) Fall: Political Economy of the Global Environment
Exploration of the interactions between basic aspects of the global economy (international trade, investment and development) and the natural environment. Topics include the economic impact of global environmental agreements and the environmental impact of

global markets, transnational corporations and development assistance by organizations such as the World Bank.

PS 454 (3 credits) Alternate Spring: International Law and the Environment
International environmental law. International case law regulating the sea, airspace, outer space and the polar regions. Includes comprehensive international regulatory legal instruments to protect the environment (e.g. the United Nations Framework Convention on Climate Change), and the doctrines, principles and rules of international law that are basic to an understanding of international legal regimes and the environment.

PS 458 (3 credits) Alternate Fall: Comparative Environmental Politics
Seminar with emphasis on enduring issues of the field of comparative politics and their relation to global environmental problems such as biodiversity, transboundary pollution and climate warming. Explores how state-society relations, political institutions, national political capacity, political processes and organizations, and international commitments potentially shape the nature and dynamics of global environmental politics and vise versa.

Forest and Agricultural Sciences,

NRM 625 (3 Credits) ADW: Advanced Ungulate Management and Production Systems
Functional biology of large herbivores (ungulates) and management of the world's grazing systems. Production strategies (cropping, herding, ranching, and farming) as they pertain to productive and/or commercial management of wild ungulates with emphasis on Alaska's species. Laboratory presents an introduction to flow charting, types of models, model design using various software, construction of a productive grazing system model, compling a written report to explain the system designed.

NRM 638 (3 Credits) Alt. Spring: GIS Programming
GIS programming for ArcView, Arc/Info and ArcGIS. Programming techniques for custominzing GIS, efficient batch processing and development of cuswtom tools for GIS display and analysis.

NRM 640 (3 credits) Alt. Spring: Simulation and Modeling in Resource Management
Introduction to and discussion of the use of simulation and modeling in natural resource management. Emphasis on concepts, strategies, and case studies.

NRM 641 (4 Credits) Fall: Natural Resource Applications of Remote Sensing
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.

NRM 651 (3 credits) Spring: Advanced Silviculture
Examines biological and environmental aspects of silviculture; addresses stand manipulation from the "silviculture 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, pre-harvest silvicultural prescriptions will be addressed.

NRM 659 (1 Credit) Fall: Boreal Forest Management and Soils (n)
Field trip in the Tanana Valley to address forest management and soils. Includes sites from Fairbanks to Northway and south to the Alaska Range. Includes soils of aeolian, glacial, fluvial, residual landforms, supporting conifer, mixed conifer-hardwoord and hardwood forests. Includes wildfire sites young plantations, immature forest stands, mature forest, subalpine and thermokarst sites.

NRM 670 (3 credits) Alt. Fall: Biometeorology
Radiation balance, energy balance relations for natural and modified surfaces; physical environment in relation to biology and ecology of plants and animals, implications for resource and environmental management.

NRM 672 (3 Credits) Alt. Spring: Nutrient Cycling
Examination of physical, chemical and biological processes controlling nutrient element recycling, availability and retention natural and managed ecosystems.

BIOL 672 (3 credits) Alt. Fall: Ecosystem Processes
A comparative approach to the structural and functional components of terrestrial ecosystems, emphasizing primary and secondary production and the dynamics of nutrient cycling processes. Interactions between producers, consumers and decomposition processes, and effects on the efficiencies of nutrient and energy transfers.

NRM 675 (3 Credits) Alt. Spring: Theoretical Forest Ecosystem Science
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.

NRM 678 (3 Credits) Alt. Spring: Ecosystem Management
Ecosystem management addresses the current concepts being debated and used to manage renewable resources. Students will, through reading, discussion and written exercises, develop understanding and applications of the concepts as well as draft definitions.

NRM 681 (3 Credits) Alt. Spring: Natural Area Protection and Management
An examination of the emergence of programs to identify, protect and maintain natural diversity and natural areas as a major factor in public and private resource management in the U.S. and Canada. Topics will include conservation biology principles, evolution and operating principles of natural area programs, natural area data management, natural area system administration,

NRM 685 (3 Credits) ADW: Soil Microbiology and Biochemistry
In-depth examination of several (4-5) 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 the class.

NRM 688 (3 Credits) Spring: Land Management of Ecosystems
Natural resource topics related to management of the terrestrial environment in regions such as the Pacific Northwest, Hawaii, and the circumpolar north are presented.

NRM 689 (1 credit) ADW: Alaska Soil Geography Field Trip
Soil geography along ecological transect in selected areas of Alaska. Hands-on experiences on soil morphology and exposure to 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.

ATM 656 (3 credits) Alt. Spring: Climate and Climate Change
The climate of the planet earth and changes with time. Radiative fluxes, greenhouse effects, energy budget, hydrological cycle, the atmospheric composition and climatic zones. Physical and chemical reasons for climatic change.

BIOL 614 (2 credits) Alt. Fall: Foraging Ecology
The dynamics of herbivory, emphasizing the foraging process and including mechanisms of feeding, feeding behavior, habitat and plant selection, physiological influences on feeding, plant and community level responses, plant defenses against herbivory and management of plant-herbivore systems.

BIOL 622 (3 credits) Alt. Spring: Readings in Conservation Biology
Critcal reading and discussion of historical and contemporary literature concerning extinction patterns, population viability and the preservation, design and management of habitats for small populations. Stresses integration of principles into strategies for biological conservation.

BIOL 659 (4 credits) Fall: Wildlife nutrition
Concepts and techniques used by wildlife biologists to understand relationships between wild animals and their habitats. Techniques for constructing energy and nutrient budgets of wild animals and applications of these budgets to population-level processes and habitat management.

BIOL 669 (3 credits) Spring: Landscape Ecology and Wildlife Habitat
A problem based learning and critical thinking approach to modern methods in landscape ecology, including geographic information systems (GIS), remote sensing, modeling, software, and the internet.

BIOL 675 (3 credits) Alt. Fall: Plant Physiological Ecology
Physiological ecology of dormancy, germination, growth, photosynthesis, water relations and nutrition with emphasis on northern and other stressful environments; relationship to community and ecosystem processes.

CHEM 631 (3 credits) Alt. Spring: Environmental Fate and Transport
Examination of the physical properties that govern the behavior, fate and transport of contaminants released into the environment. Topics include air-water partitioning, diffusion, sorption, chemical and biological transformation reactions, and modeling concepts.

ENVE 642 (3 credits) Alt Spring: Contaminant Hydrology
Theoretical and applied aspects of the movement of contaminants through saturated and unsaturated soil.

GEOS 616 (3 credits) Alt. Spring: Permafrost
The study of the occurrence, thickness, environmental problems, and mass energy transport of permafrost, including soil and ice interaction, freezing and thawing processes, and mechanical and electrical properties and processes.

5. Degree Requirements

1. Complete the general university requirements listed in the UAF catalog
2. Complete the Ph.D. degree requirements listed in the UAF catalog
3. Complete coursework as determined by the advisory committee
4. Required and Elective Elements of the Plan of Study
   a. Coursework: Students must complete the core course requirements of: NRM/ECON/BIO/ANTH 647, NRM/ECON/BIO/ANTH 649, and two semesters of NRM/ECON 694 (seminar)
   b. Outreach activity of one annual public presentation
   c. Advancement to Candidacy occurs when the student demonstrates mastery in understanding of the problems and theories of natural resource management and sustainability and in-depth knowledge of the student's dissertation research topic area. Requirements for advancement to candidacy are determined by the academic committee of the student, and shall be consistent with the candidacy requirements for Ph.D. studies at UAF. The basis of the evaluation will be comprehensive written and oral exams.
   d. Dissertation Defense Seminar
   e. Dissertation Defense Examination
   f. Doctoral Dissertation

● *Three-Year Cycle of Course Offerings*
We provide three sample course cycles to demonstrate the feasibility of each thematic area from the student's perspective. Students may choose to integrate thematic areas. All students are required to enroll in NRM 647 Regional Sustainability in the Fall semester of their first year and NRM 649 Adaptive Management and Integrated Assessment in the Spring semester of their first year. In addition, two semesters of seminar are required (including enrollment in the second semester of their first year). Students in consultation with their adviser and committee will determine the particular course selection that best addresses their academic goals.

● *Sample Course of Study*

Sample three-year course offering Resource Economics

Year One	
Fall	**Spring**
NRM/ECON 647 (Regional Sustainability)	NRM/ECON 649 (Integrated Assessment/ Adaptive Management)
ECON 601 (Microeconomic Theory I)	ECON 626 (Econometrics)
ECON 623 (Mathematical Economics)	NRM/ECON 694 (Seminar)
NRM/ECON 694 (Seminar) 601	
Year Two	
Fall	**Spring**
ECON 635 (Renewable Res. Econ)	ECON 636 (Nonrenewable Res. Econ)
ECON 602 (Economic Modeling)	STAT 605 (Spatial Stat.) or STAT 611 (Time Series)
NRM/ECON 694 (Seminar)	NRM/ECON 694 (Seminar)
Year Three	
Fall	**Spring**
NRM663 (Wilderness Concepts))	ECON 699 (Dissertation)
ECON 699 (Dissertation)	

Sample three-year course offering Resource Policy and Sustainability Science

Year One	
Fall	**Spring**
NRM/ECON 647 (Regional Sustainability)	NRM/ECON 649 (Integrated Assessment/ Adaptive Management)
STAT 401(Regression & ANOVA)	NRM 693 (Legal Topics in Nat. Res. Law)
NRM 601 (Research Methods)	NRM 637 (Resource Policy)
NRM/ECON 694 (Seminar)	NRM/ECON 694 (Seminar)
Year Two	
Fall	**Spring**
NRM678 (Ecosystem Management**)**	NRM 648 (Integ. Model Nat. & Soc. Systems)
NORS 648 (Env. Politics Circumpolar North)	NRM 630 (Resourse Management Planning)
NRM/ECON 694 (Seminar)	NRM/ECON 694 (Seminar)
Year Three	
Fall	**Spring**
NRM665 (Adv. Outdoor Recreation)	BIOL 622 (Readings in Conservation Biology)
NRM 699 (Dissertation)	NRM699 (Dissertation)

Sample three-year course offering Forest and Agricultural Sciences

Year One	
Fall	**Spring**
NRM/ECON 647 (Regional Sustainability)	NRM/ECON 649 (Integrated Assessment/ Adaptive Management)
NRM 601 (Research Methods)	STAT 401 or STAT 402 (Regression & Analytical Var. Or Scientific Sampling)
NRM/ECON 694 (Seminar)	NRM/ECON 694 (Seminar)
Year Two	
Fall	**Spring**
NRM 670 (Biometeorology)	NRM 672 (Nutrient Cycling)
NRM/ECON 694 (Seminar)	NRM/ECON 694 (Seminar)
Year Three	
Fall	**Spring**
NRM 641 (Nat. Res. App. of Remote Sensing**)**	GEOS 616 (Permafrost)
NRM 699 (Dissertation)	NRM 699 (Dissertation)

● Preliminary Catalog *Sample Course of Study*

Program in Natural Resources and Sustainability
School of Management, and
School of Natural Resources and Agricultural Sciences

Ph.D. Degree
Minimum requirement for Degree: 18 thesis credits

The joint Ph.D. Program in Natural Resources and Sustainability at the University of Alaska Fairbanks prepares future leaders as academic researchers, agency professionals and analysts of non-governmental organizations and communities for careers at the frontiers of science in the management of natural resources and environment.

Those who seek to explore and understand natural resource management systems need both a well defined skill set and a clear understanding of how specific problems are linked to broader cultural, ecological, and geopolitical contexts. Thus, the study of Natural Resources and Sustainability encompasses a spectrum of topics. In the UAF Ph.D. in NRS, we build on the existing strengths of SNRAS and SOM faculty members to educate students in specific areas, while training them to be conversant in the broader range of relevant topic areas.

The program objectives and its curriculum center around three thematic areas of study, i) resource economics, ii) resource policy and sustainability science, iii) forest and agricultural sciences. In the proposed Ph.D. program, each student draws on a common set of core courses, and with his/her graduate committee, develops a program of coursework and research that produces a unique intellectual contribution to the applied field of Natural Resource and

Sustainability. Students elect to focus on one of the three thematic areas or they choose to integrate foci to develop their areas of knowledge and dissertation research.

Graduate Program—Ph.D.

Complete the admission process including the following:

1. Complete the general university requirements as listed in the UAF catalog
2. Complete the Ph.D. degree requirements as listed in the UAF catalog
3. Complete coursework in thematic area(s) as determined by the advisory committee.
4. Required and Elective Elements of the Plan of Study
    a. Coursework: Students must complete the following core course requirements: NRM 647, NRM 649, and two semesters NRM 694.
    b. Outreach activity of one annual public presentation.
    c. Advancement to Candidacy occurs when the student demonstrates mastery in understanding of the problems and theories of natural resource management and sustainability and in-depth knowledge of the student's dissertation research topic area. Requirements for advancement to candidacy are determined by the academic committee of the student, and shall be consistent with the candidacy requirements for Ph.D. studies at UAF. The basis of the evaluation will be written and oral comprehensive exams.
    d. Dissertation Defense Seminar
    e. Dissertation Defense Examination
    f. Doctoral Dissertation

B. Program Goals

1. Brief identification of objectives and subsequent means for their evaluation

The proposed Ph.D. in Natural Resources and Sustainability (NRS) at the University of Alaska Fairbanks would prepare future leaders as academic researchers, agency professionals and analysts of non-governmental organizations and communities for careers at the frontiers of science in the management of natural resources and the environment with specific application to Alaska and the circumpolar north. The primary program objectives are to

1. Educate and train scholars at the Ph.D. level with in depth and integrated knowledge in research and management of natural resources.
2. Develop leaders who will direct the use and management of natural resources in Alaska and other northern latitude settings.
3. Create a nationally recognized program in the natural resources and sustainability that will contribute to science and inform public decision.
4. Contribute to the sustainable development of Alaska's rural and urban environments.

Objective	*Measurement*
Educate and train scholars at the Ph.D. level with in-depth and integrated knowledge in research and management of natural resources	• number of graduates • exit interviews with students
Develop leaders who will direct the use and management of natural resources in Alaska and other northern latitude settings	• employment of graduates • number of graduates in senior leadership positions in various sectors
Create a nationally recognized program in natural resources and sustainability that will contribute to science and inform public decision	• publications by students • presentations by students • external funding received
Contribute to the sustainable development of Alaska's rural and urban environments	• citations of student research • stakeholder survey for impact assessment • number of public presentations and other outreach efforts

2. Relationship of program objectives to "Purpose of the University"

The mission of UAF is stated as the following:

> *The University of Alaska Fairbanks, the nation's northernmost Land, Sea and Space Grant university and international research center, advances and disseminates knowledge through teaching, research and public service with an emphasis on Alaska, the circumpolar North and their diverse peoples. UAF--America's arctic university--promotes academic excellence, student success and lifelong learning.*

The Ph.D. Program in Natural Resources and Sustainability will serve this mission by contributing to the following key areas defined by the UAF Strategic Plan 2010.

- Maintain international prominence in research and scholarship with emphasis on the circumpolar North (Strategic Pathways and Goals).
- Spearhead integrated research, emphasizing our complex high latitude physical, biological and social systems (Vision Statement).
- Offer distinctive opportunities in undergraduate and graduate education that take advantage of our location in the Far North" (Vision Statement).
- Promotion of sustainable living in the North (Core Values).
- Increase research programs that address the Arctic and its indigenous people (Strategic Pathways and Goals).
- Increase the proportion of students and faculty engaged in research and scholarly activities (Strategic Pathways and Goals).

The challenges facing researchers and professionals in management of natural resources and environment in Alaska are considerable, and demand an in-depth expertise in specific problem areas as well as integrated academic training. Today's conditions of rapid climate change, globalization, changes in land use, and development add to the challenges of sustainable natural resource management. Establishing a Ph.D. program in NRS builds on UAF's capacity for leadership in sustainable use of Alaska's natural resources and its prominence as America's Arctic University.

3. Occupational/other competencies to be achieved

Natural resource dependent industries, government agencies, non-governmental organizations, policy institutes, Native organizations, academic institutions, and other groups of Alaska today need professionals who have competencies in wide set of natural resource management situations, while also having the in-depth expertise in a specific problem area. The NRS Program strives to meet these needs by training professionals with analytical skills for understanding natural resource problems and sustainability issues. The specific skill set of the graduate will depend on his or her research objectives, but may include quantitative modeling, scientific sampling, statistical analysis, qualitative research methods, research design and management. The broad conceptual frameworks for understanding the social-ecological systems are covered in NRS Program core courses, described below.

4. Relationship of courses to the program objectives

- Core courses: Three courses (NRM/ECON 647, 649, and 694) are required of all students of the NRS Program and have two major goals. First, they focus on fundamental concepts, frameworks, and analytical tools for understanding issues of natural resources and sustainability in an integrated approach. The topics covered in these courses serve as overarching ideas that are related directly to, and integrated with, tools such as cost/benefit analysis, scenario analysis, simulation modeling and planning, social-ecological impacts assessment, cumulative effects assessment, and institutional analysis. Other courses will allow students to enhance their knowledge in their chosen specialty within the program. Second, these courses provide a shared experience and point of reference for students within the program, giving them a basis for continued communication and collaboration across disciplinary lines during the course of their dissertation research.

- Elective courses: Nearly all of the courses described in Section A4 already are being taught at UAF and were included in that section because of their clear and direct relationship to the program objectives. That section is not exhaustive or exclusive, however, as other course offerings at UAF and other UA MAU's may be deemed appropriate by the student and advisory committee

- Research credits: As the Ph.D. is primarily an independent research degree, we interpret "courses" to be any credit-earning activity.

  The following table shows the contribution of each course type to the four specific objectives of the program.

Course	Objective			
	Educate and train scholars at the Ph.D. level with in-depth and integrated knowledge in research and management of natural resources	Develop leaders who will direct the use and management of natural resources in Alaska and other northern latitude settings	Create a nationally recognized program in natural resources and sustainability that will contribute to science and inform public decision	Contribute to the sustainable development of Alaska's rural and urban environments
NRM/ECON 647 Regional Sustainability – *Explores key conceptual and analytical frameworks for understanding issues of sustainability as related to natural resources.*	×	×		×
NRM/ECON 649 Adaptive Management and Integrated Assessment - *Provides training in the tools to undertake research that considers the interaction of social and natural dimensions of sustainability.*	×	×		×
NRM/ECON 694 NRS Seminar – *Explores current topics related to sustainability of natural resources in Alaska.*	×	×	×	×
Elective Courses	×	×		×
Dissertation Credits	×	×	×	×

III. PERSONNEL DIRECTLY INVOLVED WITH PROGRAM

A. List of faculty involved in the program

SOM Faculty

Greg Goering: Associate Dean School of Management and Professor of Economics. *Specializations:* Industrial Organization, Mathematical Economics, Microeconomic Theory. *Teaching Responsibilities:* Mathematical Economics.

Mark Herrmann: Interim Dean School of Management and Professor of Economics. *Specializations:* Fisheries Economics, Econometric Modeling, Markets. *Teaching Responsibilities:* Economic Background for Regional Resilience and Adaptation

Joe Little: Assistant Professor of Economics. *Specializations:* Non-Market Valuation, Forestry Economics, Alternative public land management. *Teaching Responsibilities:* Microeconomics, Resource Economics

Mike Pippenger: Associate Professor of Economics. *Specializations:* International Economics, Time Series Econometrics, Macroeconomics. *Teaching Responsibilities:* Microeconomics

Doug Reynolds: Associate Professor of Economics. *Specializations:* Energy economics, Energy project modeling, Oil and Natural Gas. *Teaching Responsibilities:* Resource Economics

Branka Valcic: Assistant Professor of Economics. *Specializations:* Marine Resource Economics and Policy, Spatial Econometrics, GIS. *Teaching Responsibilities:* Econometrics, Integrated Assessment and Adaptive Management, Resource Economics

SNRAS Faculty

Valerie A. Barber: Assistant Research Professor of Forest Sciences, Director, UAF Sitka Forest Products Program. *Specializations:* Forest Products

Kenneth A. Barrick: Associate Professor of Geography. *Specializations:* Physical Geography. *Teaching Responsibilities:* Geography

Matthew Cronin: Research Associate Professor of Animal Genetics. *Specializations:* Animal Genetics

Cary W. de Wit: Associate Professor of Geography. *Specializations:* Cultural Geography. *Teaching Responsibilities:* Geography

Greg L. Finstad: Instructor and Program Manager, Reindeer Research Program. *Specializations:* Reindeer Husbandry.

Peter J. Fix: Assistant Professor of Outdoor Recreation Management. *Specializations:* Outdoor Recreation Management. *Teaching Responsibilities:* Outdoor Recreation Management

John D. Fox: Associate Professor of Land Resources Management. *Specializations:* Forest Hydrology. *Teaching Responsibilities:* Hydrology, Forest Management, Ethics

Hans Geier: Research Instructor and Extension Resource Economist. *Specializations:* Natural Resource Economics

Joshua Greenberg: Associate Professor of Resource Economics. *Specializations:* Natural resource economics, fisheries policy, community impacts, bio-economic modeling. *Teaching Responsibilities:* Natural Resource Economics, Regional sustainability and resilience

Norman R. Harris: Assistant Professor of Range Management. *Specializations:* Range Science/Management. *Teaching Responsibilities:* Range Management/GIS

Patricia S. Holloway: Professor of Horticulture & Director, Georgeson Botanical Gardens. *Specializations:* Horticulture. *Teaching Responsibilities:* Horticulture

Glenn P. Juday: Professor of Forest Ecology. *Specializations:* Forest Ecology. *Teaching Responsibilities:* Conservation Biology

Meriam G. Karlsson: Professor of Horticulture. *Specializations:* Horticulture. *Teaching Responsibilities:* Plant Science

Gary Kofinas: Associate Professor of Resource Policy and Management. *Specializations:* Community resilience, co-management. *Teaching Responsibilities:* Integrated Assessment/Adaptive Management

Jingjing Liang: Assistant Professor of Forestry. *Specializations:* Natural Resources Management, Wildland Fire Economics and Management, Climate Change, Forest Growth and Yield. *Teaching Responsibilities:* Forest Management, Research Methods, Biometrics

Julie Lurman: Assistant Professor of Natural Resources Law. *Specializations:* Natural Resources Policy and Law. *Teaching Responsibilities:* Natural Resources Policy and Law

Jenifer Huang McBeath: Professor of Plant Pathology/Biotechnology. *Specializations:* Plant Pathology. *Teaching Responsibilities:* Plant Pathology

Anthony T. Nakazawa: Professor of Economics.

Chien-Lu Ping: Professor of Soil Sciences. *Specializations:* Soil Chemistry, Soil Genesis and Classification. *Teaching Responsibilities:* Soil Science

Scott T. Rupp: Associate Professor of Forestry. *Specializations:* Forest Ecology/ Management. *Teaching Responsibilities:* Forest Mensuration

Mike Sfraga: Director, UA Geography Program & Assistant Professor of Geography. *Specializations:* Geography. *Teaching Responsibilities:* Geography

Milan Shipka: Professor of Animal Science & Extension Livestock Specialist. *Specializations:* Animal Science. *Teaching Responsibilities:* Animal Science

Jeffrey Smeenk: Assistant Professor of Horticulture & Horticulture Extension Specialist. *Specializations:* Horticulture

Juan Andres Soria: Assistant Research Professor of Wood Chemistry, SNRAS/AFES. *Specializations:* Bio-fuels, Bio-products, Forest Products

Elena B. Sparrow: Research Associate Professor of Resources Management. *Specializations:* Science Education/Outreach. *Teaching Responsibilities:* Science Education

Stephen D. Sparrow, Jr.: Associate Dean, SNRAS, & Professor of Agronomy. *Specializations:* Soil Science, Agronomy. *Teaching Responsibilities:* Soil Science

Sidney Stephens: Research Instructor of Science Education.

Susan Todd: Associate Professor of Resource Planning. *Specializations:* Resource Planning, Conflict Resolution. *Teaching Responsibilities:* Natural Resources Management, Resource Planning

David Valentine: Associate Professor of Forest Soils. *Specializations:* Forest Soils, Nutrient Cycling. *Teaching Responsibilities:* Nutrient Cycling

David L. Verbyla: Professor of Geographic Information Systems (GIS) in Natural Resources. *Specializations:* Remote Sensing, GIS. *Teaching Responsibilities:* GIS

John A. Yarie: Professor of Silviculture. *Specializations:* Forest Ecology. *Teaching Responsibilities:* Forest Ecology, Silviculture

Mingchu Zhang: Assistant Professor of Agronomy. *Specializations:* Soil Science, Agronomy. *Teaching Responsibilities:* Soil Science

SFOS

Keith Criddle: *Specializations:* Bioeconomic Modeling, Marine Policy, Time Series Analysis. *Teaching Responsibilities:* Econometrics, Marine Policy.

B. Administrative and coordinating personnel

The NRS Ph.D. program will rely on existing personnel for administrative and coordinating support.

C. Classified personnel

The NRS Ph.D. program will rely on existing classified personnel for delivery.

IV. ENROLLMENT INFORMATION

A. Projected enrollment/present enrollment

We anticipate 5 new students per year.

B. How determined/who surveyed/how surveyed

The projected enrollment for the proposed Ph.D. program is based upon the established track record of SNRAS in producing Ph.D.'s and a survey of current UAF students. The historical record and student survey provide strong support for the enrollment success of the Ph.D. program in Natural Resources and Sustainability and for our projection of being able to recruit at least 5 new students per year.

Established Record

Faculty in the School of Natural Resources and Agricultural Sciences have mentored interdisciplinary Ph.D. students since the 1970s, and have graduated an average of 1 per year for the past 10 years (Table 1).

Table 1. Compilation of Ph.D. recipients in interdisciplinary studies at UAF whose advisors were or are faculty in SNRAS (except for David Porter School of Management).

Name, year	Major Professor	Thesis Title	Employment, if known
Robert Parkerson, 1977	Bonita Neiland	The Effects of N, P, K Fertilization on the Lower Stem Xylem of Quaking Aspen in Interior Alaska.	
JoEllen Spencer, 1981	Bonita Neiland	A Comparison of Computer-aided Analysis Techniques for Remote Sensing Data	
Michael Weber, 1982	Keith Van Cleve	The use of ^{15}N in Monitoring Forest Floor Nitrogen Dynamics in Permafrost-free and Permafrost-dominated Black Spruce Ecosystems in Interior Alaska	
Terrance Moore, 1985 (deceased)	Keith Van Cleve	Seasonal Fungal Biomass Dynamics in an Interior Alaskan Paper Birch (*Betula papyrifera* Marsh) and Quaking Aspen (*Populus tremuloids* Michx) Forest and Effects of Long Term Fertilization	
Andrew Gordon, 1986	Keith Van Cleve	Seasonal Patterns of Nitrogen Mineralization and Nitrification Following Harvesting in White Spruce Stands of Interior Alaska	Professor of Environmental Biology, University of Guelph
John Hom, 1986	Keith Van Cleve	Investigations into the Major Controls on the Productivity of Black Spruce (*Picea Mariana*) in the Interior of Alaska	Deputy Program Manager, USDA Forest Service Northern Global Change Research Program
Rudolph Candler II, 1987	Keith Van Cleve	Characterization of Metal-Organic Complexes in Aspen and Birch Forest Soils in Interior Alaska	Laboratory manager UAF, retired
Charles Knight, 1988	Stephen Sparrow	Fate of Fertilizer Nitrogen in a Subarctic Agricultural Soil	Associate Professor at UAF SNRAS, retired, now AK Division of Ag
Katherine Klingensmith, 1988	Keith Van Cleve	Nitrogen Dynamics in Primiary Succssional Soils on the Tanana River of Interior Alaska	Associate Professor of Biology, Keuka College
David Pare, 1990	Keith Van Cleve	Dynamics of Nutrient Cycling on Post-Harvested White Spruce Sites in Interior Alaska	Researcher, Canadian Forest Service

Name, year	Major Professor	Thesis Title	Employment, if known
Andrew Youngblood, 1992	Keith Van Cleve	Structure and Dynamics in Mixed Forest Stands of Interior Alaska	Researcher, USDA Forest Service
Robert Ott, 1997	Glenn Patrick Juday	Natural Disturbance at the Site and Landscape Levels in Temperate Rainforests of Southeast Alaska	AK Division of Forestry
T. Scott Rupp, 1997	John Yarie	Regeneration Dynamics of Interior Alaska White Spruce Ecosystems: Modeling Establishment Patterns	Associate Professor of Forest Measurements, UAF
Frederick Foster, 1998	Carol E. Lewis	Mapping Impacts of Education for Wilderness Management Planning	Coastal Training Program Coordinator, Kachemak Bay Research Reserve
Donald Pendergrast, 1998	Alan Jubenville	Evaluating Interpretive Services	Outdoor Recreation Planner, National Park Service
Xiaoyan Dai, 2001	Chien-Lu Ping	Bioavailablity and Chemical Characterization of Soil Organic Matter in Arctic Soils	
Valerie Barber, 2002	B. Finney & G. Juday	Millennial to Annual Scale Paleoclimatic Change in Central Alaska During the Late Quaternary Interpreted From Lake Sediments and Tree Rings	Assistant Research Professor, SNRAS, UAF
David Maddux, 2002	Stephen Sparrow	Constructed Wetlands for Wastewater Treatment in the Subarctic	Wetland Ecologist, Applied Wetlands Technology
Dorte Dissing, 2003	David L.Verbyla	Landscape Control of Thunderstorm Development in Interior Alaska	GIS Specialist, ABR
Betty McKinney, 2003	David O. Porter	Alaska's Quality Schools Initiative: A Description and Analysis on 51 School's Perceived Strengths and Weakness in Factors Associated with Organizational Change	
Martin Wilmking, 2003	Glenn Patrick Juday	The Treeline Ecotone in Interior Alaska-From Theory to Planning and the Ecology in Between	Emmy Noether Junior Research Group Leader "Ecosystem Dynamics", Greifswald University,

Name, year	Major Professor	Thesis Title	Employment, if known
			Germany
Jason Vogel, 2004	David W. Valentine	Carbon Cycling in Three Mature Black Spruce (*Picea mariana* [Mill.] B.S.P) Forests in Interior Alaska	Post Doctoral Fellow, University of Florida
Mingyuan Cheng, 2004	Jennifer H. McBeath	Mechanisms Involved in the Cold Tolerant *Trichoderma atriviride* Biocontrol	
Evan Kane, 2006	David W. Valentine	Mechanisms of Soil Carbon Stabilization in Black Spruce Forests of Interior Alaska: Soil Temperature, Soil Water, and Wildfire	Post Doctoral Fellow, Michigan State University
Paul Duffy, 2006	T. Scott Rupp	Interactions Among Climate, Fire, and Vegetation in the Alaskan Boreal Forest	Consultant, Neptune Inc.

SNRAS faculty currently are mentoring 8 Ph.D. students (Table 2).

Table 2. Current Ph.D. students in interdisciplinary studies at UAF whose advisors are faculty in SNRAS.

Name	Major Professor
Archana Bali	Gary Kofinas
David D'Amore	Dave Valentine
Dixie Dayo	Gary Kofinas
Gregory Finstad	Norm Harris and Knut Kielland
Kimberly Maher	Glen Juday
Chanda Meeks	Gary Kofinas
James Powell	Gary Kofinas
Martha Raynolds	Dave Verbyla
Aigin Zhoa	Jennifer McBeth

Student Survey

Methods

The following enrollment projections were derived using data obtained through an online survey conducted between May and September of 2007. The survey was administered to 1,600 graduate and undergraduate students at the University of Alaska-Fairbanks in the College of Engineering, College of Sciences and Mathematics, School of Natural Resources and Agricultural Sciences,

and the School of Management. In addition, students in the political science and anthropology departments were also surveyed. Students were contacted by email and invited to participate in the online survey. The survey was hosted on Surveymonkey, which provides secure and confidential web survey administration services. Students were allowed to take the survey once. After accounting for undeliverable email addresses and student opt-out requests a total 1,396 students were contacted. A total of 163 students participated which yields a 12% response rate. The low response rate is attributable to the lack of multiple follow-up contacts.

The sample frame employed is representative of graduate and undergraduate students at UAF who are likely applicants to the proposed program. Due to the limited sample frame, the findings should not be used to make inferences about potential applicants coming from outside of UAF or the state.

Copies of the survey are available in Appendix A of this proposal. To assess potential application numbers undergraduate students were asked if they would consider applying to the program. While graduate students were asked if they would have considered applying had the program existed prior to the start of their graduate studies. Graduate students were also asked if they would consider transferring from their current graduate program into the proposed doctoral program if it were established before they completed their course of study. Students were also given an opportunity to indicate which study tracts they would be interested in pursuing, they also provided some personal information. Basic descriptive statistics along with principal survey questions are presented in Tables 3-9. Survey data have also been broken down by gender and Alaska residency (Tables 10-15).

Discussion

Of the 162 responses, approximately 73 (44%) of respondents were graduate students and 89 (56%) were seniors. Undergraduate students were asked if they would consider applying to the proposed program (Table 3). For UAF undergraduates, a total of 37 (44%) out of 89 students would consider applying to the program (Table 4). Graduate students were asked two separate questions given their current enrollment in active graduate programs. The first inquired if they would consider transferring to the new program if it were established prior to the completion of their graduate studies (Table 5),[1] the second asked if they would have considered applying had the program been available at the time of their application (Table 6). Of the 73 graduate student respondents, a total of 30 (40%) would consider transferring to the proposed program. Most of these students are currently enrolled in the UAF Interdisciplinary Ph.D. Studies program While 46 students (64%) indicated that they would have considered applying to the proposed program had it been available at the time they were applying to graduate school. Combining data presented in Tables 4 and 6, a total of 83 UAF students, graduate and undergraduate, expressed positive interest in the proposed program. While this data should not be generalized to larger student populations it is likely that, if marketed extensively, it would be possible to generate significant external student interest in the program. To complete the survey, students provided information about their gender and residency status (AK resident/Non-Resident), this information is found in Tables 8 and 9. Of the 162 individuals surveyed, 88 (58%) of the respondents were female. Given the sample frame employed it is not surprising that 117 of 162 respondents (77%) were Alaska residents. Information on survey respondent gender and Alaska

[1] Information pertaining to transfer requirements are, as of yet, undetermined. Accordingly, graduate students were not provided this information on the survey. In addition, the survey did not ask graduate students to provide information on where they were in their current course of studies.

State residency was used to further breakdown student interest in the program (Tables 10-15). Of note, female respondents expressed a strong interest, particularly graduate students, in applying to the program. Approximately 60% of female graduate level respondents indicated that they would apply for the program had it existed (Table 12). From the standpoint of serving the needs of Alaskan students, the data also indicate that UAF graduate and undergraduate students with Alaska residency have a strong interest in applying to the program. Approximately 40% of UAF undergraduates with Alaska residency (Table 13) would consider applying, 37% of UAF graduates with Alaska residency (Table 14) would consider transferring, and 64% of UAF graduates with Alaska residency (Table 15) would have considered applying to the program.

Table 3: Current Academic Standing

1. What is your current academic standing (check most appropriate answer)?

Standing	Number of Responses	Percent of Responses
Sophomore	17	10.6
Junior	20	11.9
Senior	35	21.9
Graduate	72	44.4
Other	18	11.3
Observations	162	

Note: The category "Other" consists of recent graduates.

Table 4: UAF Undergraduate Student Program Interest

2. Would you consider applying to a doctoral program in Natural Resources and Sustainability if one was available at UAF?

Response	Number of Responses	Percent of Responses
Yes	37	41.6
No	52	58.4
Observations	89	

Table 5: UAF Graduate Student Interest in Transferring to Proposed Program

3. Would you consider transferring into this program if it were established before you complete your graduate program?

Response	Number of Responses	Percent of Responses
Yes	30	40.3
No	43	59.7
Observations	73	

Table 6: UAF Graduate Student Interest in Applying to Proposed Program

4. Had doctoral program in Natural Resources and Sustainability had been available would you have considered applying?

Response	Number of Responses	Percent of Responses
Yes	46	63.9
No	27	36.1
Observations	73	

Table 7: Course of Study Interest

6. Which study track(s) are of interest to you? (Please Check All That Apply)

Study Track	Number of Responses	Percentage of Responses
Resource Environmental Economics	63	48.1
Resource Management	71	53.4
Resource Ecology	66	50.4
Integrated	64	48.1
Observations	264	

Note: Respondents were allowed to select more than one option.

Table 8: Respondents by Gender

Gender	Number of Responses	Percentage of Responses
Female	88	57.9
Male	64	42.1
Observations	152	
Non-Response	10	

Table 9: Respondents by Alaska Resident Status

Residency	Number of Responses	Percentage of Responses
Alaskan	117	77
Non-Resident	35	23
Observations	152	
Non-Response	10	

Table 10: Undergraduate Student Interest by Gender

Response	Response Proportion
Female	
Yes	0.37
No	0.63
Male	
Yes	0.44
No	0.56

Table 11: Graduate Student Interest in Transferring by Gender

Response	Response Proportion
Female	
Yes	0.40
No	0.60
Male	
Yes	0.35
No	0.65

Table 12: Graduate Student Interest in Applying by Gender

Response	Response Proportion
Female	
Yes	0.62
No	0.38
Male	
Yes	0.59
No	0.41

Table 13: Undergraduate Student Interest in Applying by Alaska Residency

Response	Response Proportion
AK Resident	
Yes	0.40
No	0.60
Non-Resident	
Yes	0.40
No	0.60

Table 14: Graduate Student Interest in Transferring by Alaska Residency

Response	Response Proportion
AK Resident	
Yes	0.33
No	0.67
Non-Resident	
Yes	0.45
No	0.55

Table 15: Graduate Student Interest in Applying by Alaska Residency

Response	Response Proportion
AK Resident	
Yes	0.64
No	0.36
Non-Resident	
Yes	0.54
No	0.46

C. Minimum enrollments to maintain program for years 1, 2, 3, 4, and 5

At least one new student per year.

D. Maximum enrollment which program can accommodate

Given current resources the maximum enrollment the program can accommodate is 30 students at any given time. The main limiting factor will be available faculty workloads for advising students and serving on student's committees and office space for students. All students will be

funded through external grants, so funding from UAF will not limit the number of students the program can accommodate. Currently, graduate students in SNRAS are housed in various offices on West Ridge, including a temporary unit near AHR Building, one office area in O'Neill, Fairbanks Experiment Farm, and in laboratories at Fairbanks and Palmer. Graduate students in the SOM Resource and Applied Economics are housed in various offices in Bunnell.

E. Special restrictions on enrollments

Other than meeting admissions criteria and limiting the total number of students to 30, the program will have no special restrictions on enrollments.

V. NEED FOR PROGRAM

A Requirement for Other Programs

Not applicable

B. Employment Market Needs

A survey of employment market needs has not been conducted at the current time. A survey will be conducted in the future. In this document, we establish employment market needs through an assessment of employment based on a variety of data collected from the National Science Foundation's "Survey of Earned Doctorate (SED)," and the Bureau of Labor Statistics (BLS) "Occupational Outlook Handbook (BLSH)," as well as other information. The proposed study tracks were assumed to correspond to the broader doctoral field of Biological and Agricultural Sciences and Economics collected by the NSF. Trend data on the number of earned doctorates (years 1966-2004) in comparable academic fields indicate that there has been considerable growth in the number of Ph.D's granted in biological and agricultural sciences. With approximately 2,700 Bio-ag Ph.D's being granted in 1966 and approximately 7,000 being granted in 2004. The expansion in the number of Bio-ag science Ph.D's suggests that there was a growing demand for individuals with requisite skills in these fields during the period studied. As noted in the BLSH, the 2006 outlook for Alaska predicts continued growth in the demand for these fields and, concurrently, and upward trend in salaries (BLSH 2006). Over the same study period the number of Economic Ph.D's granted showed upward growth between 1966 and 1974 but has fluctuated since that time. Given the substantial quantitative rigors associated with advanced economic studies this information is unsurprising. The occupational outlook projects average growth in the demand for Ph.D. level economists, however, the BLS also projects above average growth in salaries (BLSH 2006). Detailed Alaska (as of May 2006) wage and salary information for occupations that correspond to the study tracts proposed for the program are presented in Table 16.

A recent Fairbanks Daily News-Miner article summarizes the difficulties the State of Alaska has encountered in trying to find qualified personnel to fill positions. As noted in the article,

approximately one-third of state employees depart their jobs on a yearly basis and one-quarter of state employees will qualify for retirement in the next five years (News-Miner 2007). The shortage of qualified workers itself, suggests that employment opportunities for students in the proposed program should be exceptional. To further underscore the point the same article contains this statement made by the Alaska Department of Natural Resources: [DNR] "Lacks the human resources needed to properly fulfill its mission." Provided the information gleaned from the student data, the proposed program would serve Alaska students and serve the state as program graduates would have the requisite training and qualifications needed to help state agencies execute their missions.

Table 16: Alaska Employment and Wage Data (Select Occupations)

Occupation (SOC code)	Employment(1)	Percent Employed in Anchorage	Annual mean wage(2)
Conservation Scientists	220	25.3	$66,190
Foresters	110	2.2	$59,130
Environmental Scientists and Specialists, Including Health	520	7.6	$62,870
Economists	40	5.3	$68,910

Notes:
(1) Estimates for detailed occupations do not sum to the totals because the totals include occupations not shown separately. Estimates do not include self-employed workers.
(2) Annual wages have been calculated by multiplying the hourly mean wage by 2,080 hours; where an hourly mean wage is not published, the annual wage has been directly calculated from the reported survey data.

SOC code: Standard Occupational Classification code -- see http://www.bls.gov/soc/home.htm

Graduates of the Ph.D. in UAF Natural Resources and Sustainability will have several professional tracks from which to choose, and we anticipate they will have ample employment opportunities within each. Graduates electing a career in academics will find a range of faculty positions in schools of natural resource, resource economics, and environmental studies and sciences. These Ph.Ds will also find an increasingly expanding number of research funding opportunities related to integrated or interdisciplinary programs that explicitly link social, economic, and ecological dimensions. Several examples of this type of research currently exist through the National Science Foundation, and graduates of the program will be well positioned to serve as grant PIs. Those electing to pursue professional careers with government agencies, such as the National Park Service or the Alaska Department of Environmental Conservation, will find that their skills as applied resource management researchers will be in high demand as agencies address societal-ecological problems, such as the economic implications of climate change. Other professional tracks are available as well. There is currently a trend among non-governmental organizations (i.e. non-profits) of Alaska and the United States as a whole to build the organizational research capacity with internally hired Ph.Ds. The Nature Conservancy, the Wilderness Society, and Audubon Society are examples of such organizations that currently

employ research staff with Ph.D. training. These Ph.Ds will also have ample opportunities to work as private consultants, especially given the need for rigorous analysis by private consultant firms that are hired to conduct environmental impact assessments. As well, the recent stated objective of the Alaska Federation of Natives board of directors to train more Alaskan Native Ph.Ds reflects to the need for well-trained researchers to staff organizations like the First Peoples Institute and Native profit and not-for-profit organizations. We anticipate that the demand for Ph.Ds in the area of natural resources and sustainability will grow significantly as Alaska addresses future questions of sustainable development.

VI. OTHER

No material at this time.

VII. RESOURCE IMPACT

A. Budget

This program will be offered at no additional cost to the University. We utilize existing University resources including faculty and staff support to offer the program. SNRAS has an demonstrable record of producing Ph.D.'s through the UAF INDS program using its available resources. By teaming with SOM in this program, we are able to pool our existing resources to offer the program without additional budget requirements.

The completed Resource Commitment Form is attached.

B. Facilities/space needs

We will rely on existing facilities and space to so support the Ph.D. program. This includes faculty, student and administrative offices, instructional space, and research space.

C. Credit hour production

A maximum of 270 credit hours per semester given 30 students enrolled full-time (minimum 9 credit hours per semester).

D. Faculty

There will be a program director (part time) who will be an existing faculty. Other faculty will participate through student committee participation and course instruction. No new faculty are requested to meet these requirements. However, this is contingent on the continued availability of current faculty positions in SNRAS and SOM.

E. Library/Media materials, equipment and services:

Need to respond to following question: 'Have you reviewed the Library/Media material, equipment and services needed by this proposed action with the Library Collection Development Officer? (Karen Jensen, 6695)'

Existing resources meet program needs.

VIII. RELATION OF PROGRAM TO OTHER PROGRAMS WITHIN THE SYSTEM

A. Effects on enrollments elsewhere in the system

Students may enroll in courses outside the program.
Our survey results show that there is considerable interest in this program from students currently enrolled in the INDS Ph.D. program.

B. Does it duplicate/approximate programs anywhere in the system?

No

C. How does the program relate to research or service activities?

1. Contributions to research or service

Like most other Ph.D. programs, the NRS Ph.D. Program is centered on training students in original research. The NRS Program will distinguish itself from other programs by emphasizing research focused on both disciplinary (e.g., forest ecology, resource economics) and interdisciplinary (e.g., reaching ecological and economic objectives via adaptive management) natural resource issues at high latitudes, focused primarily on Alaska. In so doing, the NRS Program will contribute directly to the research mission of the University of Alaska, particularly with respect to the following elements of the Vision Statement in the 2006 Strategic Plan:

- Spearhead integrated research, emphasizing our complex high latitude physical, biological and social systems
- Link research discoveries with teaching, service and community engagement
- Create innovative collaborations with communities, businesses and governments that meet state, national and global needs

2. Benefits from research or service activities

The University of Alaska Fairbanks is currently involved in several funded national initiatives that complement the goals and objectives of the proposed Ph.D. program. The *Resilience and Adaptation Program* at UAF is funded by NSF -IGERT from 2002 to 2011 and is focused on Ph.D. education and training in the integration of social and natural science to address questions of sustainability in the North. The second phase of the program, "Resilience and adaptation of Social-Ecological Systems in a Rapidly Changing North," refunded by NSF in 2007 ($3.2m/five years), provides traineeship funding that will support for more that 20 Ph.D. students for two

years each. The program currently has more than 50 graduate students, with many of these students currently enrolled in UAF's INDS Ph.D. program, and are likely candidates for the NRS Ph.D. The newly funded EPSCoR (Phase 3) "Resilience and Vulnerability in a Rapidly Changing North" ($9m/three years) is now being launched and for the next three years will fund approximately 22 graduate students per year. The EPSCoR program emphasis is on building the research capacity at UA to integrate social, biological, and physical sciences; the proposed NRS Ph.D. would provide an important educational complement to that effort. Other initiatives and research projects include The Alaska Center for Climate Assessment and Policy**,** part of NOAA's national Regional Integrated Science Assessment program; the newly funded Scenarios Network for Alaska Planning project at UAF, which is part of a circumpolar IPY program and led by a SNRAS faculty member; and the Center for Global Change at IARC, which funds graduate student research on global change.

IX. IMPLEMENTATION/TERMINATION

A. Date of implementation

Program is targeted to be available Fall 2008.

B. Plans for recruiting students

Ph.D. recruitment typically occurs through faculty contacts. Websites have become the primary recruitment tool for graduate programs, e.g., UAF RAP program. We will develop a program website. The website will provide program details, faculty contacts, research themes, funding opportunities and an on-line application.

We will plan to utilize the newly developed website of the UAF M.S. Resource and Applied Economics Program, developed by one of the program's faculty, as a template for our web-site. The website has been developed as a both recruitment and retention tool. As a recruitment tool, the website offers all the necessary information prospective students may be interested in, including the admissions process, program requirements, funding opportunities, research opportunities, faculty information, lifestyle information, and current graduate students' information. As a retention tool, it offers information (including links to all the necessary forms) of importance to current students, such as progress guidelines, course descriptions and schedule, research opportunities, upcoming seminars, as well as current graduate students' information. The website is made searchable through the Internet search engines, such as Google, by specifying a number of keywords, in addition to the text that exists on the page. The more times the website has been linked to other websites (e.g. university, professional organizations, individual faculty pages), the higher its ranking will be when searched through a search engine. As the M.S. program is making sure that the M.S. website is widely linked, we will make sure that our Ph.D. program's website is widely linked appearing within the first three websites when one uses keywords such as natural resources, sustainability, forestry, resources management.

Additional recruitment tools to be developed include the following:

- Program brochures to be distributed to academic and agency sites. North American Universities offering M.S. programs in Natural Resources, Economics, Wildlife Biology and related fields will be particularly targeted.
- Professional meetings—posters and direct faculty initiated student recruitment
- Professional and organizational associations such as the National IGERT Association, the Society of American Foresters, the Association of Environmental and Resource Economists, the Ecological Society of America, and the American Society for Horticultural will be utilized to distribute program information
- Establish relationships with and distribute recruitment materials through high-latitude institutions with program in relevant fields of study via University of the Arctic programs.
- List serves such as the ones for Resource Economics, the International Institute of Fisheries Economics and Trade, and the International Arctic Social Sciences Association will be utilized.

C. Termination date (if any)

N/A

D. Plans for phasing out program if it proves unsuccessful

In the event of termination students are guaranteed degree completion and this will require no additional resources.

E. Assessment of the program. (Include a Student Outcomes Assessment Plan.)

Academic Outcomes Assessment Plan--Ph.D. in Natural Resources and Sustainability.

EXPANDED STATEMENT OF INSTITUTIONAL PURPOSE	INTENDED OUTCOMES/OBJECTIVES	ASSESSMENT CRITERIA AND PROCEDURES	IMPLEMENTATION
Mission Statement: The School of Natural Resources and Agricultural Sciences and the School of Management are committed to educating scholars at the Ph.D. level with in-depth and integrated knowledge about natural resources research and management.	Graduates will have the skills to carry out world-class research in natural resources and their management and to participate responsibly in the decision making process about the use of natural resources.	Establish measures of advanced level of knowledge about natural resources and their management.	Require a comprehensive examination to be administered in the second year of enrollment in a graduate program. Questions will address basic knowledge in mathematics, science, and economics related to natural resources and their management and appropriate course work chosen by the student and their committee. Evaluate Ph.D. dissertations for content quality. Administer exit interviews by the deans of the schools.
Develop leaders who will effectively direct the use and management of natural resources in Alaska and other high latitude regions.	Graduates are prepared to enter and move into high level resource management positions and to effectively affect policy related to natural resource use and management.	Measure employment success in high level positions in natural resource related fields	Track employment record of graduates through alumni and employer surveys.

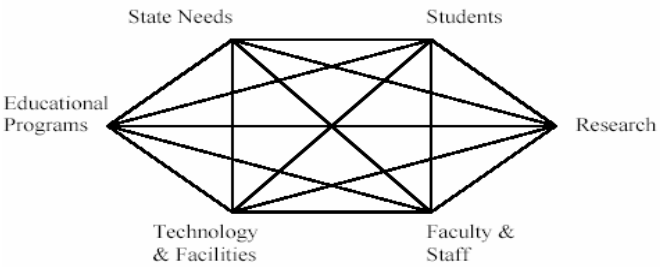
NRS Ph.D. Proposal

EXPANDED STATEMENT OF INSTITUTIONAL PURPOSE	INTENDED OUTCOMES/OBJECTIVES	ASSESSMENT CRITERIA AND PROCEDURES	IMPLEMENTATION
Educate students who will be recognized nationally and internationally and who will contribute significantly to science and inform public decision.	Graduates are capable of high level contributions to the knowledge of natural resources management and sustainability and to use that knowledge to inform the public about natural resource management.	Provide a measure of students ability to be productive scientists and to be good communicators with the public	Track numbers of publications in high level peer reviewed journals and amounts external funding received by graduates. Track number of publications designed to inform the public and presentations at public meetings.
The hallmark of quality graduates will be their ability to contribute significantly to the sustainable development of Alaska's and the Circumpolar North's rural and urban environments.	Graduates are prepared to effectively make and influence decisions about resource use, conservation, and sustainable development.	Provide a measure of knowledge in sustainable resource use and management and their abilities to work with the public and policy makers to develop decisions that will result in wise use and management of natural resources.	Track citations of students' research. Periodically administer stakeholder surveys to assess impact. Track number of public presentations and other outreach efforts.

X. REGENTS GUIDELINES

The Board of Regents' requires the completion of the following Summary Form.
* *see next page*

University of Alaska Board of Regents
Program Approval Summary Form
MAU: UAF
Title: Ph.D. Natural Resources and Sustainability
Target admission date: Fall 2008



How does the program relate to the **Education** mission of the University of Alaska and the MAU?

The Ph.D. Program in Natural Resources and Sustainability (NRS) directly services the educational mission of the University of Alaska Fairbanks. The UAF Vision Statement (Strategic Plan 2010) states that UAF will "Offer undergraduate and graduate education that takes advantage of our location in the Far North." This Ph.D. program focuses on the education of high-level professionals with skills for considering the interaction of social and natural systems and informing the development and implementation of practices and policies that enhance natural resource management with emphasis on Alaska and the Circumpolar North.

The University of Alaska Fairbanks is currently involved in several funded national initiatives that are relevant to the educational goals and objectives of the NRS Ph.D. program. The *Resilience and Adaptation Program* at UAF is focused on Ph.D. education and training in the integration of social and natural science to address questions of sustainability in the North. The NRS Ph.D. program would provide an important educational complement to the emphasis of the newly funded *EPSCoR* (Phase 3) on building the research capacity at UA to integrate social, biological, and physical sciences; The NRS Ph.D. program would also provide a key educational linkage to several other UAF initiatives and research projects including The Alaska Center for Climate Assessment and Policy, the newly funded Scenarios Network for Alaska Planning project at UAF, which is part of a circumpolar IPY program and the Center for Global Change at IARC, which funds graduate student research on global change.

What **State Needs** met by this program.

Alaska and the Circumpolar North face increasingly complex challenges in use and management of natural resources. These challenges require the education and training of high-level professionals with skills for considering the interaction of social and natural systems and informing the development and implementation of practices and policies that enhance natural resource management. The Ph.D. in Natural Resources and Sustainability at the University of Alaska Fairbanks would prepare future leaders as academic researchers, educators, agency and industry professionals and analysts of non-governmental organizations and communities for careers at the frontiers of science in the management of natural resources and environment.

What are the **Student** opportunities and outcomes? Enrollment projections?

Graduates electing a career in academics will find a range of faculty positions in schools of natural resource, resource economics, and environmental studies and sciences. These Ph.D.'s will also find an increasingly expanding number of research funding opportunities related to

integrated or interdisciplinary programs that explicitly link social, economic, and ecological dimensions. Several examples of this type of research currently exist through the National Science Foundation, and graduates of the program will be well positioned to serve as grant PIs. Those electing to pursue professional careers with government agencies, such as the National Park Service or the Alaska Department of Environmental Conservation, will find that their skills as applied resource management researchers will be in high demand as agencies address societal-ecological problems, such as the economic implications of climate change. Other professional tracks are available as well. There is currently a trend among non-governmental organizations (i.e. non-profits) of Alaska and the US as a whole to build the organizational research capacity with internally hired Ph.D.'s. The Nature Conservancy, the Wilderness Society, and Audubon Society are examples of such organizations that currently employ research staff with Ph.D. training. These Ph.D.'s will also have ample opportunities to work as private consultants, especially given the need for rigorous analysis by private consultant firms that are hired to conduct environmental impact assessments. As well, the recent stated objective of the Alaska Federation of Natives board of directors to train more Alaskan Native Ph.D.'s reflects to the need for well-trained researchers to be staff organizations like the First Peoples Institute and Native profit and not-for-profit organizations. We anticipate that the demand for Ph.D.'s in the area of natural resources and sustainability will grow significantly as Alaska addresses future questions of sustainable development.

Targeted enrollment is five students per year. Total enrollment is seen as twenty students by year four of the program.

Describe **Research** opportunities:

The NRS Ph.D. Program is centered on training students in original research. The NRS Program will distinguish itself from other programs by emphasizing research focused on both disciplinary (e.g., forest ecology, resource economics) and interdisciplinary (e.g., reaching ecological and economic objectives via adaptive management) natural resource issues at high latitudes, focused primarily on Alaska. In so doing, the NRS Program will contribute directly to the research mission of the University of Alaska, particularly with respect to the following elements of the Vision Statement in the 2006 Strategic Plan:

- Spearhead integrated research, emphasizing our complex high latitude physical, biological and social systems
- Link research discoveries with teaching, service and community engagement
- Create innovative collaborations with communities, businesses and governments that meet state, national and global needs

Describe Fiscal Plan for development and implementation:

There are no new funds being sought for the program. Courses included in the program are currently being offered. Existing faculty and administrative staff will deliver and administrate the program. Students will be located in existing student office facilities at SOM and SNRAS.

ATTACHEMENTS

Resource Commitment

RESOURCE COMMITMENT TO THE PROPOSED DEGREE PROGRAM
(please see budget notes on next page

Resources	Existing	New		Total
	College/School	College/School	Others (Specify)	
Regular Faculty (FTE's & dollars)	$13,325	$0	$0	$13,325
Adjunct Faculty (FTE's & dollars)	$0	$0	$0	$0
Teaching Assistants (Headcount)	$0	$0	$0	$0
Instructional Facilities (in dollars and/or sq. footage)	800 sq ft.	$0	$0	800 sq ft.
Office Space (Sq. footage)	1,392 sq. feet	$0	$0	1,392 sq. feet
Lab Space (Sq. footage)	none	$0	$0	none
Computer & Networking (in dollars)[f]	none	$0	$0	none
Research/ Instructional/ Office Equipment (in dollars)	none	$0	$0	none
Support Staff (FTE's & dollars)	$25,295	$0	$0	$25,295
Supplies (in dollars)	negligible	$0	$0	negligible
Travel (in dollars)	none	$0	$0	none

Signature_____ _____
Carol Lewis, Dean of SNRAS Date

Signature_____ _____
Mark Herrmann, Interim Dean, SOM Date

Notes on Resource Commitment

The School of Natural Resources and Agricultural Sciences and the School of Management are committed to delivering the proposed doctorate program in Natural Resources and Sustainability at zero additional cost to the two schools. This will be accomplished by reallocating existing resources within the Schools, including resources that are already committed through our graduate programs, and by utilizing externally sponsored research projects to fund additional requirements associated with student graduate work. Below are specific notes on the Resource Commitment form categories.

Regular Faculty: The School of Management will be offering one additional 3-unit course that is currently on the books but has never been taught (Econ 602 – Economic Modeling). The Economics Program will reallocate existing faculties time to teach this course. Thus, the 1/10 time to teach this course ($9,926 salary and benefits) will be a workload reallocation.

The School of Natural Resources and Agricultural Sciences and the School of Management will jointly teach one additional 1-unit course (NRM/Econ 694 – NRS Seminar). The Natural Resources Management and Economics programs will reallocate existing faculties' time to teach this course. Thus, the 1/30 time to teach this course ($3,309 salary and benefits) will be a workload reallocation.

Instructional Facilities: For the two new courses there will be a need for approximately a 400 sq ft. classroom per course. The classroom used may replace one in another course or be offered during a non-peak time, such as evenings. Classroom requirements should not be a burden to UAF and most likely will be a reallocation of space.

Office Space: We estimated 1,392 sq ft. for students based on an assumption of a sustainable 12 students in the program using 116 sq ft. of office space. This space will be reallocated from existing uses.

Computers: As both schools upgrade their faculty computers the replaced computers will be made available for the new students. Other computer equipment will come from sponsored research.

Support Staff: The main support staff will be housed in the School of Natural Resources and Agricultural Sciences. The Administrative Assistant for the Natural Resource Management program and the Administrative Assistant for UA Geography program will have $1/10^{th}$ of their annual time reallocated to provide administrative services to the NRS Ph.D. program (e.g., monitor and track student applications, coordinate academic paperwork, etc…). The Student Coordinator for SNRAS will have $1/10^{th}$ of their time reallocated to provided student recruitment and support services. The expense listed, $25,295, is calculated as the sum total of this $1/10^{th}$ annual time reallocation for each of the current support staff based on their current salary and benefits.

Supplies: Supplies for students will be negligible. Any large supply needs will come from sponsored research.

Travel: Student travel will come from sponsored research or UAF travel grants.

New Course: Natural Resources and Sustainability Seminar, Format 1

FORMAT 1
Submit original with signatures + 3 copies

TRIAL OR NEW COURSE PROPOSAL

SUBMITTED BY
NOTE: use the tab key to move to the next box

Department	**RESOURCES MANAGEMENT AND ECONOMICS**	**College/School**	**SNRAS/SOM**
Prepared by	**Joshua Greenberg**	**Phone**	**x7189**

See http://www.uaf.edu/uafgov/faculty/cd for a complete description of the rules governing curriculum & course changes.

1. ACTION DESIRED (check one):	**Trial Course** ☐	**New Course** ☒					
2. COURSE IDENTIFICATION:	**Dept**	**NRM**	**Course #**	**694**	**No. of Credits**	**1**	
3. CROSS LISTED?	***YES*** ☒	***NO*** ☐	**If yes, Dept:**	ECON	**Course #**	694	
STACKED?	***YES*** ☐	***NO*** ☐	**If yes, Dept.**		**Course #s**		

See http://www.uaf.edu/uafgov/faculty/cd/credits.html for more information on number of credits.

(Requires approval of both departments and deans involved. Add lines at end of form for such signatures.)

4. PROPOSED COURSE TITLE	**Natural Resources and Sustainability Graduate Seminar**

5. FREQUENCY OF OFFERING ☐ **As Demand Warrants** ***—OR—***

☒ **Every** **OR** ☐ **Alternate**
☒ **SPRING** ☐ **SUMMER** ☒ **FALL**

6. SEMESTER & YEAR OF FIRST OFFERING (if approved)	**Fall 2008**

7. COURSE FORMAT

NOTE: Course hours may not be compressed into fewer than three days per credit. Any course compressed into fewer than six weeks must be approved by the college or school's curriculum council. Furthermore, any core course compressed to less than six weeks must be approved by the core review committee.

COURSE FORMAT:	☒ *full semester*	*If not full semester, indicate number of weeks:*
OTHER FORMAT (specify)		
Mode of delivery (specify lecture, field trips, labs, etc)	**Lecture**	

8. CONTACT HOURS PER WEEK:	1.5	LECTURE hours/weeks		LAB hours /week		PRACTICUM hours /week	

A. Full Semester Course
Note: # of credits are based on contact hours. Each hour in lecture=1 credit. Three hours in lab in a science course=1 credit,
2 hours in non-science lab= 1 credit. ___ hours in practicum=___ credits. This must match with the syllabus.
See http://www.uaf.edu/uafgov/faculty/cd/credits.html for more information.
B. Less than full semester:

OTHER HOURS (specify type)	

9. BRIEF COURSE CATALOG DESCRIPTION (50 words or less, if possible):

Explore emerging resource and environmental policy issues of Alaska and the circumpolar north.

10. COURSE CLASSIFICATIONS: (undergraduate courses only. Use approved criteria found on Page 10 & 17 of the manual. If justification is needed, attach on separate sheet.)

H = Humanities ☐ N = Natural Science ☐ S = Social Sciences ☐

Will this course be used to fulfill a requirement for the baccalaureate core? ☐ **YES** ☐ **NO**

IF YES, check which core requirements it could be used to fulfill:

O = Oral Intensive, Format 6 ☐ W = Writing Intensive, Format 7 ☐ Natural Science, Format 8 ☐

11. COURSE REPEATABILITY:

Is this course repeatable for credit? ☒ **YES** ☐ **NO**

Justification: Indicate why the course can be repeated (for example, the course follows a different theme each time). **The course follows different themes each time. The course is the required gaduate seminar course for the NRS Ph.D. program.**

How many times may the course be repeated for credit? **3** **TIMES**

If the course can be repeated with variable credit, what is the maximum number of credit hours that may be earned for this course? **CREDITS**

12. GRADING SYSTEM:

LETTER: ☒ **PASS/FAIL:** ☐

RESTRICTIONS ON ENROLLMENT (if any)

13. PREREQUISITES **Graduate Standing**

These will be *required* before the student is allowed to enroll in the course.

RECOMMENDED

Classes, etc. that student is strongly encouraged to complete prior to this course.

14. SPECIAL RESTRICTIONS, CONDITIONS

15. PROPOSED COURSE FEES $

Has a memo been submitted through your dean to the Provost & VCAS for fee approval? ☐ **YES** ☐ **NO**

16. PREVIOUS HISTORY

Has the course been offered as special topics or trial course previously? ☐ **YES** ☒ **NO**

If yes, give semester, year, course #, etc.:

17. ESTIMATED IMPACT

WHAT IMPACT, IF ANY, WILL THIS HAVE ON BUDGET, FACILITIES/SPACE, FACULTY, ETC.

No new expenditures are being requestd for the course. Current faculty will have their time reallocated to teach the course. A 400 sq ft classroom will be requireed. We will adjust the course time in accordance with space availability.

18. LIBRARY COLLECTIONS

Have you reviewed with the library collection development officer (Pauline Wilson, 474-6695) any library/media collections, equipment, and services affected by this proposed action?

YES	☒	NO	☐	If no, why not?	

19. IMPACTS ON PROGRAMS/DEPTS:

What programs/departments will be affected by this proposed action?

Include information on the Programs/Departments contacted (e.g., email, memo)

Natural Resource and Sustainability Ph.D. program and SNRAS and SOM. This Ph.D. program is being offered jointly through both Schools. Deans of both Schools have been actively involved in drafting the program proposal, including this required course.

20. Positive and negative impacts

*Please specify **positive and negative** impacts on other courses, programs and departments resulting from the proposed action.*

The course will support the Ph.D. program in Natural Resources and Sustainability. The seminar topics may be of interest to graduate students in other programs, and therby expand UAF's graduate course offerings. No negative impacts are anticipated

JUSTIFICATION FOR ACTION REQUESTED

The purpose of the department and campus-wide curriculum committees is to scrutinize course change and new course applications to make sure that the quality of UAF education is not lowered as a result of the proposed change. Please address this in your response. This section needs to be self-explanatory. If you ask for a change in # of credits, explain why; are you increasing the amount of material covered in the class? If you drop a prerequisite, is it because the material is covered elsewhere? Use as much space as needed to fully justify the proposed change and explain what has been done to ensure that the quality of the course is not compromised as a result.

The Ph.D. program in Natural Resources and Sustainability is a new Ph.D. program at UAF. This course is the required seminar for the program. All students are required to enroll in the seminar for at least 2 semesters.

APPROVALS:

	Date		
Signature, Chair, Program/Department of:			
	Date		
Signature, Chair, Program/Department of:			
	Date		
Signature, Chair, College/School Curriculum Council for:			
	Date		

Signature, Chair, College/School Curriculum Council for:	
	Date
Signature, Dean, College/School of:	
	Date
Signature, Dean, College/School of:	
	Date
Signature of Provost (if applicable)	

ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION.
Offerings above the level of approved programs must be approved in advance by the Provost.

	Date
Signature, Chair, UAF Faculty Senate Curriculum Review Committee	

ATTACH COMPLETE SYLLABUS (as part of this application).
Note: syllabus must follow the guidelines discussed in the Faculty Senate Guide http://www.uaf.edu/uafgov/faculty/cd/syllabus.html.
The department and campus wide curriculum committees will review the syllabus to ensure that each of the items listed below are included. If items are missing or unclear, the proposed course change will be denied.

Syllabus: Natural Resources and Sustainability Seminar

School of Management, and School of Natural Resources and Agricultural Sciences

Natural Resources Management/Economics 694 – Natural Resources and Sustainability PhD Seminar
Fall/Spring Semester 2006

Our Theme this Semester: <to be varied>

Instructors

Dr. Joshua Greenberg
Department of Resources Management
372 O'Neill
474-7189
ffjag@uaf.edu
Office Hours: *TBA*

Dr. Joe Little
Department of Economics
213C Bunnell
474-6930
ffskt@uaf.edu
Office Hours: *TBA*

Course Objective

Explore emerging resource and environmental policy issues of Alaska and the circumpolar north

Course Text

Title - <Readings will be assigned as appropriate to the seminar theme >

Course Outline and Format < this is a sample format, actual format will depend on specific seminar topics >

- Weeks 1-5 will include the introduction and presentations by different scientists, educators and stakeholders. Presentations will pertain to the specific seminar theme.
- Weeks 6-10 we will discuss (and possibly debate) the principles discussed and questions raised in required readings for the course.
- Weeks 11-15 we will have student presentations

Grading

Grading for NRM/ECON 6xx is by letter grade. You are expected to do all of the assigned readings and to come to every class prepared to discuss or lead discussion. You will be graded based on a combination of input from the course instructors and evaluations submitted by other participating faculty. Students will be graded on a written synopsis of a given problem or situation, presentation of that problem or situation, and effectiveness as a discussion leader. Attendance and participation will also count for a small part of the grade. The percentage breakdown for grading will be:

Previous Items	%	Proposed Items	Pts	%
Written problem or situation synopsis	40%	Reflections	100 pts.	~70%
Presentation by students	30%			
Effectiveness at leading discussion	20%	Effectiveness at leading discussion	30 pts.	~20%
Attendance and participation	10%	Attendance and participation	15 pts.	~15%

The following grading scale will apply:

A - 90 to 100
B - 80 to 89
C - 70 to 79
D - 60 to 69
F - < 60

Reading Reflections <sample example of class exercise>

Since this course will be based on discussions of the readings, it is important for everyone to keep up with the readings. To encourage this, ONE-page reflections will be turned in on each week's reading assignment. Reflections include THREE key points the author made. These points can be things that you found surprising, profound, irritating or downright wrong. Outstanding papers will (*briefly*) probe the implications, strengths and weaknesses of the reading. At the top of each reflection, please indicate which chapters you are reviewing.

UAF Policies Disabilities Services

The University of Alaska Fairbanks is committed to providing equal access for students with disabilities. The Office of Disability Services implements the Americans with Disabilities Act (ADA) and insures that UAF students have equal access to the campus and course materials. We will work with the Office of Disabilities Services (203 WHIT, 474-7043) to provide reasonable accommodation to students with disabilities. If you have a physical or learning disability, please advise us in writing of any special

consideration necessary by the beginning of the second class. We will do everything possible to accommodate you in accordance with the Americans with Disabilities Act. Priority seating close to the board and screen is provided for students who need to be in close proximity to the board.