



**Board of Regents Program Action Request**  
**Proposal to Add or Change a Program of Study**  
 University of Alaska

<b>1a. UA University</b> UAF	<b>1b. School or College</b> College of Natural Sciences and Mathematics	<b>1c. Department or Program</b> multiple
<b>2. Complete Program Title:</b> Earth System Science, MS		
<b>3. Type of Program:</b>		
Undergraduate Certificate <input type="checkbox"/>	Associate <input type="checkbox"/>	Baccalaureate <input type="checkbox"/>
Master's <input checked="" type="checkbox"/>	Doctorate <input type="checkbox"/>	Post-Baccalaureate Certificate <input type="checkbox"/>
<b>4. Type of Action:</b> <input checked="" type="checkbox"/> Add <input type="checkbox"/> Change		
Implementation Semester: Fall Year: 2022-2023		

**6. Projected Revenue and Expenditure Summary:**  
 Provide information for the 5<sup>th</sup> year after program change approval if a baccalaureate or doctoral degree program; **for the 3<sup>rd</sup> year after program approval if a master's or associate degree program**; or for the 2<sup>nd</sup> year after program approval if a graduate or undergraduate certificate. If information is provided for another year, specify ( ) and explain in the program summary attached. Note that revenues and expenditures are not always entirely new; some may be current (see 7d.)

Projected Annual Revenues in FY25		Projected Annual Expenditures in FY25	
<b>Unrestricted</b>		Salaries & benefits (faculty & staff)	\$25,000
General Fund		Other (commodities, services, etc.)	
Student Tuition & Fees	\$ 62,000.00	<b>TOTAL EXPENDITURES:</b>	\$ 25,000.00
Indirect Cost Recovery		One-time Expenditures to Initiate Program (if >\$250,000)	
TVEP or Other (specify):		(These are costs in addition to the annual costs, above.)	
<b>Restricted</b>		Year 1	
Federal Receipts		Year 2	
TVEP or Other (specify):		Year 3	
<b>TOTAL REVENUES</b>	<b>\$ 62,000.00</b>	Year 4	

Page # of attached summary where the budget is discussed, including initial phase-in: 23-24

**7. Budget Status. Items a., b., and c. indicate the source(s) of the general fund revenue specified in item 6. If any grants or contracts will supply revenue needed by the program indicate amount anticipated and expiration date, if applicable.**

Revenue source	Continuing	One-Time
a. In current legislative budget request		
b. Additional appropriation required		
c. Funded through new internal UA university redistribution	\$ 25,000.00	
<a href="#">d. Funds currently committed to the program[1]</a>		
e. Funded all or in part by external funds, expiration date		
f. Other funding source (specify type):		

**8. Facilities. New or substantially (>\$25,000 cost) renovated facilities will be required.**  Yes  No

If yes, discuss the extent, probable cost, and anticipated funding source(s), in addition to those listed in sections 6 and 7 above.

**9. Projected Enrollments (headcount of majors). If this is a program discontinuation request, project the teach-out enrollments.**

Year 1:  Year 2:  Year 3:  Year 4:

Page number of attached summary where demand for this program is discussed: 14

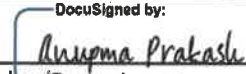

<b>10. Number of new TA or faculty hires anticipated (or number of positions eliminated if a program discontinuation):</b>  Graduate TA <input type="text"/> Adjunct <input type="text"/> Term <input type="text"/> Tenure track <input type="text"/>	<b>11. Number of TAs or faculty to be reassigned:</b>  Graduate TA <input type="text"/> Adjunct <input type="text"/> Term <input type="text"/> Tenure track <input type="text"/> Former assignment of any reassigned faculty: For more information see attached summary page:
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12. Other programs affected by the proposed action, including those at other campuses (please list):	
Program Affected	Anticipated Effect
UAF Atmospheric Sciences MS	The success of the proposed ESS program is contingent upon eventual degree replacement of these existing degrees. This would occur by having current students in these programs finish their degrees, during which time all new students would enroll in Earth Systems Science.
UAF Geophysics MS	
UAF Geoscience MS	
Biological Sciences MS	The ESS Ecosystems track may attract some students who would otherwise pursue this degree.
Interdisciplinary Studies MS	Students currently using INDS to pursue this kind of cross-disciplinary degree may instead enroll in one of the ESS tracks.

Page number of attached summary where effects on other programs are discussed: 23-24

<b>13. Specialized accreditation or other external program certification needed or anticipated. List all that apply or 'none':</b>  none	<b>14. Aligns with University or campus mission, goals, core themes, and objectives (list):</b>  Aligned with UAF mission as leader in Arctic Science. Supports 5 of 6 goals in UAF's strategic plan. Page in attached summary where alignment is discussed: <u>12-13</u>
<b>15. State needs met by this program (list):</b>  Further arctic-focused research and scholarship Prepare students for jobs in agencies such as NOAA, Dept. of Defense, and NASA.	<b>16. Program is initially planned to be: (check all that apply)</b>  Available to students attending classes at campuses <input checked="" type="checkbox"/> X Available to students via e-Learning <input type="checkbox"/> Partially available to students via e-Learning <input type="checkbox"/> Page # in attached summary where e-Learning is discussed: <u>N/A</u>

17. If this program is an addition, would program be eligible for State's Eligible Training Provider List program?  
 Yes  No  [\(Click here for more information\)](#)

Submitted by:	October 12, 2022
DocuSigned by:  Chancelor/President	Date:
Consensus support of AC <input checked="" type="checkbox"/> Not supported by AC <input type="checkbox"/>	
Recommend approval by VPASR 	Date: 10/13/22
Recommend disapproval by VPASR	Date:

2Net FTE (full-time equivalents). For example, if a faculty member will be reassigned from another program, but his/her original program will hire a replacement, there is one net new faculty member. Use fractions if appropriate. Graduate TAs are normally 0.5 FTE. The numbers should be consistent with the revenue/expenditure information provided.

Attachments:  Summary of Degree or Certificate Program Proposal  Other (optional)

Motion 2022-266-3

## **Motion to Create a PhD in Earth Systems Science**

### **MOTION:**

The UAF Faculty Senate moves to approve a new PhD in Earth Systems Science, housed in the College of Natural Science and Mathematics.

Earth System Science (ESS) is a multidisciplinary degree program that provides the option for disciplinary concentration in one of eight topics: Sustainability, Ecosystems, Hydrology, Atmospheric and Climate Sciences, Cryosphere, Solid Earth Geophysics, Geoscience, Geospatial Science. The ESS program involves faculty participation from six departments (Geosciences; Atmospheric Sciences; Biology and Wildlife; Natural Resources and Environment; Civil, Geological, and Environmental Engineering; Cross-Cultural Studies) and five research institutes (Geophysical Institute; International Arctic Research Center; Institute of Arctic Biology; Institute of Northern Engineering; Institute of Agriculture, Natural Resources and Extension).

The proposed ESS program will be enabled by suspending admissions into the current six degrees: MS/PhD Geophysics, MS/PhD Geoscience, MS/PhD Atmospheric Sciences. New students applying to the participating departments will be enrolled in the specific ESS-track programs. Once the ESS programs are fully established, in an estimated period of 5-6 years, the faculty in the participating departments will reassess the academic structure that best captures the students' interest and aligns with future research areas and needs.

**Rationale:** Earth System Science (ESS) is a modern, established field of science involving multiple disciplines and seeks to understand the Earth system through observations, experiments, modeling, and assessments. UAF faculty and students will undertake world-leading research in ESS and its subdisciplines of ecosystems, atmospheric sciences, solid earth geophysics, and more. This proposal will establish a degree program in ESS by combining new formal degree pathways (Sustainability, Hydrology, Ecosystems) with existing ones, notably, from Geosciences and Atmospheric Sciences. As envisioned, ESS would provide an improved, broader degree experience for students, while also serving as a powerful showcase for UAF science and recruitment.

In 2022, the National Academy of Sciences published a 124-page report entitled "Next Generation Earth Systems Science at the National Science Foundation". This timely report provides formal statements that support our goal to establish an Earth System Science (ESS) graduate degree program at UAF. Among the six "key characteristics needed for next-generation Earth Systems Science at NSF" is the following:

"Educate and support a workforce with the skills and knowledge to effectively identify, conduct, and communicate Earth Systems Science. The current and future workforce in Earth Systems Science must maintain strong disciplinary knowledge and skills while developing interdisciplinary and transdisciplinary science skills and practices that will help tackle problems

Motion 2022-266-3

at the intersection of natural and human systems. Necessary skills and practices include systems thinking, integration and application of human dimensions, complex problem solving, computational and analytical skills, spatial and temporal reasoning, communicating to diverse audiences, and the ability to work ethically in diverse teams.”

This very recent statement is in line with the goals of the proposed ESS program, described here, as well as the efforts and discussions across the UAF campus since September 2020.

**EFFECTIVE:**

Immediately upon Chancellor approval or acknowledgement.

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DocuSigned by:  
*Ataur Chowdhury*  
13EE814B32A0408  
Ataur Chowdhury, UAF Faculty Senate President

The Chancellor:       X   Approves            Vetoes            Acknowledges

DocuSigned by:  
*Daniel M. White*  
AF68DBA18CA94AC  
Daniel M. White, UAF Chancellor

October 11, 2022  
Date: \_\_\_\_\_

## Overview

9. 01/12/22 11:31 am  
Kinchel Doerner  
(kdoerner2):  
Approved for MT  
Dean
10. 01/12/22 2:56 pm  
Ashley Lindsoe  
(aclindsoe):  
Approved for  
Faculty Senate  
Coordinator
11. 03/23/22 9:21 pm  
Jennifer Carroll  
(jlcarroll): Approved  
for Graduate  
Curriculum  
Committee Chair
12. 06/16/22 10:29 am  
Ashley Lindsoe  
(aclindsoe):  
Rollback to  
Graduate  
Curriculum  
Committee Chair for  
Faculty Senate  
President
13. 09/23/22 12:52 pm  
Syndonia Bret Harte  
(msbretharte):  
Approved for  
Graduate  
Curriculum  
Committee Chair

Earth System Science (ESS) at UAF is a multidisciplinary degree program that provides the option for disciplinary concentration in one of eight topics: Sustainability, Ecosystems, Hydrology, Atmospheric and Climate Sciences, Cryosphere, Solid Earth Geophysics, Geoscience, Geospatial Science. The ESS program involves faculty participation from seven departments (Natural Resources and Environment; Center for Cross-Cultural Studies; Biology and Wildlife; Civil, Geological, and Environmental Engineering; Atmospheric Sciences; Physics; Geosciences) and five research institutes (Institute of Agriculture, Natural Resources and Extension; Institute of Arctic Biology; Institute of Northern Engineering; International Arctic Research Center; Geophysical Institute).

#### Admission Requirements

University Admission criteria apply to Earth System Science, notably, that incoming students must have an undergraduate degree in a suitable field of study. Admission to Earth System Science (without concentration) is determined by an admissions committee. Admission to Earth System Science with concentration is determined by an admissions committee established within each concentration. Furthermore, the following concentrations have specific admission requirements:

Hydrology: 1 year calculus, 1 year physics, and 1 year of either geology, chemistry, biology, or engineering

Atmospheric and Climate Sciences: 1 year calculus, differential equations, chemistry

Cryosphere and Solid Earth Geophysics: 1 year calculus, differential equations, and linear algebra (recommended: partial differential equations, computational physics)

#### Program Requirements

## Minimum Requirements for Earth System Science Ph.D.: 26 credits

### **Concentrations: SUSTAINABILITY, ECOSYSTEMS, HYDROLOGY, ATMOSPHERIC AND CLIMATE SCIENCES, CRYOSPHERE, solid earth geophysics, GEOSCIENCE, GEOSPATIAL SCIENCE**

#### General University Requirements

Complete the graduate general university requirements.

#### Ph.D. Degree Requirements

Complete the Ph.D. degree requirements. <sup>1</sup>

#### Earth System Science Program Requirements

Complete the following:

ESS F601 Introduction to Earth System Science (Intro to Earth System Science) 3

ESS F602 Best Practices for Research in Alaska (Best Practices for Research in Alaska) 1

ESS F692P Seminar 1

Complete one of the following: 3-18

13 credits of approved electives (no concentration) <sup>2</sup>  
concentration

1  
requires 18 thesis credits.

2  
recommended courses from any of the concentrations or the methods and cross-cutting list.

## Methods and Cross-cutting course List

Methods and Cross-cutting courses:

<u>ACNS F629</u> Geography of the Arctic and Circumpolar North	3
<u>ATM F601</u> Introduction to Atmospheric Sciences	3
<u>ATM F610</u> Analysis Methods in Meteorology and Climate	3
<u>ATM F625</u> Physical Hydrometeorology	3
<u>ATM F626</u> Course ATM F626 Not Found (Arctic Water and Energy Cycle)	
<u>ATM F680</u> Climate Change Processes: Past, Present, Future	4
<u>BIOL F602</u> Research Design	3
<u>BIOL F604</u> Scientific Writing, Editing and Revising in the Biological Sciences	3
<u>BIOL F680</u> Data Analysis in Biology	3
<u>CCS F612</u> Traditional Ecological Knowledge	3
<u>FISH F646</u> Freshwater Habitat Dynamics	3
<u>GEOS F422</u> Geoscience Applications of Remote Sensing	3
<u>GEOS F605</u> Geochronology	3
<u>GEOS F606</u> Volcanology	3
<u>GEOS F618</u> Introduction to Geochemistry	3
<u>GEOS F622</u> Digital Image Processing in the Geosciences	3
<u>GEOS F627</u> Inverse Problems and Parameter Estimation	3
<u>GEOS F631</u> Foundations of Geophysics	4
<u>GEOS F633</u> Aqueous and Environmental Geochemistry	3
<u>GEOS F636</u> Programming and Automation for Geoscientists	2
<u>GEOS F639</u> InSAR and Its Applications	3
<u>GEOS F653</u> Palynology and Paleopalynology	4
<u>GEOS F654</u> Visible and Infrared Remote Sensing	3
<u>GEOS F657</u> Microwave Remote Sensing	3
<u>GEOS F658</u> Applications of GPS and GIS in Geophysics	3
<u>GEOS F660</u> The Dynamic Alaska Coastline	3
<u>GEOS F670</u> Selected Topics in Volcanology	2
<u>GEOS F681</u> Snow in the Environment	3
<u>NRM F435</u> GIS Analysis	4
<u>NRM F647</u> Sustainability in the Changing North	3
<u>NRM F613</u> Resilience Internship	2
<u>NRM F638</u> GIS Programming	3
<u>NRM F641</u> Natural Resource Applications of Remote Sensing	3
<u>PHYS F628</u> Digital Time Series Analysis	3
<u>PHYS F647</u> Fundamentals of Geophysical Fluid Dynamics	3
<u>STAT F401</u> Regression and Analysis of Variance	4
<u>STO F666</u> Scientific Teaching	2

## Concentrations

### SUSTAINABILITY

This concentration encompasses scholarly and practical aspects of sustainability and society in Earth System Science with a specific emphasis on Alaska and the Arctic. The vision is to provide graduate training in interdisciplinary research to solve real-world problems, especially in building mutually respectful research partnerships with groups, organizations, and communities outside the University.

Minimum requirements for sustainability concentration 11

Complete the following:

<u>CCS F612</u> Traditional Ecological Knowledge	3
<u>NRM F613</u> Resilience Internship	2
<u>NRM F647</u> Sustainability in the Changing North	3

Complete one of the following: 3

<u>ACNS F600</u> Perspectives on the North	
<u>ACNS F601</u> Research Methods and Sources in the North	
<u>ACNS F610</u> Northern Indigenous Peoples and Contemporary Issues	
<u>ACNS F629</u> Geography of the Arctic and Circumpolar North	
<u>ACNS F652</u> International Relations of the North	
<u>ACNS F657</u> Comparative Indigenous Rights and Policies	
<u>ACNS F662</u> Alaska Government and Politics	
<u>ACNS F669</u> Arctic Politics and Governance	
<u>ACNS F683</u> 20th-century Circumpolar History	
<u>CCS F602</u> Cultural and Intellectual Property Rights	
<u>CCS F608</u> Indigenous Knowledge Systems	
<u>CCS/NRM F656</u> Sustainable Livelihoods and Community Well-being	
<u>FISH F611</u> Human Dimensions of Environmental Systems	
<u>FISH F675</u> Political Ecology	

<u>FISH F613</u>	Human-environment Research Methods
<u>NRM F630</u>	Resource Management Planning
<u>NRM F692</u>	Graduate Seminar
<u>STO F601</u>	Communicating Science

## ECOSYSTEMS

The Ecosystems concentration in Earth System Science addresses the interactions of organisms with the transformation and flux of energy and matter. Ecosystem science is inherently inter-disciplinary, including ecology, natural history, statistics, chemistry, geology, geography, and hydrology. Students will therefore benefit from shared courses and seminars with other concentrations. Students enrolling in the Ecosystems concentration will pursue research and training in observing, modeling, and predicting processes including fluxes of water, energy, carbon, and nutrients, and many will focus on high-latitude ecosystems.

Minimum requirements for ecosystems concentration

3

Complete one of the following:

<u>BIOL F605</u>	Animal Stable Isotope Ecology
<u>BIOL F618</u>	Biogeography
<u>BIOL F646</u>	Freshwater Habitat Dynamics
<u>BIOL F669</u>	Landscape Ecology and Wildlife Habitat
<u>BIOL F673 (ECOSYSTEM ECOLOGY)</u>	Course BIOL F673 (ECOSYSTEM ECOLOGY) Not Found
<u>BIOL F686</u>	Vertebrate Paleontology
<u>BIOL F688</u>	Arctic Vegetation Ecology: Geobotany
<u>BIOL F689</u>	Vegetation Description and Analysis

## HYDROLOGY

Understanding how water cycles through the Earth's many systems fundamentally link hydrology to a broad range of scientific disciplines and societal needs. Focusing on water movement and storage in the Arctic brings particular intrigue and challenge in terms of interactions with frozen ground, glacier runoff, freeze-thaw cycles, snowmelt, and river and lake ice dynamics. Career opportunities for graduates of the Hydrology Concentration in Earth System Science include river flood forecasting, field and remote sensing hydrologist, water quality specialist, water resources management and policy, water supply treatment and distribution, stream and fish habitat restoration, and the opportunity to work as a cold-regions hydrologist with interdisciplinary science and resource management teams in Alaska and other northern regions. Graduates are prepared to hold positions in government, industry, consulting or academia.

Minimum requirements for hydrology concentration

13

Complete the following:

<u>CE F665</u>	Watershed Hydrology	3
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Complete 10 credits from the following:

10

<u>CE F663</u>	Groundwater Hydrology
<u>CE F662</u>	Open Channel and River Engineering

Methods and Cross-cutting course list

One graduate-level course approved by the student's advisory committee

## ATMOSPHERIC AND CLIMATE SCIENCES

The field of atmospheric and climate science covers a wide variety of disciplines involving the physical and chemical properties and processes of the atmosphere. Current research in atmospheric sciences focuses on atmospheric dynamics, chemistry and biogeochemistry, air-sea-ice interactions, climate modeling, cloud and aerosol physics, radiative processes, mesoscale modeling, numerical weather prediction and aviation weather, and upper atmosphere (stratosphere and mesosphere). The faculty are well-positioned to be a vibrant part of methods and cross-cutting education and research in the Earth System Science Program.

Graduate students are an essential component of a research university and an integral component of the research activities across the campus at UAF, both in the experiments in the laboratory and the field as well as in data sciences, which includes modeling and analysis of weather and climate data. Research institutes and the CNSM provide excellent environments for research in atmospheric and climate sciences as well as multidisciplinary research with researchers spanning diverse expertise.

Minimum requirements for atmospheric and climate sciences concentration

18

Complete the following:

<u>ATM F613</u>	Atmospheric Radiation	3
<u>ATM F615</u>	Cloud Physics	3
<u>ATM F645</u>	Atmospheric Dynamics	3
<u>ATM F646</u>	Atmospheric Dynamics II: Climate Dynamics	3

Complete two of the following:

6

<u>ATM F644</u>	Weather Analysis and Forecasting
<u>ATM F658</u>	Air-sea Interactions
<u>ATM F673</u>	Micrometeorology with Focus on Subarctic and Arctic Ecosystems

One graduate-level course (maximum 3 credits) approved by the student's advisory committee

## CRYOSPHERE

The Cryospheric Concentration is located within the geosphere cohort of ESS tracks. This concentration focuses on snow, sea-ice, glaciers, and permafrost. Research within the Cryosphere Concentration is grounded in physics, mathematics, numerical modeling and data science. Methods and applications in Cryosphere seek to understand earth surface processes at high latitudes and how they are responding to ongoing climate change as well as associated impacts on both the built and natural environment. The courses and research associated with snow, sea-ice, glaciers, and permafrost connect with the full spectrum of topics in the Earth System Science curriculum, including geospatial sciences, geosciences, climate science, hydrology, ecology, and sustainability. The Cryosphere Concentration at UAF is strengthened by the expansive natural laboratory and faculty expertise. Ph.D. and MS coursework and graduate research will be conducted closely with the Geophysical Institute.

Minimum requirements for cryosphere concentration

13

Complete the following:

<u>GEOS F631</u>	Foundations of Geophysics	4
One course from the B-list		3
Complete 2 of the following:		6
<u>GEOS F615</u>	Sea Ice	
<u>GEOS F616</u>	Permafrost	
<u>GEOS F617</u>	Glaciers	
<u>GEOS F681</u>	Snow in the Environment	
<u>PHYS F614</u>	Ice Physics	

One graduate-level course (maximum 4 credits) approved by the student's advisory committee

## SOLID EARTH GEOPHYSICS

The Solid Earth Geophysics concentration of Earth System Science includes the disciplines of seismology, geodesy, volcanology, and infrasound, and it is grounded in physics, mathematics, computing, and data science. Methods and applications in Solid Earth Geophysics seek to characterize dynamic Earth processes and associated natural hazards relevant to Alaska and surrounding regions, including earthquakes, tsunamis, volcanoes, and landslides. Continuously recording instruments used in Solid Earth Geophysics, such as seismometers and GPS, capture a wide range of environmental activities and phenomena relevant to Earth System Science, in addition to human-caused events such as nuclear explosions.

Minimum requirements for solid earth geophysics concentration 13

Complete the following:

<u>GEOS F631</u>	Foundations of Geophysics	4
Complete from the following:		9

<u>GEOS F604</u>	Seismology
<u>GEOS F606</u>	Volcanology
<u>GEOS F626</u>	Applied Seismology
<u>GEOS F669</u>	Geodetic Methods and Modeling
<u>GEOS F670</u>	Selected Topics in Volcanology
<u>GEOS F692</u>	Geol/Geophys Seminar

Methods and Cross-cutting course list

One graduate-level course approved by the student's advisory committee

## geoscience

The Geoscience concentration falls within the geosphere cohort of ESS tracks with a focus on tectonics, paleontology, and petrology of sedimentary, igneous, and metamorphic rocks. Methods and applications include reconstruction of past climates, ecosystems, and plate configurations, dating of geologic specimens, and locating economically valuable mineral deposits.

Minimum requirements for geoscience concentration 5

Complete 5 credits from the following: 5

<u>GEOS F621</u>	Advanced Petrology
<u>GEOS F647</u>	Advanced Sedimentology and Stratigraphy

Methods and Cross-cutting course list

One graduate-level course approved by the student's advisory committee

## geospatial science

The Geospatial Science concentration of Earth System Science includes the disciplines of visible to infrared and microwave (SAR and InSAR) remote sensing, Geographic Information Systems, and their applications in the area of geosciences, natural resource management, and environmental monitoring. It is grounded in geographic science, mathematics, computer science, and data science. Methods and applications in Geospatial Science concentration seek to characterize our changing environment, inventory and management of natural resources, and mitigate risks from geo-hazards relevant to Alaska and surrounding regions. Continuous geospatial observations of our ever-changing environment and geo-hazards from space and air are an essential component of Earth System Science, as they allow for detailed studies of processes and events across scales relevant to the associated disciplines.

Minimum requirements for geospatial science concentration 9

Complete 3 of the following: 9

<u>GEOS F622</u>	Digital Image Processing in the Geosciences
<u>GEOS F629</u>	Geologic Hazards and Natural Disasters
<u>GEOS F639</u>	InSar and Its Applications
<u>GEOS F654</u>	Visible and Infrared Remote Sensing
<u>GEOS F657</u>	Microwave Remote Sensing
<u>GEOS F658</u>	Applications of GPS and GIS in Geophysics
<u>NRM F435</u>	GIS Analysis
<u>NRM F638</u>	GIS Programming
<u>NRM F641</u>	Natural Resource Applications of Remote Sensing

## Road Maps & Outcomes

### Road Map & Outcomes

We envision offering ESS 601, ESS 602, and ESS 492/692 each fall. In addition to the three ESS courses, each concentration relies on a set of courses.

Examples for two concentrations are provided next.

Ph.D. ESS with concentration in Sustainability:

Plan of Study Grid

First Year



		Credits
Fall		
<u>NRM F647</u>	Sustainability in the Changing North	3
<u>FISH F613</u>	Human-environment Research Methods	3
	Credits	6
Spring		
<u>CCS F612</u>	Traditional Ecological Knowledge	3
<u>ACNS F662</u>	Alaska Government and Politics	3
	Credits	6
Second Year		
Fall		
<u>NRM F613</u>	Resilience Internship	2
or <u>CCS F613</u>	or Alaska Standards for Culturally Responsive Schools	
<u>FISH F611</u>	Human Dimensions of Environmental Systems	3
	Credits	5
Spring		
<u>ACNS F662</u>	Alaska Government and Politics	3
	Credits	3
Third Year		
Fall		
<u>CCS F656</u>	Sustainable Livelihoods and Community Well-being	3
or <u>NRM F656</u>	or Sustainable Livelihoods and Community Well-being	
	Credits	3
Spring		
<u>STO F601</u>	Communicating Science	2
	Credits	2
	Total Credits	25

**Ph.D. ESS with concentration in Solid Earth Geophysics:**  
Plan of Study Grid

		Credits
First Year		
Fall		
<u>GEOS F631</u>	Foundations of Geophysics	4
<u>GEOS F636</u>	Programming and Automation for Geoscientists	2
	Credits	6
Spring		
<u>GEOS F627</u>	Inverse Problems and Parameter Estimation	3
<u>GEOS F692</u>	Geol/Geophys Seminar	1-6
	Credits	4-9
Second Year		
Fall		
<u>GEOS F669</u>	Geodetic Methods and Modeling	3
	Credits	3
Spring		
<u>GEOS F626</u>	Applied Seismology	4
<u>GEOS F657</u>	Microwave Remote Sensing	3
<u>GEOS F692</u>	Geol/Geophys Seminar	1-6
	Credits	8-13
Third Year		
Fall		
<u>GEOS F631</u>	Foundations of Geophysics	4
<u>GEOS F636</u>	Programming and Automation for Geoscientists	2
	Credits	6
Spring		
<u>GEOS F627</u>	Inverse Problems and Parameter Estimation	3
<u>GEOS F692</u>	Geol/Geophys Seminar	1-6
	Credits	4-9
	Total Credits	31-46

Additional courses to consider include GEOS 657, GEOS 606, GEOS 670, and PHYS 628.

original lists:

**Ph.D. ESS with concentration in Sustainability:**

Year 1, fall: NRM 647, FISH 613

Year 1, spring: CCS 612, ANCS 662

Year 2, fall: NRM/CCS 613, FISH 611

Year 2, spring: ANSC 662

Year 3, fall: CCS/NRM 656

Year 3, spring: STO 601

**Ph.D. ESS with concentration in Solid Earth Geophysics:**

Year 1, fall: GEOS 631, GEOS 636

Year 1, spring: GEOS 627, GEOS 692 (seminar)

Year 2, fall: GEOS 669

Year 2, spring: GEOS 626, GEOS 657, GEOS 692 (seminar)

Year 3, fall: GEOS 631, GEOS 636

Year 3, spring: GEOS 627, GEOS 692 (seminar)

Attachment

## Program Goals

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Goals of this program in relation to the department and college

The National Academy of Sciences recently published a 124-page report entitled "Next Generation Earth Systems Science at the National Science Foundation". This timely report provides formal statements that support our goal to establish an Earth System Science (ESS) graduate degree program at UAF. Among the six "key characteristics needed for next-generation Earth Systems Science at NSF" is the following:

"Educate and support a workforce with the skills and knowledge to effectively identify, conduct, and communicate Earth Systems Science. The current and future workforce in Earth Systems Science must maintain strong disciplinary knowledge and skills while developing interdisciplinary and transdisciplinary science skills and practices that will help tackle problems at the intersection of natural and human systems. Necessary skills and practices include systems thinking, integration and application of human dimensions, complex problem solving, computational and analytical skills, spatial and temporal reasoning, communicating to diverse audiences, and the ability to work ethically in diverse teams."

This very recent statement is in line with the goals of the proposed ESS program, described here, as well as the efforts and discussions across the UAF campus since September 2020. Both our efforts and the NSF report are guided by the 2020 overview paper by Steffen et al. (Nature Reviews Earth & Environment), which is attached to this submission.

Please refer to the one-page visual (ESS\_one\_slide.pdf) that provides an overview of the structure of the ESS degree program. The program cuts across several academic boundaries, which reflects the breadth of disciplines needed to approach ESS. The participating academic and research faculty span three colleges (CNSM, CEM, CRCD), six departments (Natural Resources and the Environment; Center for Cross-Cultural Studies; Biology and Wildlife; Civil, Geological, and Environmental Engineering; Atmospheric Sciences; Geosciences), and five institutes (GI, IARC, IAB, INE, IARNE). By linking several disciplines, the ESS program will provide a much-needed curricular complement to existing and future research in ESS at UAF.

Our submission for a graduate degree program in Earth System Science (ESS) at UAF is guided by the following set of tenets:

- + ESS is a modern, established field of science involving multiple disciplines and seeks to understand the Earth system through observations, experiments, modeling, and assessments (Steffen et al., 2020; Next Generation Earth Systems Science at the National Science Foundation, 2022).
- + ESS at UAF has an arctic emphasis.
- + ESS is aligned with the mission of UAF as a leader in Arctic Science.
  - Mission 1: "We are Alaska's research university and America's arctic university."
- + ESS supports the strategic plan of UAF. ESS relates directly to 5 of the 6 goals:
  - Modernize the student experience.
  - Solidify our global leadership in Alaska Native and Indigenous programs.
  - Achieve Tier 1 research status.
  - Embrace and grow a culture of respect, diversity, inclusion and caring.
  - Revitalize key academic programs.
- + ESS is not a department; it is a cross-campus degree program formed by a collection of schools, departments, faculty, staff, and students.
- + ESS promotes collaborations among research institutes, departments, and students across campus.
- + ESS promotes modern, standardized training in scientific methods (e.g., open-source software development).
- + ESS enables interdisciplinary, multidisciplinary, and disciplinary degree pathways.
- + ESS prepares students for cross-discipline team science problem solving increasingly needed by many employers.
- + Research faculty and academic faculty have equal opportunities in terms of the makeup of ESS thesis committees.

In this opening section, we will establish the primary structure and goals of the degree program. In later responses, we will point back to this section.

The PhD/MS Earth System Science degree program offers flexible degree pathways that enable disciplinary focus within one of 8 concentrations or multidisciplinary emphasis (without a concentration). In all cases, each student is exposed to the fundamentals of earth system science via a set of three required courses, which we refer to as "A courses". These courses will help form a cross-campus cohort of graduate students coming from 6 departments. A single set of cross-cutting "B courses" emphasize methods. The "C courses" provide disciplinary expertise that is needed for a concentration.

The primary objective of the ESS degree program is to establish a curriculum that:

1. supports the study of the Earth system, with emphasis on the arctic regions
2. centralizes, focuses, and maximizes existing research expertise
3. directly integrates sustainability and co-production of knowledge with research domains

These objectives are identified in regard to both the mission and the strategic plan of UAF. At its core, the ESS program supports Mission 1: "We are Alaska's research university and America's arctic university." ESS aggregates several degree programs and portions of others that comprise a major training component of arctic research enterprise at UAF. Supporting the ESS curriculum are the directors of all five institutes whose faculty are associated with ESS:

- + David Barnes, Institute of Northern Engineering
- + Hajo Eicken, International Arctic Research Center
- + Robert McCoy, Geophysical Institute
- + Diane O'Brien, Institute of Arctic Biology
- + Peter Pinney, Institute of Agriculture, Natural Resources and Extension

The ESS program, while curricular in nature, will provide a foundation of training for the graduate students, who are critical for the success of research at UAF.

The ESS program addresses five of the six goals of UAF's strategic plan (see above). The ESS program contributes to achieving Tier I research status by integrating across research units to attract students interested in interdisciplinary research and encouraging collaboration across units, which could increase research funding. The ESS curriculum, with its disciplinary links, constitutes a revitalized academic program (strategic goal) for its focus on the Arctic. The strategic goal of Modernizing the student experience is achieved by emphasizing the importance of multidisciplinary science—even while enabling disciplinary focus, which is desirable to many students and employers. It is also captured by the effort of ESS to train students with the latest methods (e.g., open-source computing in cloud environments, high-frequency environmental sensing, and analysis of "big data" ) that will serve their research and careers beyond UAF. The ESS concentration in Sustainability provides a formal degree pathway for students wanting to concentrate on the theory and best practices for research engagement and use-inspired science. Equally important, the presence of Sustainability within ESS shows that it is a key component that offers graduate training for research within all other concentrations. The emphasis on sustainability—which includes aspects of co-production of knowledge and boundary-spanning—addresses all of UAF strategic goals, in particular, "Embrace and grow a culture of respect, diversity, inclusion and caring" and "Solidify our global leadership in Alaska Native and Indigenous programs".

The ESS program is built upon degree programs involving faculty from 6 departments that participate in 6 PhD programs and 7 MS programs. ESS is not simply an aggregation of these departments, degree programs, and portions of degree programs. Examples of connectivity are as follows:

- 1) All ESS students are required to take 5 credits of 3 classes (A courses) that introduce the discipline of ESS. The content of these courses will emphasize ESS as a whole. The requirement for all students will help establish a cohort of students coming from different subdisciplines of ESS.
- 2) The list of B courses is an achievement in itself. Currently, there is no way for a student or faculty to easily identify courses in the domain of ESS.
- 3) ESS faculty are optimistic that other areas of alignment will be possible, notably:
  - a. Common guidelines for comprehensive exams. (Currently, there are widely different approaches to satisfying the formal requirements.)
  - b. Establishment of seminar-like scheduling for all ESS students talks for a) comprehensive exams and b) thesis defenses.
  - c. An annual ESS poster symposium to share and celebrate the work of the students.
  - d. Gradual alignment of B/C courses with the overall theme of ESS.

The degree requirements at the B/C course levels vary from one concentration to another, depending on the preferences of the ESS faculty. These differences reflect our preference of flexibility over standardization, as well as the reality that certain disciplines may require more or less coursework, relative to research, in order to culminate in a successful thesis.

It will be important to establish evaluation capabilities at the outset of the program. For example, we want to establish a database of all students and faculty in the program, and to collect the information from students in their careers after ESS at UAF. The primary form of evaluation of the ESS program will be through annual surveys to ESS-participating students and faculty, preceded by a set of discussion forums pertaining to the degree experience and structure. Another form of evaluation will come from the number of students enrolled in the program, which we expect to grow over the first 5 years (and hopefully beyond). We envision bringing in representative job employers on a regular basis to discuss the program and to interact with students. Finally, we would be interested to have an external board—combining non-ESS UAF scientists as well as experts from outside UAF—provide an external review of the program every 3 years.

Aligns with UAF  
Strategic Plan and  
UA Goals &  
Measures

As stated in the brief description above:

- + ESS at UAF has an arctic emphasis.
- + ESS is aligned with the mission of UAF as a leader in Arctic Science.
- Mission 1: "We are Alaska's research university and America's arctic university."

- + ESS supports the strategic plan of UAF. ESS relates directly to 5 of the 6 goals:
  - Modernize the student experience.
  - Solidify our global leadership in Alaska Native and Indigenous programs.
  - Achieve Tier 1 research status.
  - Embrace and grow a culture of respect, diversity, inclusion and caring.
  - Revitalize key academic programs.

State of Alaska or national occupational needs met by this program

The base competencies in ESS are reflected in the learning outcomes of the required "A courses". Students will gain competence in systems approaches to addressing issues across the Earth System and will be exposed to state-of-the-art research in the disciplines related to ESS. They will have a high-level perspective of ESS, which will either provide context for their disciplinary thesis work or it will form the basis for a multidisciplinary thesis pursuit. The fundamental tools of ESS are observations, experiments, modeling, and assessment. The ESS courses will prepare students in these realms, and then many students will use these skills within their own thesis research.

Though particular research skills required by each discipline vary, many of the core approaches or techniques are shared. Enrollment of students from across ESS in the "B courses", which emphasize research methods, will encourage cross-fertilization and collaboration across departments. For example, students conducting empirical research will gain training in design and maintenance of environmental sensing networks. Analysis and mathematical modeling of ESS processes (e.g., glacier flow, energy flux, and material cycling) will require computing skills (e.g., Python, C, Fortran, R) and training in mathematics or statistics (e.g., linear algebra, differential equations, time series analysis). Sustainability science is recognized by the National Academies of Sciences as a problem-based, interdisciplinary field that investigates complex, social-ecological systems and engages use-inspired basic research to solve real-world problems. Its inclusion in the ESS program will provide students with both disciplinary and interdisciplinary interests an opportunity to understand the human dimensions of the earth system and to learn tools for applying scientific inquiry toward solving large-scale, complex real-world problems. Finally, disciplinary competencies will be achieved through respective concentrations. Each concentration includes a list of "C courses" that will provide disciplinary rigor. Students and their committees will identify training within the concentration necessary to successfully complete the thesis. Theses in ESS are expected to exemplify development of disciplinary expertise within the interdisciplinary context of ESS.

## Program Learning Outcomes - to print in catalog

Brief identification of objectives and subsequent means for their evaluation

The courses chosen for the ESS program are the ones that are currently most suited for either covering a concentration within ESS or for covering methods that are needed for ESS. The three newly proposed "A courses" required for all students provide an overarching view of ESS. After taking these courses (or concurrently), students will pursue either a multidisciplinary cross-cutting degree path or they will concentrate within a particular domain.

Program Learning Outcome (PLO 1)

Program Learning Outcome (PLO 2)

Program Learning Outcome (PLO 3)

Program Learning Outcome (PLO 4)

Relationship of courses to the program learning outcomes

SLOA

## Personnel Directly Involved with Program

Personnel directly involved with program

Position	New Hire or Existing	Qualifications	Duties
Michael Koskey	FAC	Teaching faculty for sustainability concentration.	faculty
Sarah Trainor	FAC	Teaching faculty for sustainability concentration.	faculty
Greg Breed	FAC	Teaching faculty for sustainability concentration.	faculty

Position	New Hire or Existing	Qualifications	Duties
Donie Bret-Harte	FAC	Teaching faculty for ecosystems concentration.	faculty
Jordi Cristobal	FAC	Research faculty for ecosystems concentration.	faculty
Devin Drown	FAC	Teaching faculty for ecosystems concentration.	faculty
Eugenie Euskirchen	FAC	Teaching faculty for ecosystems concentration.	faculty
Jeff Falke	FAC	Teaching faculty for ecosystems concentration.	faculty
Helene Genet	FAC	Research faculty for ecosystems concentration.	faculty
Tamara Harms	FAC	Teaching faculty for ecosystems concentration.	faculty
Falk Huettmann	FAC	Teaching faculty for ecosystems concentration.	faculty
Steffi Ickert-Bond	FAC	Teaching faculty for ecosystems concentration.	faculty
Jay Jones	FAC	Teaching faculty for ecosystems concentration.	faculty
Knut Kielland	FAC	Teaching and research faculty for ecosystems concentration.	faculty
Mary Beth Leigh	FAC	Teaching faculty for ecosystems concentration.	faculty
Jeff Muehlbauer	FAC	Teaching faculty for ecosystems concentration.	faculty
Mario Muscarella	FAC	Teaching faculty for ecosystems concentration.	faculty
Skip Walker	FAC	Teaching faculty for ecosystems concentration.	faculty
Christopher Arp	FAC	Research faculty for hydrology concentration.	faculty
David Barnes	FAC	Teaching faculty for hydrology concentration.	faculty
Robert Bolton	FAC	Research faculty for hydrology concentration.	faculty
Sveta Stuefer	FAC	Teaching faculty for hydrology concentration.	faculty
Horacio Toniolo	FAC	Teaching faculty for hydrology concentration.	faculty
Andy Aschwanden	FAC	Research faculty for cryosphere concentration.	faculty
Jennifer Delamere	FAC	Research faculty for cryosphere concentration.	faculty
Mark Fahnestock	FAC	Research faculty for cryosphere concentration.	faculty
Louise Farquharson	FAC	Research faculty for cryosphere concentration.	faculty
Alexander Koholodov	FAC	Research faculty for cryosphere concentration.	faculty
Chris Larsen	FAC	Research faculty for cryosphere concentration.	faculty
Andy Mahoney	FAC	Research faculty for cryosphere concentration.	faculty
Sergey Marchenko	FAC	Research faculty for cryosphere concentration.	faculty

Position	New Hire or Existing	Qualifications	Duties
Dmitry Nicolsky	FAC	Research faculty for cryosphere concentration.	faculty
Mathew Sturm	FAC	Research faculty for cryosphere concentration.	faculty
Ken Tape	FAC	Research faculty for cryosphere concentration.	faculty
Martin Truffer	FAC	Teaching faculty for cryosphere concentration.	faculty
Melinda Webster	FAC	Research faculty for cryosphere concentration.	faculty
Uma Bhatt	FAC	Teaching faculty for atmospheric and climate sciences concentration.	faculty
Peter Bieniek	FAC	Research faculty for atmospheric and climate sciences concentration.	faculty
Javier Fochesatto	FAC	Teaching faculty for atmospheric and climate sciences concentration.	faculty
Richard Lader	FAC	Research faculty for atmospheric and climate sciences concentration.	faculty
Igor Polyakov	FAC	Teaching faculty for atmospheric and climate sciences concentration.	faculty
John Walsh	FAC	Research faculty for atmospheric and climate sciences concentration.	faculty
Xiangdong Zhang	FAC	Teaching faculty for atmospheric and climate sciences concentration.	faculty
Bernard Coakley	FAC	Teaching faculty for solid earth geophysics concentration.	faculty
David Fee	FAC	Research faculty for solid earth geophysics concentration.	faculty
Tarsilo Girona	FAC	Research faculty for solid earth geophysics concentration.	faculty
Ronni Grapenthin	FAC	Teaching faculty for solid earth geophysics concentration.	faculty
Natalia Ruppert	FAC	Research faculty for solid earth geophysics concentration.	faculty
Carl Tape	FAC	Teaching faculty for solid earth geophysics concentration.	faculty
Michael West	FAC	Research faculty for solid earth geophysics concentration.	faculty
Pat Druckenmiller	FAC	Teaching faculty for geoscience concentration.	faculty
Sarah Fowell	FAC	Teaching faculty for geoscience concentration.	faculty
Pavel Izbekov	FAC	Research faculty for geoscience concentration.	faculty
Jessica Larsen	FAC	Teaching faculty for geoscience concentration.	faculty
Taryn Lopez	FAC	Research faculty for geoscience concentration.	faculty
Chris Maio	FAC	Teaching faculty for geoscience concentration.	faculty
Paul McCarthy	FAC	Teaching faculty for geoscience concentration.	faculty
Jochen Mezger	FAC	Teaching faculty for geoscience concentration.	faculty
Elisabeth Nadin	FAC	Teaching faculty for geoscience concentration.	faculty

Position	New Hire or Existing	Qualifications	Duties
Sean Regan	FAC	Teaching faculty for geoscience concentration.	faculty
Michael Whalen	FAC	Teaching faculty for geoscience concentration.	faculty
Rudi Gens	FAC	Research faculty for geospatial science concentration.	faculty
Robert Herrick	FAC	Research faculty for geospatial science concentration.	faculty
Franz Meyer	FAC	Teaching faculty for geospatial science concentration.	faculty
Santosh Panda	FAC	Teaching faculty for geospatial science concentration.	faculty
Anupma Prakash	FAC	Teaching faculty for geospatial science concentration.	faculty
Peter Webley	FAC	Research faculty for geospatial science concentration.	faculty
Simon Zwieback	FAC	Teaching faculty for geospatial science concentration.	faculty
Nancy Fresco	FAC	Research faculty for geospatial science concentration.	faculty
Benjamin Gaglioti	FAC	Research faculty for ecosystems concentration.	faculty
Faculty	FAC	Rich Collins -	faculty

## Enrollment Information

### Projected Enrollments

Year 1    5                      Year 2    10                      Year 3    15                      Year 4    20

How was enrollment projected? Who was surveyed and how? (ie student interest assessment, job market analysis, and/or National or Alaskan trends)  
 The projected enrollment answer above explains this in detail. Also, the creation of the program itself was motivated by discussions with several agencies that hire UAF graduates.

Are there special restrictions on enrollments?  
 No

## Need for Program

### Employment Market Needs:

Who surveyed? How? Include a student interest, assessment, job market analysis, and/or Alaska/national trends.

Employers have expressed the need for personnel who have skills beyond 'classical' training in order to navigate the complex problems facing society globally but particularly in Alaska and the Arctic. Federal agencies hire "classically trained" people with degrees in the natural sciences (and a few social scientists and anthropologists) for their environmental analysis, assessment and studies programs and find that these people are not well positioned to work at the intersection of environmental sciences, policy, and regulations. Agency officials have emphasized the need to expose students/staff to the interdisciplinary nature of the work at many federal regulatory agencies, which typically sits at the intersection of environmental (& social) sciences with policy (laws, statutes, regulations that science has to support). The greatest challenge at present is that the vast majority of staff are trained in a single discipline. Communication and science communication with industry and stakeholders is seen as critical in the regulatory and monitoring work of many federal agencies. The emphasis of the ESS is to train disciplinary scientists with the skills to navigate across disciplines and would well prepare them for State, Federal, and Industry employment opportunities, which have been challenging to fill.

### Attach File

How have employment market needs been met to date?

Agency staff in NOAA Alaska have been directly queried about the ESS concept during its development and their feedback has helped us craft the program to be responsive to their needs. Numerous state and federal agency staff (i.e., BOEM, NOAA, DNR) have relayed the information to UAF faculty that is synthesized in the above paragraph. Examples of agencies and entities who would be interested in hiring ESS students include the following: NSF,

USGS, NOAA, NCAR, NASA (note that NASA created the term “Earth System Science” in the 1980s), Department of Defense, U.S. National Laboratories, notable National Nuclear Security Administration (Sandia, LANL, LLNL) and also those associated with the Department of Energy, and Alaska Department of Natural Resources (Forestry; Geological and Geophysical Surveys; Mining, Land, and Water; Division of Oil and Gas). Federal agencies are increasingly in need of staff with systems thinking experience. NOAA for example is facing increasing challenges in resource management because of climate change drivers and for 2022 their prime focus is on co-management approaches. Similarly, BOEM needs staff with disciplinary expertise who also possess the skills to navigate across different expertise in order to handle planning and management problems. Both of these areas require broader, systems-based approaches. NOAA Alaska leadership and staff have expressed interest in availability of specialty courses (e.g., sea-ice, snow, Arctic climate and policy) as part of a graduate degree or a certificate to prepare their workforce to fill gaps in their knowledge of operating in Alaska and the Arctic. The Department of Interior Climate Adaptation Science Centers administered by USGS is a partnership-driven program that teams scientific researchers with natural and cultural resource managers and local communities to help fish, wildlife, waters, and lands across the country adapt to changing conditions. The CASCs do take a systems science approach to address stakeholder needs and challenges, with a focus on generating actionable science in a co-production setting. The proposed ESS program would produce the kinds of researchers the CASC Network needs and especially with the co-production focus of the program. The current administration's interests, as reflected in the President's proposed budget, will require significant increases in staffing within the CASC network in the coming years offering attractive opportunities for ESS program graduates at both the PhD and MS levels. The ESS emphasis on team science will prepare program graduates for the long and sustainable careers that allows them to adjust in a constantly changing employment landscape.

## Budget & Resource Impact

Projected Annual Revenues in FY	Projected Annual Expenditures in FY
<b>Unrestricted</b>	Salaries & benefits (faculty and staff)
General Fund	Other (commodities, services, etc.)
Student Tuition & Fees	Total Expenditures
Indirect Cost Recovery	One-time Expenditures to Initiate Program (if >\$250,000)
TVEP or Other (specify):	(These are costs in addition to the annual costs, above.)
<b>Restricted</b>	Year 1
Federal Receipts	Year 2
TVEP or Other (specify):	Year 3
Total Revenues	Year 4
If proposed budget is 0, please explain how additional expenses (faculty, staff, etc) are being accounted for	

## Relation of Program to other Programs within the UAF System

Other programs affected by the proposed action, including those at other campuses (please list)

Which currently active UAF program is closest related?

Attach correspondence with the department regarding the closest program

## Implementation/Sustainability/Termination

Plans for recruiting students

The formation of ESS at UAF would provide a unifying, modern, and big-picture theme for attracting students to UAF. The justification for the program provides the same strategies for recruitment: 1) the flexibility of disciplinary or multidisciplinary degree pathways, 2) the opportunity to work on complex, systems-scale problems, 3) training opportunities aligned with the needs of employers, 4) training for research in the Arctic.

An up-to-date, modern website is needed to identify the active research by students and faculty within the program and to clarify all the connections among departments and institutes on campus.

Dedicated physical space for ESS collaborative activities would strengthen the program. Not only would such space lead to improved research (through collaboration), it would also enhance the students' experience within the program, which ultimately helps to attract future students. Drafted bylaws for ESS propose linking each student to a department—and therefore a student's “home space”—via the role of the student's thesis committee chair. With students' home spaces scattered across the campus, it will be important to have a collaborative space for ESS.

In recent years, some entities on campus have flown prospective students up to UAF in February. (This



practice is common at wealthier institutions in the Lower 48.) This has been seen as an excellent investment, as it has helped attract students who were deliberating between UAF and other competitive schools. Students who visit Fairbanks and UAF seem to have positive experiences, and therefore we would hope to pursue this level of recruiting.

Several recruitment-related items were laid out in a Strategic Enrollment Planning proposal submitted in February 2022.

Sustainability plans, to include grants, donations, development funds, etc.

Plans for phasing out program if it proves unsuccessful

If the program proves to be unsuccessful—in terms of low enrollments and surveyed dissatisfaction among students and faculty—then tracks would “retreat” back to their original degree programs after the trial period. This would require accommodating students who had enrolled in ESS. Potentially some of these students would be able to switch to the original programs rather than finishing with an ESS degree; this transition is enabled by the inherent efficiencies of having programs (one replacing the other) that rely on the same set of courses.

In addition for providing contingency plans for phasing out the program, we would like to identify future plans for growing the program. In our view, the most important steps for the future of the program are:

1. Seeking curricular efficiencies by combining future courses and establishing new ones.
2. Beginning the discussion for establishing an undergraduate degree option in ESS. Potentially this could be a concentration that is added to existing degree programs, but ideally it would be a degree itself. It would be mutually beneficial to have an ESS BS alongside an ESS MS/PhD.
3. Establishing an ESS certificate. This could help attract many others into ESS courses and has already been identified by federal and state agency leadership as of interest to their employees.
4. Seeking additional UAF expertise, in the form of new concentrations, in order to broaden the scope of the Earth System Science degree program at UAF. The largest category is ocean science; fruitful discussions with CFOS faculty occurred between April and September, 2021. Another realm is environmental chemistry. The inclusion of a broader co-production component will be essential for equitable engagement of Alaska indigenous communities. We envision establishing a mechanism for newcomers to propose new concentrations that broaden the scope of ESS and deliver students into the program, without creating redundancies at our relatively small university.

Attach SLOA Plan

[ESS\\_SLOA\\_PhD.pdf](#) 12/02/21 9:46 am  
[ESS\\_SLOA\\_PhD\\_changes.pdf](#) 12/02/21 9:46 am

## Regents Guidelines

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Upload Program Action Request Form

[Earth System Science, PhD Program Action Request Form.xlsx](#) 10/01/21 1:19 pm  
[Earth System Science, PhD Program Action Request Form 4-22-2022.xlsx](#) 04/22/22 6:55 am  
[ESS\\_financial\\_impact\\_4-22-2022.pdf](#) 04/22/22 6:55 am

## Prospectus

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Upload Prospectus Document(s)

[Earth System Science, PhD Prospectus Template.docx](#) 10/01/21 1:19 pm  
[ESS Prospectus PhD 4-22-2022.pdf](#) 04/22/22 6:55 am  
[ESS\\_financial\\_impact\\_4-22-2022.pdf](#) 04/22/22 6:55 am

Rationale

Earth System Science (ESS) is a modern, established field of science involving multiple disciplines and seeks to understand the Earth system through observations, experiments, modeling, and assessments. UAF faculty and students undertake world-leading research in ESS and its subdisciplines of ecosystems, atmospheric sciences, solid earth geophysics, and more. This proposal seeks to establish a degree program in ESS by combining new formal degree pathways (Sustainability, Hydrology, Ecosystems) with existing ones, notably, from Geosciences and Atmospheric Sciences. As envisioned, ESS would provide an improved, broader degree experience for students, while also serving as a powerful showcase for UAF science and recruitment.

Additional Information

Supporting Documents

[ESS\\_492\\_692\\_seminar.pdf](#) 10/03/21 4:30 pm  
[Steffen\\_2020\\_ESS.pdf](#) 10/03/21 4:30 pm  
[ESS\\_overview.pdf](#) 10/03/21 4:30 pm  
[ESS\\_602\\_Best\\_Practices\\_Research\\_in\\_Alaska.pdf](#) 10/03/21 4:30 pm  
[ESS\\_601\\_Intro\\_to\\_ESS.pdf](#) 10/03/21 4:30 pm  
[ESS\\_courseleaf\\_response\\_to\\_CNSM.docx](#) 12/07/21 9:34 am  
[ESS\\_bylaws.pdf](#) 03/14/22 8:46 am

Graduate Academic & Advisory Committee Statement on the Earth Systems Sciences Proposal.pdf 03/23/22

9:21 pm

ESS\_supp\_2022.pdf 04/22/22 6:43 am

ESS\_bylaws\_4-22-2022.pdf 04/22/22 6:55 am

ESS\_courseleaf\_response\_to\_GAAC\_v4\_4-22-2022.pdf 04/22/22 6:55 am

UA Mail - ESS Rollback.pdf 06/16/22 10:28 am

ESS\_bylaws\_20220907.pdf 09/09/22 1:58 pm

ESS\_one\_slide.pdf 09/09/22 1:58 pm

Key: 362

Prospectus for Earth System Science, Ph.D.  
University of Alaska Fairbanks

## **A. Mission and Goals:**

Earth System Science (ESS) is a modern, established field of science involving multiple disciplines and seeks to understand the Earth system through observations, experiments, modeling, and assessments. UAF faculty and students undertake world-leading research in ESS and its subdisciplines of ecosystems, atmospheric sciences, solid earth geophysics, and more. This proposal seeks to establish a degree program in ESS by combining new formal degree pathways (Sustainability, Hydrology, Ecosystems) with modified versions of existing degree pathways, notably, from within Geosciences and Atmospheric Sciences. As envisioned, ESS would provide an improved, broader degree experience for students, while also serving as a powerful showcase for UAF science and recruitment. The ESS program is a curricular complement to the natural strengths of UAF as a leader in arctic research.

**Mission:** The mission of the Earth System Science program at UAF is to provide graduate students with the multi-disciplinary training needed to understand the principles and applications of Earth System Science (observations and measurements, experiments, modeling, and assessment), with emphasis on the arctic region.

**ESS Concentrations:** The ESS program offers eight disciplinary concentrations:

1. ESS Sustainability
2. ESS Ecosystems
3. ESS Hydrology
4. ESS Atmospheric and Climate Sciences
5. ESS Cryosphere
6. ESS Solid Earth Geophysics
7. ESS Geoscience
8. ESS Geospatial Science

**Motivation:** UAF does not currently have a curricular pathway for ESS, which would require both disciplinary and multidisciplinary options. A 2022 report on Earth System Science by the National Academy of Sciences wrote this: "The current and future workforce in Earth Systems Science must maintain **strong disciplinary knowledge and skills, while developing interdisciplinary and transdisciplinary science skills and practices** that will help tackle problems at the intersection of natural and human systems. Necessary skills and practices include systems thinking, integration and application of human dimensions, complex problem solving, computational and analytical skills, spatial and temporal reasoning, communicating to diverse audiences, and the ability to work ethically in diverse teams."

## **Tenets of ESS at UAF:**

- ESS is a modern, established field of science involving multiple disciplines and seeks to understand the Earth system through observations, experiments, modeling, and assessments (Steffen et al., 2020; Next Generation Earth Systems Science at the National Science Foundation, 2022).
- ESS at UAF has an arctic emphasis.
- ESS is aligned with the mission of UAF as a leader in Arctic Science.

- Mission 1: “We are Alaska's research university and America's arctic university.”
- ESS supports the strategic plan of UAF. ESS relates directly to 5 of the 6 goals:
  - Modernize the student experience.
  - Solidify our global leadership in Alaska Native and Indigenous programs.
  - Achieve Tier 1 research status.
  - Embrace and grow a culture of respect, diversity, inclusion and caring.
  - Revitalize key academic programs.
- ESS is not a department; it is a cross-campus degree program formed by a collection of schools, departments, faculty, staff, and students.
- ESS promotes collaborations among research institutes, departments, and students across campus.
- ESS promotes modern, standardized training in scientific methods (e.g., open-source software development).
- ESS enables interdisciplinary, multidisciplinary, and disciplinary degree pathways.
- ESS prepares students for cross-discipline team science problem solving increasingly needed by many employers.
- Research faculty and academic faculty have equal opportunities in terms of the makeup of ESS thesis committees.

## **B. Authorization:**

The University of Alaska Fairbanks (UAF) is one of three individually accredited universities within the University of Alaska system. UAF has been continuously accredited since 1934 by the Northwest Commission on Colleges and Universities. The Constitution of the State of Alaska establishes the University of Alaska as the state university, governed by a Board of Regents appointed by the governor. Alaska Statutes provide for a board of eleven voting members, including one student, with authority to carry out the mission of the university system and its constituent units, including the determination and regulation of the university's course of instruction and the conferring of degrees. Members of the board have no contractual, employment, or financial interest in the university. The chair is elected from among the board. The board appoints the president of the university system, who in turn appoints the chancellor of UAF. Both officers are full-time employees whose only responsibility is to the institution.

## **C. Educational Offerings:**

1. Descriptive information of the educational offering(s):

The ESS program includes three sets of courses:

- A. **Required courses.** These provide provide foundational introductory training for their degree programs:
  - ESS 601 Introduction to Earth System Science [3 credits]
  - ESS 602 Best Practices for Research in Alaska [1 credit]
  - ESS 692/492 Earth System Science seminar [1 credit]
- B. **Methods and cross-cutting courses.** This list of existing courses provides a single place where students can find courses relevant to ESS.
- C. **Discipline-specific courses.** These are offered within concentrations.

The PhD in Earth System Science is a thesis-based degree that includes the option of one of 8 concentrations. The varying level of credit requirements within the concentrations reflects the diversity of needs within the subdisciplines of ESS.

					A	B/C	thesis	project	total
			conc.		credits	credits	credits	credits	credits
1	ESS	PhD		thesis	5	13	18	0	36
2	ESS	PhD	SUS	thesis	5	11	18	0	34
3	ESS	PhD	ECO	thesis	5	3	18	0	26
4	ESS	PhD	HYDR	thesis	5	13	18	0	36
5	ESS	PhD	ATM	thesis	5	18	18	0	41
6	ESS	PhD	CRYO	thesis	5	13	18	0	36
7	ESS	PhD	SOLID	thesis	5	13	18	0	36
8	ESS	PhD	GEOS	thesis	5	5	18	0	28
9	ESS	PhD	GIS	thesis	5	9	18	0	32

[THIS TABLE WOULD BE TRANSFERRED TO THE MS PROSPECTUS:]

					A	B/C	thesis	project	total
			conc.		credits	credits	credits	credits	credits
1	ESS	MS		thesis	5	13	12	0	30
2	ESS	MS	SUS	thesis	5	14	12	0	31
3	ESS	MS	ECO	thesis	5	13	12	0	30
4	ESS	MS	HYDR	thesis	5	13	12	0	30
5	ESS	MS	ATM	thesis	5	13	12	0	30
6	ESS	MS	CRYO	thesis	5	13	12	0	30
7	ESS	MS	SOLID	thesis	5	13	12	0	30
8	ESS	MS	GEOS	thesis	5	13	12	0	30
9	ESS	MS	GIS	thesis	5	13	12	0	30
10	ESS	MS	SUS	project	5	19	0	6	30
11	ESS	MS	ATM	project	5	19	0	6	30
12	ESS	MS	GIS	project	5	19	0	6	30

2. Evidence of approval by the appropriate academic policy body of the institution:

Senate signature page and BOR approval from the minutes will be provided by the Office of the Provost.

## D. Planning:

### 1. Evidence of need for the change and the students to be served:

The complexity of scientific problems in the field of ESS cannot be encompassed within any current degree program at UAF. A student interested in achieving formal training in ESS would need to establish an interdisciplinary degree, including a custom list of courses, while also needing to find the relevant faculty from across campus to form the thesis committee. Such a student would remain relatively isolated in their pursuits. By comparison, the ESS degree program would formalize the curriculum for students interested in this field of science or its underlying subdisciplines. It would also establish a formal cohort of students to form a scientific community and promote collaborations. The degree program would improve the interface between students and research opportunities at UAF.

**Career opportunities.** Agency staff in NOAA Alaska have been directly queried about the ESS concept during its development and their feedback has helped us craft the program to be responsive to their needs. Numerous state and federal agency staff (i.e., BOEM, NOAA, DNR) have relayed the information to UAF faculty that is synthesized in the above paragraph.

Examples of agencies and entities who would be interested in hiring ESS students include the following: NSF, USGS, NOAA, NCAR, NASA (note that NASA created the term “Earth System Science” in the 1980s), Department of Defense, U.S. National Laboratories, notably National Nuclear Security Administration (Sandia, LANL, LLNL) and also those associated with the Department of Energy, and Alaska Department of Natural Resources (Forestry; Geological and Geophysical Surveys; Mining, Land, and Water; Division of Oil and Gas).

### 2. The procedures used in arriving at the decision to change:

The current effort to establish ESS as a curricular program at UAF began in fall of 2020. Discussions among faculty have been nearly constant since that time, with the core discussions accelerating in May 2021 with the establishment of an ESS Working Group, with one person representing each of the proposed concentrations.

- **2020** Oct: “Modernizing Earth Sciences Graduate Education at UAF,” a 4-page pdf doc produced by Uma Bhatt, Javier Fochesatto, Sarah Fowell, and Franz Meyer
- **2021** Jan: start of campus-wide discussion forums on Earth System Science (sponsored by CNSM)
- **2021** April: focusing of ESS curricular structure (A/B/C courses) and broadening of scope to 7 concentrations, including Sustainability
- **2021** May: establishment of ESS Working Group (1 person per concentration/track, plus graduate student representative)
- **2021** summer: sustained discussions to identify participating groups
- **2021** Sept: finalize participating groups; finalize curriculum for each concentration
- **2021** Oct 15: submit program into Courseleaf for UAF review; draft ESS Bylaws
- **2021** Oct 23: pass departmental review from six departments (NRE Valentine, BIO Wagner, CGEE Darrow, ATM Fochesatto, PHYS Truffer, GEOS McCarthy)
- **2022** Jan 22: pass CNSM curriculum review (Chair Dr. Pat Doak), following refinement
- **2022** Feb 14: Tape/Bhatt zoom meeting with GAAC curriculum review (Co-chairs Dr. Jennifer

Carroll and Dr. Javier Fochesatto)

- 2022 March 01: feedback received from GAAC
- 2022 March 23: pass GAAC, following refinement
- 2022 April 04: Discussion Item at Faculty Senate meeting
- 2022 April: discussions among ESS Working Group, Faculty Senators, and participating faculty and administrators
- 2022 May 02: Business Item at Faculty Senate meeting

3. The organizational arrangements that must be made within the institution to accommodate the change:

The program requires its participating departments to coordinate and collaborate with other departments. The program includes participation from three different colleges (CNSM, CEM, CRCD), and therefore coordination (e.g., revenue streams related to faculty and students) is also needed at that level. Three deans have been involved in the discussion and are in agreement that cross-disciplinary work requires this collaboration. A faculty member ESS Lead will lead the ESS Governance Committee, which is composed of ESS Representatives for each concentration, as specified in the bylaws drafted by the ESS Working Group. The ESS Lead will be supported by a workload reduction provided by the CNSM Dean.

4. Timetable for implementation.

1. April 4. Discussion Item at UAF Faculty Senate meeting.
2. May 2. Business Item at UAF Faculty Senate meeting.
3. May. Kickoff of ESS discussions: fall 2022 course offerings, marketing, website. Migrate from ESS Working Group to ESS Governance Committee.
4. June. Website established.
5. Summer 2022.
  - a. Prepare offerings of ESS 601, 602, 692/492.
  - b. Establish admissions committees for each ESS concentration.
  - c. Convey to admitted students and existing students the opportunity to shift their degree to ESS.
6. Fall 2022.
  - a. Teach ESS 601, 602, 692/492
  - b. Coordinate admissions committees for spring 2023.

#### **E. Budget:**

1. The budget projections (revenue and expenditures) for each of the first three years of operation:

Please see the Program Action Request and financial impact document.

2. Revenue and expenditures associated with the change itself:

Please see the Program Action Request and financial impact document.

3. Institutional financial support to be reallocated to accommodate the change:

Please see the Program Action Request and financial impact document.

4. The budgetary and financial implication of the change for the entire institution:

Please see the Program Action Request and financial impact document.

**F. Student Services:**

Students will have access to the support services available on the UAF campus.

**G. Physical Facilities:**

The program relies on existing departmental resources, including physical space for students and faculty. The program expresses a desire for dedicated collaborative space, which is something that would be helpful to establish as the program grows.

**H. Library and Information Resources:**

The program will rely on existing library and information resources.

**I. Faculty and Staff:**

A list of 71 UAF tenure-track and research faculty are listed in the program proposal as expressing interest in serving as collaborating faculty within Earth System Science. Below we list faculty serving roles that will be important for the success of the program. Administrative support staff will primarily originate from within the participating departments.

**Earth System Science Working Group:**

Sarah Trainor (ESS Sustainability)  
Tamara Harms (ESS Ecosystems)  
Christopher Arp (ESS Hydrology)  
Uma Bhatt (ESS Atmospheric and Climate Sciences)  
Louise Farquharson (ESS Cryosphere)  
Carl Tape (ESS Solid Earth Geophysics)  
Sarah Fowell (ESS Geoscience)  
Franz Meyer (ESS Geospatial Science)  
Skye Kushner (PhD student)

**Department Chairs of participating departments:**

David Valentine, Natural Resources and Environment  
Sean Asikluk Topkok, Center for Cross-Cultural Studies  
Diane Wagner, Biology and Wildlife  
Margaret Darrow, Civil, Geological, and Environmental Engineering  
Javier Fochesatto, Atmospheric Sciences  
Martin Truffer, Physics  
Paul McCarthy, Geosciences



**Directors of participating institutes:**

Peter Pinney, Institute of Agriculture, Natural Resources and Extension

Diane O'Brien, Institute of Arctic Biology

David Barnes, Institute of Northern Engineering

Hajo Eicken, International Arctic Research Center

Robert McCoy, Geophysical Institute

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Financial impact statement for the proposed Earth System Science (ESS) PhD and MS programs  
*This document is referenced in the Program Action Request and the Prospectus.*

Departments with faculty participating in ESS:

1. Natural Resources and Environment
2. Center for Cross-Cultural Studies
3. Biology and Wildlife
4. Civil, Geological, and Environmental Engineering
5. Atmospheric Sciences
6. Physics
7. Geosciences

Proposed programs within the UA system require submission of a [Program Action Request Form spreadsheet](#). The proposed ESS programs are envisioned to leverage existing administrative structures, notably, the 7 academic departments whose tenure-track and collaborating faculty are among the 71 who intend to participate in the ESS degree programs. Each graduate student in ESS would be linked with a department via the Chair of the thesis committee for the graduate student. Paperwork related to ESS degrees will be handled by the respective departments and their administrative assistants. For example, the current administrative assistant for the Department of Atmospheric Sciences is also the assistant for the Department of Geosciences. This person will therefore pick up the administration of the new students entering into ESS concentrations linked with these two departments. With the exception of 5 credits of 3 new courses (ESS 601, ESS 602, ESS 692/492), all courses for ESS are offered within existing departments on campus. No TAs are needed for the three new courses. In summary, the ESS program, as proposed, will not incur new expenses.

In response to the the items identified within the ESS Courseleaf proposal, CNSM commits to (memo from CNSM Dean 4/12/2022):

1. **a program manager for the success of this project.** This will be achieved by a workload release of no less than a one (1) course (~3–4 workload units) for the faculty member associated with the ESS program.
2. **administrative assistance** sufficient to ensure timely and accurate processing and routing of ESS documents and other managerial tasks. This will be achieved largely by redirecting duties of the CNSM Dean's administrative aid but will also include use of office associates in departments associated with the ESS program.
3. working toward a **dedicated space** on campus for the ESS program. The goal of a common space for students and faculty to build a cohort and interact socially and intellectually is an important aspect of an interdisciplinary program but is not necessarily essential to the launch. Currently, we are looking for a location but none has been identified. Finding a suitable space will remain a goal for the intermediate future.
4. a modern, attractive, current **website for the ESS program.** CNSM maintains a Public Information Officer staff member expert at website design. Using this staff member, CNSM has recently updated the college's site (<https://www.uaf.edu/cnsm/>) and developed a comprehensive pre-health professions website (<https://www.uaf.edu/prehealth/>) among other improvements on departmental pages. Once approved, the PIO will develop, then maintain, an ESS site with input from ESS faculty.

As the program grows, the resources will be adjusted to accommodate the expanding administrative needs.

The UAF Provost has expressed administrative commitment to the 3 new ESS courses and to the startup of the program (4/21/2022 letter).

The proposal includes suspending admission into six degree programs, with ESS providing equivalent and improved degree pathways for students in those subjects. The following table lists the six degree programs that would be suspended in the transition to ESS PhD/MS. It also lists the list of actively enrolled students:

			Fall 21	<b>Spring 22</b>
1	PhD	Geoscience	12	<b>14</b>
2	MS	Geoscience	22	<b>23</b>
3	PhD	Geophysics	24	<b>25</b>
4	MS	Geophysics	9	<b>8</b>
5	PhD	Atmospheric Sciences	4	<b>5</b>
6	MS	Atmospheric Sciences	2	<b>1</b>
		<b>TOTAL</b>	<b>73</b>	<b>76</b>

Students within these programs would be required to finish their degrees within the maximum allowable limits, as determined by UAF (10 years for PhD from the time of starting; 7 years for MS).

21 April 2022



To whom it may concern:

The Geophysical Institute (GI) Graduate Student Association (GIGSA) represents the interests of a diverse group of students studying the solid earth, atmosphere, cryosphere, and anthroposphere. The proposed Earth System Science (ESS) program will cultivate and strengthen new and existing cross-disciplinary collaborations involving students in the GI. Furthermore, it will attract additional strong students to the GI, benefiting GIGSA and its members.

GIGSA members have been involved in the development of the ESS program. GIGSA joins other departments, units, and student groups on campus in voicing our support for the implementation of this program.

Sincerely,

A handwritten signature in black ink, appearing to read "Liam Toney". The signature is fluid and cursive, with a large initial "L" and "T".

Liam Toney  
President, GIGSA




## OFFICE OF THE REGISTRAR

University of Alaska Fairbanks

P.O. Box 757495, Fairbanks, Alaska 99775-7495

907-474-6300  
907-474-1590 fax  
uaf-registrar@alaska.edu  
www.uaf.edu/reg

To: UAF Faculty Senate  
From: Holly McDonald, Interim Registrar   
CC: Carl Tape, Geophysics  
Date: April 21, 2022  
Subject: Earth Systems Science Coding

The current proposal for Earth Systems Science, PhD program outlines a structure to identify which students are working with a specific chair. Our student information system (Banner) allows us to create degree program coding in a way that we can assign students to a specific college and department to allow tracking and identification.

Please feel free to contact me if you have any questions at [hamcdonald@alaska.edu](mailto:hamcdonald@alaska.edu).

April 21, 2022



To whom it may concern:

As the Biology & Wildlife Graduate Student Association (BGSA), we are representing the interests of students in the Biology and Wildlife department. We are familiar with the proposed Earth System Science (ESS) program and its proposed bylaws and formally endorse the program. We are thus in full support of a positive vote from the Faculty Senate on ESS.

We believe ESS is an important step towards strengthening the graduate program and graduate education, by building important cross-disciplinary connections and collaboration.

Members of BGSA have been involved and heard in the discussions and development of ESS, and we join the wide support for ESS across departments.

Sincerely,

A handwritten signature in black ink, appearing to read 'Kristin Olson', is written over a white background.

Kristin Olson  
BGSA President

A handwritten signature in black ink, appearing to read 'Laura Weingartner', is written over a white background.

Laura Weingartner  
BGSA Vice President

A handwritten signature in black ink, appearing to read 'Hannah Mevenkamp', is written over a white background.

Hannah Mevenkamp  
BGSA Secretary

A handwritten signature in black ink, appearing to read 'Laura Knutsen', is written over a white background.

Laura Knutsen  
BGSA Treasurer

A handwritten signature in black ink, appearing to read 'Caitlyn Oliver Brown', is written over a white background.

Caitlyn Oliver Brown  
BGSA Outreach Coordinator

Dear ESS Working Group:

I am chair of the **Department of Natural Resources and Environment (DNRE)**, and I am familiar with the proposed ESS MS/PhD program and its proposed bylaws. The ESS MS/PhD program includes new student degree pathways that are enabled by faculty within several departments, including ours. Our department will support students within **ESS Sustainability** and **ESS Geospatial Sciences** who are associated with our department (via the role of the thesis committee chair). Furthermore, we expect to receive course/thesis credit revenue from these students. Specifically, our department will support:

- participation of our tenure-track faculty or collaborating faculty as the thesis committee chair
- participation of our tenure-track faculty or collaborating faculty on the thesis committees
- provision of workspace for students with a **DNRE** committee chair
- oversight of paperwork associated with thesis committees
- review of theses by department chairs (following initial review by the ESSGC)

In addition to supporting these existing responsibilities, we recognize that ESS will create some additional commitments that are open to all ESS faculty, including those associated with our department. The roles include:

- participation of our tenure-track faculty or collaborating faculty within the ESS degree program, such as on the proposed ESS Governance Committee
- participation of our tenure-track faculty or collaborating faculty within accreditation efforts such as SLOAs

Furthermore we are prepared to coordinate with personnel from other departments or with those who are dedicated to the ESS degree program.

I approved the ESS courseleaf submission in October 2021, and our department remains in support of ESS at UAF and committed to its success.

David Valentine  
Chair, Department of Natural Resources and the Environment  
April 7, 2022



Center for Cross-Cultural Studies  
*Indigenous Studies MA and PhD Programs*  
*Alaska Native Knowledge Network*

PO Box 756730-UAF  
Fairbanks, Alaska 99775-6730

(907) 474-1902  
uaf-cxcs@alaska.edu



April 20, 2022

Dear ESS Working Group:

I am chair of the **Center for Cross-Cultural Studies (CCS)**, and I am familiar with the proposed ESS MS/PhD program and its proposed bylaws. The ESS MS/PhD program includes new student degree pathways that are enabled by faculty within several departments, including ours. Our department will support students within **ESS Sustainability** who are associated with our department (via the role of the thesis committee chair). Furthermore, we expect to receive course/thesis credit revenue from these students. Specifically, our department will support:

- participation of our tenure-track faculty and collaborating faculty as thesis committee chairs
- participation of our tenure-track faculty and collaborating faculty on thesis committees
- participation of our tenure-track faculty and collaborating faculty on admission committees
- provision of workspace for students with a **CCS** committee chair
- oversight of paperwork associated with thesis committees
- review of theses by department chair

In addition to supporting these existing responsibilities, we recognize that ESS will create some additional commitments that are open to all ESS faculty, including those associated with our department. The roles include:

- participation of our tenure-track faculty and collaborating faculty within the ESS degree program, such as on the proposed ESS Governance Committee
- participation of our tenure-track faculty and collaborating faculty within accreditation efforts such as SLOAs

Furthermore we are prepared to coordinate with personnel from other departments or with those who are dedicated to the ESS degree program.

Sincerely,

Dr. Sean Asikluk Topkok  
Associate Professor and Chair,  
Center for Cross-Cultural Studies  
Indigenous Studies Graduate Programs  
Alaska Native Knowledge Network  
[cstopkok@alaska.edu](mailto:cstopkok@alaska.edu) 907-474-5537





## DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT

University of Alaska Fairbanks  
COLLEGE OF NATURAL SCIENCE & MATHEMATICS  
P.O. Box 757200, Fairbanks, Alaska 99775-7200

Dr. Sarah F. Trainor  
907-474-7878  
907-474-6184 fax  
sfrainor@alaska.edu  
www.uaf.edu/nre

To Whom it May Concern,

I wanted to reach out to underscore that the ESS program has been developed by a group of committed faculty and has the potential to add an important integrated, holistic perspective in science education and research at UAF.

I am co-lead for the Sustainability concentration of ESS and we working now with Graduate School Director Collins, Debbie Mekiana, Margaret Rudolf and an interdisciplinary team of people to write a planning grant proposal to the NSF Cultural Transformation in the Geosciences program that, if funded, would strengthen and bolster the entire ESS program. Our intention is to follow-up this planning grant effort with a longer and larger implementation proposal.

The rationale, goals, and activities in this project are in direct alignment with three of the six UAF Strategic Planning Goals 2019-2027. First, by developing cultural competency and directly working to support Alaska Native students, this project directly addresses the two goals to 1) establish global leadership in Alaska Native and Indigenous programs and 2) embrace and grow a culture of respect, diversity, inclusion and caring. In addition, with a vision of a subsequent CTGC implementation proposal that includes building out cross-generational mentorship, hands-on internships, and job placement, the project also addresses the UAF strategic goal to revitalize key academic programs to make them responsive to workforce development needs.

This NSF program is new and we have been told it will be growing. Our proposed activities would support the ESS program in partnering with the Alaska Native Success Initiative and the UAF Department of Equity and Compliance to build a supportive and inclusive learning and research environment for Alaska Native Students and all students with diverse backgrounds in bringing the "human dimension" into geoscience, including engagement and partnership in research with communities.

Margaret Rudolf and I met with the UAF ANSI Implementation team on April 8th and VC Stern expressed her support for this project.

While we can certainly complete our project within the existing academic structure, if the ESS program is approved it will provide a strong platform for our work and our work would strengthen the ESS program.

Please do not hesitate to reach out if you have any questions or hesitations in supporting the ESS program.

Respectfully,

A handwritten signature in blue ink, appearing to read 'Sarah F. Trainor', is written over a light blue horizontal line.

Sarah Trainor

*Naturally Inspiring.*

Dear ESS Working Group:

I am chair of the **Department of Biology and Wildlife (BIOL)**, and I am familiar with the proposed ESS MS/PhD program and its proposed bylaws. The ESS MS/PhD program includes new student degree pathways that are enabled by faculty within several departments, including ours. Our department will support students within **ESS Ecosystems** who are associated with our department (via the role of the thesis committee chair). Furthermore, we expect to receive course/thesis credit revenue from these students. Specifically, our department will support:

- participation of our tenure-track faculty or collaborating faculty as the thesis committee chair
- participation of our tenure-track faculty or collaborating faculty on the thesis committees
- provision of workspace for students with a **BIOL** committee chair
- oversight of paperwork associated with thesis committees
- review of theses by department chairs (following initial review by the ESSGC)

In addition to supporting these existing responsibilities, we recognize that ESS will create some additional commitments that are open to all ESS faculty, including those associated with our department. The roles include:

- participation of our tenure-track faculty or collaborating faculty within the ESS degree program, such as on the proposed ESS Governance Committee
- participation of our tenure-track faculty or collaborating faculty within accreditation efforts such as SLOAs

Furthermore we are prepared to coordinate with personnel from other departments or with those who are dedicated to the ESS degree program.

I approved the ESS courseleaf submission in October 2021, and our department remains in support of ESS at UAF and committed to its success.

Diane Wagner  
Chair, Department of Biology and Wildlife  
April 6, 2022

Dear ESS Working Group:

I am chair of the **Department of Civil, Geological, and Environmental Engineering (CGEE)**, and I am familiar with the proposed ESS MS/PhD program and its proposed bylaws. The ESS MS/PhD program includes new student degree pathways that are enabled by faculty within several departments, including ours. Our department will support students within **ESS Hydrology** who are associated with our department (via the role of the thesis committee chair). Furthermore, we expect to receive course/thesis credit revenue from these students. Specifically, our department will support:

- participation of our tenure-track faculty or collaborating faculty as the thesis committee chair
- participation of our tenure-track faculty or collaborating faculty on the thesis committees
- provision of workspace for students with a **CGEE** committee chair
- oversight of paperwork associated with thesis committees
- review of theses by department chairs (following initial review by the ESSGC)

In addition to supporting these existing responsibilities, we recognize that ESS will create some additional commitments that are open to all ESS faculty, including those associated with our department. The roles include:

- participation of our tenure-track faculty or collaborating faculty within the ESS degree program, such as on the proposed ESS Governance Committee
- participation of our tenure-track faculty or collaborating faculty within accreditation efforts such as SLOAs

Furthermore we are prepared to coordinate with personnel from other departments or with those who are dedicated to the ESS degree program.

I approved the ESS courseleaf submission in October 2021, and our department remains in support of ESS at UAF and committed to its success.

Margaret Darrow

Chair, Department of Civil, Geological, and Environmental Engineering

April 12, 2022



DEPARTMENT OF ATMOSPHERIC SCIENCES  
COLLEGE OF NATURAL SCIENCE AND MATHEMATICS  
314 AKASOFU BUILDING, P.O. BOX 757320  
907-474-7368

April 19, 2022

**TO: ESS Working Group**

**CC: Drs. Xiangdong Zhang, Uma Bhatt, Igor Polyakov, Peter Bieniek, Richard Lader**

The faculty in the Department of Atmospheric Sciences(ATM) are ready to participate and integrate the ESS MS and PhD programs. As per our internal departmental discussions, the ATM department will input new students in both MS and PhD ESS program while keeping both MS and PhD Atmospheric Sciences programs in standby until the MS and PhD ESS Atmospheric and Climate Sciences is fully developed and in steady-state.

As chair of ATM, I have been involved in the development of the proposed ESS MS and PhD programs and the proposed bylaws. The faculty in our department are ready to support students within ESS Atmospheric and Climate Sciences based on our research grant funding. It is expected therefore, that as a result of the collective effort represented by the ESS program implementation, we will increase students credits hours and graduate counts by stimulating new research areas where atmospheric and climate sciences play a major role.

Our faculty therefore will commit to:

- participate as thesis committee chair and/or member.
- provide workspace for students with an ATM committee chair in the CNSM or Research Institutes depending upon the faculty appointment.
- review and participate of the committees and public theses defenses and be an actively engaged member of the ESS community across campus.

In addition, as faculty members of the ESS program we are prepared to participate in accreditation efforts and in providing input to the formulation of the Student Learning Outcomes Assessment. Furthermore, we are prepared to coordinate our efforts with personnel from the departments integrating the ESS program. I approved the ESS course leaf submission in October 2021, and our department remains in support of ESS at UAF and committed to its success.

Sincerely,

A handwritten signature in black ink, appearing to read 'J. Fochesatto'.

**Javier Fochesatto Ph.D.,**  
**Professor and Chair Department of Atmospheric Sciences**  
**College of Natural Science and Mathematics, University of Alaska Fairbanks**  
Office Room 317 Reichardt Building West Ridge, Main Campus  
1930 Yukon Drive. P.O. Box 755940. Fairbanks, Alaska 97775-5904, USA.  
(P): 1-907-888-3673  
(E): gjfochesatto@alaska.edu

*Naturally Inspiring.*

The University of Alaska Fairbanks is an AA/EO employer and educational institution and prohibits illegal discrimination against any individual. Learn more about UA's notice of nondiscrimination.

Department of Atmospheric Sciences faculty

DocuSigned by:



B13E77F004CC48C  
Dr. Uma Bhatt

DocuSigned by:



5EA1D6980DD7420  
Dr. Igor Polyakov

DocuSigned by:



8B38AC40AB18425  
Dr. Xiangdong Zhang

Department of Atmospheric Sciences cooperating faculty

DocuSigned by:



DAC0A0DB409B461  
Dr. Peter Bieniek

DocuSigned by:



6BBB5EAA1A9E473  
Dr. Richard Lader



U.S. DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
NATIONAL WEATHER SERVICE  
ALASKA REGION  
222 West 7<sup>th</sup> Avenue, #23  
Anchorage, Alaska 99513-7575

To: Whom it may concern

I would like to provide a letter of support to recognize the importance of the education opportunities at the University of Alaska in Fairbanks to recruiting efforts for the National Weather Service (NWS). Both undergraduate and graduate programs that prepare Alaskans and other students to compete for positions in Alaska Region NWS are critical for staff retention and succession planning. Some points regarding the Earth System Science (ESS) program:

- I have examined the proposed structure and find it to be forward-leaning. I believe it will position UAF graduates well for competing in a workplace that embraces a comprehensive approach to Earth System Science.
- This framework lines up with our employment needs. The large majority of NWS employees in Alaska comes from other parts of the country and retention is a consistent problem. Employees get a start in Alaska and then move to locations closer to family in the lower 48. The only effective way to combat this phenomena (which impacts all federal science agencies) is to recruit trained Alaskans who will be "close to family" already.
- I have worked with Dr. Uma Bhatt to identify the requirements for an undergraduate BS degree that would qualify for a meteorologist position within the NWS. Those requirements can largely be met within the proposed structure and there are options to collaborate with nearby universities in the Pacific Northwest to complete what is still needed. There are currently no university undergraduate degrees offered in Alaska.
- Current and Proposed disciplines relevant to NWS positions include Hydrology, Atmospheric Science, Climate Science and Geospatial Science. The new track in Sustainability highlights the Social Science needs of the NWS, which are steadily increasing.
- NWS Alaska has a number of employees who are originally from the lower 48 but attended UAF for undergraduate or graduate studies. A disproportionate number of UAF graduates have made Alaska their home and have been with the Alaska Region NWS for 10 years or more, which is another reason for our strong support of the Earth System Science Curriculum and associated majors.

This only addresses areas that touch the National Weather Service, but other line offices within NOAA such as the National Marine Fisheries Service, National Ocean Service, and National Environmental Satellite, Data and Information Service all have jobs in Alaska that are included in this discussion. With the emphasis on climate change and Arctic issues, the programs that fall under an integrated ESS are more critical than ever. Thanks for your consideration.

Respectfully,

A handwritten signature in cursive script that reads "Scott Lindsey".

Dr. Scott Lindsey  
Regional Director  
NOAA/NWS Alaska Region Headquarters  
222 West 7th Avenue #23  
Anchorage, AK 99513-7575  
<http://weather.gov/arh>  
Office - (907)271-5126  
Fax - (907)271-3711

Dear ESS Working Group:

I am chair of the **Department of Physics (PHYS)**, and I am familiar with the proposed ESS MS/PhD program and its proposed bylaws. The ESS MS/PhD program includes new student degree pathways that are enabled by faculty within several departments, including ours. Our department will support students within **ESS Cryosphere** who are associated with our department (via the role of the thesis committee chair). Furthermore, we expect to receive course/thesis credit revenue from these students. Specifically, our department will support:

- participation of our tenure-track faculty or collaborating faculty as the thesis committee chair
- participation of our tenure-track faculty or collaborating faculty on the thesis committees
- provision of workspace for students with a **PHYS** committee chair
- oversight of paperwork associated with thesis committees
- review of theses by department chairs (following initial review by the ESSGC)

In addition to supporting these existing responsibilities, we recognize that ESS will create some additional commitments that are open to all ESS faculty, including those associated with our department. The roles include:

- participation of our tenure-track faculty or collaborating faculty within the ESS degree program, such as on the proposed ESS Governance Committee
- participation of our tenure-track faculty or collaborating faculty within accreditation efforts such as SLOAs

Furthermore we are prepared to coordinate with personnel from other departments or with those who are dedicated to the ESS degree program.

I signed the courseleaf submission in October 2021, and our department remains in support of ESS at UAF and committed to its success.

Martin Truffer  
Chair, Department of Physics  
April 6, 2022

Dear ESS Working Group:

I am chair of the **Department of Geosciences (GEOS)**, and I am familiar with the proposed ESS MS/PhD program and its proposed bylaws. The ESS MS/PhD program includes new student degree pathways that are enabled by faculty within several departments, including ours. Our department will support students within **ESS Solid Earth Geophysics, ESS Geoscience, ESS Cryosphere, and ESS Geospatial Sciences** who are associated with our department (via the role of the thesis committee chair). Furthermore, we expect to receive course/thesis credit revenue from these students. Specifically, our department will support:

- participation of our tenure-track faculty and collaborating faculty as thesis committee chairs
- participation of our tenure-track faculty and collaborating faculty on thesis committees
- participation of our tenure-track faculty and collaborating faculty on admission committees
- provision of workspace for students with a **GEOS** committee chair
- oversight of paperwork associated with thesis committees
- review of theses by department chair

In addition to supporting these existing responsibilities, we recognize that ESS will create some additional commitments that are open to all ESS faculty, including those associated with our department. The roles include:

- participation of our tenure-track faculty and collaborating faculty within the ESS degree program, such as on the proposed ESS Governance Committee. If the ESS Representative to ESS Geoscience is a collaborating faculty in our department, then we will require this Representative to attend our monthly faculty meetings, in order to ensure communication between our department and the ESS Governance Committee.
- participation of our tenure-track faculty and collaborating faculty within accreditation efforts such as SLOAs

Furthermore we are prepared to coordinate with personnel from other departments or with those who are dedicated to the ESS degree program.

I approved the ESS courseleaf submission in October 2021, and our department remains in support of ESS at UAF and committed to its success.

Paul McCarthy  
Chair, Department of Geosciences  
April 7, 2022





Peter Pinney, Interim Director,  
Institute of Agriculture,  
Natural Resources  
And Extension  
Associate Vice Chancellor  
and Executive Dean, Emeritus  
907-474-7429  
pppinney@alaska.edu

P.O. Box 756180, Fairbanks, Alaska 99775-6180

April 15, 2022

TO: Curriculum Review Committee  
UAF Faculty Senate

RE: ESS interdisciplinary option

The institute is in favor of an interdisciplinary approach to the ESS option under consideration. Along with the two faculty members who are actively members of the committee supporting this approach, the joint CNSM and IANRE faculty in Natural Resources and Environment are willing to look for ways in which their offerings can fit students building an interdisciplinary degree.

Personally, I would love to see an agriculture option, even if not called such, and incorporating sustainability, remote sensing, policy, even bringing in business information on how to be a new and beginning farmer or supporting a foundation for an expansion in agriculture. This topic is currently popular in many camps across the state, given the concern for food systems, supply and security.

I would be more than willing to assist in building a cohesive set of courses that would meet the intent of ESS.

Sincerely,

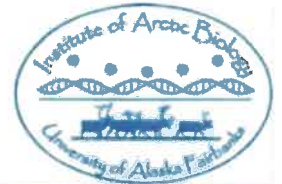
A handwritten signature in blue ink that reads "Peter Pinney".

Peter Pinney, Interim Director  
Institute of Agriculture, Natural Resources and Extension



Institute of  
Arctic Biology

907-474-7640 • Fax 907-474-6967  
www.iab.uaf.edu • fyab@uaf.edu



America's Arctic University

April 14, 2022

ESS Working Group

UAF

Dear Earth System Science Working Group:

As the Interim Director of the Institute of Arctic Biology I would like to express my appreciation for your efforts to establish the PhD/MS program in Earth System Science (ESS) at UAF. I formally endorsed the ESS proposal in September 2021, consenting to be listed in the courseleaf submission, because I see the ESS as a positive step toward inter-disciplinary exchange and collaboration at UAF, one that will contribute to the viability of UAF's diverse graduate programs.

Graduate education has long been a cornerstone of research at UAF, including within IAB. The proposed ESS would strengthen the collaborative connections across campus that are needed to tackle complex scientific problems facing Alaska. Several faculty within my institute have expressed interest in being part of this program, especially those who work on ecosystem change which integrates across multiple levels of the natural sciences.

Graduate students in the ESS program who have faculty advisors in IAB will be eligible to access summer support through the IAB Summer Graduate Research Fellowship, which each year offers partial summer support to 6-10 students based on need and progress in their degree programs.

Sincerely yours,

A handwritten signature in black ink, appearing to read 'Diane M. O'Brien'.

Diane O'Brien

Interim Director, Institute of Arctic Biology

[dmobrien@alaska.edu](mailto:dmobrien@alaska.edu)

**Institute of Northern Engineering**  
University of Alaska Fairbanks



240 ELIF, PO Box 755910  
Fairbanks, Alaska 99775-5910  
(907) 474-5457

April 11, 2022

Dear Earth System Science Working Group:

Thank you for your efforts to establish the PhD/MS program in Earth System Science (ESS) at UAF. I am director of the Institute of Northern Engineering and a potential faculty member in the ESS program. I formally endorsed the ESS proposal in September 2021, consenting to be listed in the Courseleaf submission. Graduate education has long been a cornerstone of research at UAF, including within our institute. The proposed ESS would strengthen the collaborative connections across campus that are needed to tackle complex scientific and engineering problems facing Alaska. Moreover, due to budget cuts, the College of Engineering and Mines lost a key ESS related graduate degree program on hydrology and environmental science (Water & Environmental Science master's degree). It is now difficult for CEM and INE to market this area of graduate studies (under the interdisciplinary degree program) and, indeed, a historically strong area of research for INE in the Water & Environmental Research Center. This area of research is externally funded annually by the US Geological Survey through the National Institutes for Water Resources (NIWR). The majority of funding we receive from NIWR is applied to graduate student support. The ESS program would once again provide us the opportunity to attract graduate students interested in hydrology, especially arctic hydrology. With the growth of arctic studies at other US universities over the last ten years, we are starting to lose dominance in one of our research and academic strength areas. I strongly support the creation of ESS at UAF and the many faculty—including those within my institute—who have expressed to be part of this program.

Sincerely,

A handwritten signature in blue ink, appearing to read 'David L. Barnes', with a stylized flourish at the end.

David L. Barnes, Ph.D.  
Interim Director of INE  
Professor of Civil and Environmental Engineering  
College of Engineering and Mines  
Institute of Northern Engineering  
University of Alaska Fairbanks

*Engineering solutions for the world's cold regions and beyond.*  
[www.uaf.edu/ine](http://www.uaf.edu/ine)





**Hajo Eicken**  
Director  
[heicken@alaska.edu](mailto:heicken@alaska.edu)  
+1-(907)474-7280

8 April 2022

ESS Working Group  
UAF

*Subj: Letter of Support of Earth System Science Program*

Dear Earth System Science Working Group,

As Director of the International Arctic Research Center I would like to thank you for your efforts to establish the PhD/MS program in Earth System Science (ESS) at UAF. Your work is preparing the ground for what promises to be a highly relevant, attractive, and very timely new graduate program offering at UAF. As you are aware, I formally endorsed the ESS proposal in September 2021, consenting to be listed in the Courseleaf submission.

Graduate education has long been a cornerstone of research at UAF and figures prominently within our institute. The proposed ESS would strengthen the collaborative connections across campus that are needed to address the range of challenges and opportunities facing the State of Alaska and the nation as a result of rapid Arctic change.

I strongly support the creation of ESS at UAF and the many faculty—including those within the institute I lead—who have expressed to be part of this program. ESS as currently laid out presents a great opportunity to both retain all the existing strengths in the different programs/departments represented in the submission, while adding substantial value and heft to these offerings through the creation of an overarching Earth System Science context. The latter has emerged as essential in attracting top-tier graduate students and retaining our competitive edge in graduating students that address the need for expertise in actionable science increasingly needed in government agencies and the private sector.

Given the importance and timeliness of the program, we anticipate to help support graduate students in the program by providing fellowships for students working with IARC faculty on topics of climate change and sustainability – drawing on funds from IARC's Roger Markle endowment.

A handwritten signature in black ink that reads "Hajo Eicken". The signature is written in a cursive, flowing style.

Hajo Eicken  
Director, International Arctic Research Center



April 12, 2022

Dear Earth System Science Working Group:

Thank you for your efforts to establish the PhD/MS program in Earth System Science (ESS) at UAF. I am director of the Geophysical Institute and formally endorsed the ESS proposal in September 2021, consenting to be listed in the courseleaf submission.

Graduate education has long been a cornerstone of research at UAF, including within our institute. The proposed ESS would strengthen the collaborative connections across campus that are needed to tackle complex scientific problems facing Alaska.

I support the creation of ESS at UAF and the many faculty—including those within the Geophysical Institute—who have expressed to be part of this program. We have several student support programs that will assist ESS students. In particular, the Schaible Fellowship and the DGGG/Geosciences/GI Fellowships which would provide funding to incoming students. Graduate students are vital to the success of the GI, and the new PhD/MS program in Earth System Science will play a large role in a continued strong cohort of students working with our researchers.

Sincerely,

DocuSigned by:  
*Robert P. McCoy*

EFC44BC8576B48E

Robert P. McCoy

Director

Geophysical Institute

rpmccoy@alaska.edu




## COLLEGE OF NATURAL SCIENCE & MATHEMATICS

University of Alaska Fairbanks  
P.O. Box 7555940, Fairbanks, Alaska 99775-5940

Kinchel C. Doerner, Dean  
907-474-7608  
907-474-5101 fax  
kdoerner2@alaska.edu  
www.uaf.edu/ensm

DATE: 12 April 2022

TO: Earth System Science (ESS) Development Team  
c/o Carl Tape

FROM: Kinchel C. Doerner 

SUBJECT: Administrative Support for ESS graduate program

The College of Natural Science and Mathematics is well situated and committed to supporting all administrative needs of this new program. The following narrative appeared in the program proposal.

*“Although Earth System Science is not a department, it will need a minimum of four items in order to thrive: 1) a program manager and coordinator, perhaps enabled by >2 months within a faculty member’s workload (similar to department chair), 2) an administrative assistant to assist in the management of the degree program; 3) a dedicated space on campus where students and faculty can congregate, interact, and collaborate; and 4) an up-to-date, modern website, along with someone to maintain it. Since each student is linked to a department, we anticipate that student office spaces will be spread out across campus; hence, it is important for the program to have dedicated space for collaboration.”*

CNSM commits to:

- 1) a program manager for the success of this project. This will be achieved by a workload release of no less than a one (1) course (~3-4 workload units) for faculty member associated with the ESS program.
- 2) administrative assistance sufficient to ensure timely and accurate processing routing of ESS documents and other managerial tasks. This will be achieved largely by redirecting duties of the CNSM Dean’s administrative aid but will also include use of office associates in departments associated with the ESS program.
- 3) working toward a dedicated space on campus for the ESS program. The goal of a common space for students and faculty to build a cohort and interact socially and intellectually is an important aspect of an interdisciplinary program but is not necessarily essential to the launch. Currently, we are looking for a location but none has been identified. Finding a suitable space will remain a goal for the intermediate future.
- 4) a modern, attractive, current website for the ESS program. CNSM maintains a Public Information Officer staff member expert at website design. Using this staff member, CNSM has recently updated the college’s site (<https://www.uaf.edu/cnsm/>) and developed a comprehensive pre-health professions website (<https://www.uaf.edu/prehealth/>) among other improvements on departmental pages. Once approved, the PIO will develop then maintain an ESS site with input from ESS faculty.
- 5) As the program grows, the resources will be adjusted to accommodate the expanding administrative needs.

*Naturally Inspiring.*



April 19th, 2022

To: UAF Faculty Senate  
From: William Schnabel, Dean, UAF College of Engineering and Mines  
re: CEM Support for the Earth System Science Program

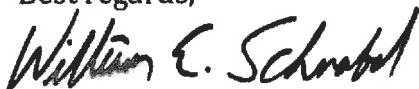
Dear Faculty Senators,

I am writing to express support for the initiation of the new Earth System Science program under consideration at UAF. While the program will be administratively housed in CNSM, I view the program to be a unit-spanning program, similar indeed to the borderless nature of earth systems themselves. Thus, I see CEM as an active and engaged participant in the program.

The program represents an innovative approach to MS/PhD education, and I believe will significantly enhance our capacity to collaborate as mentors and researchers. Participating students will benefit from a more diverse array of disciplinary approaches compared to traditional STEM programs. We in CEM will look forward to our faculty participation in the Hydrology concentration area, as well as other concentration areas that may arise in the future.

I believe that this program will result in higher graduate enrollments, stronger graduate cohorts, and more engaged and successful faculty collaboration between units. The time is right for ESS.

Best regards,



William E. Schnabel, PhD, PE  
Dean, UAF College of Engineering and Mines  
weschnabel@alaska.edu

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*Naturally Inspiring.*



**COLLEGE OF RURAL AND  
COMMUNITY DEVELOPMENT**

University of Alaska Fairbanks

P.O. Box 756500, Fairbanks, Alaska 99775-6500

907-474-7143  
907-474-5824 fax  
[www.uaf.edu/rural](http://www.uaf.edu/rural)

April 20, 2022

Dear Earth System Science Working Group:

I am familiar with the proposed Earth System Science degree program at UAF. I am supportive of Dr. Michael Koskey in his efforts to establish the ESS Sustainability concentration, along with Dr. Sarah Trainor and others. The proposed model of enabling departmental oversight -- such as the Center for Cross-Cultural Studies, in the case of Dr. Koskey's students -- is both sensible and innovative.

Sincerely,

DocuSigned by:

A handwritten signature in blue ink, appearing to read 'Bryan Uher', is placed over a blue DocuSign signature line.

556ED2F2DA1142E  
Bryan Uher, Dean

College of Rural and Community Development

PO Box 756500

Fairbanks, AK 99775

[bmuhher@alaska.edu](mailto:bmuhher@alaska.edu)

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*Naturally Inspiring.*





Anupma Prakash  
Provost & Executive Vice Chancellor  
907-474-6634  
907-474-1836 fax  
Uaf-provost@alaska.edu  
www.uaf.edu/provost

**Office of the Provost**

311 Signers' Hall, P.O. Box 757580, Fairbanks, Alaska 99775-7580

**4/21/22**

**Subject: Support Letter for the Earth Systems Science Program**

To Whom it May Concern:

The Earth Systems Science Program has been largely developed using existing courses and faculty resources. The program has five credits worth of new overarching courses.

I will work with the College of Natural Science and Mathematics (CNSM) Dean to ensure that there are resources to offer these new courses. Additionally, I am committing one-time financial resources to help start up the Earth Systems Science Program.

Sincerely,

A handwritten signature in black ink that reads 'Anupma Prakash'. The signature is written in a cursive style.

Anupma Prakash  
UAF Provost and Executive Vice Chancellor

---

*Naturally Inspiring.*



Alexandra Fitts, Vice Provost  
907-474-2764  
907-474-1836 fax  
affitts@alaska.edu  
www.uaf.edu/provost

**Office of the Provost**

P.O. Box 757580, Fairbanks, Alaska 99775-7580

DATE: April 19, 2022  
TO: UAF Faculty Senate  
FROM: Alexandra Fitts, Vice Provost and Accreditation Liaison Officer  
RE: Earth Systems Science MS and PhD Proposals

A handwritten signature in blue ink, appearing to read 'Alexandra Fitts', is written over the 'FROM:' line of the email header.

I am writing in response to GAAC 's concerns about the proposed Earth Systems Science degrees, specifically the concern that the new programs would fall outside of the purview of Program Review, as they are outside the current department structure, and faculty senate may not have an opportunity to review changes.

The Program Review structure is flexible and designed to meet UAF's needs. The program review process can easily incorporate the review of the proposed Earth System Science program and the tracks within the program. This process will allow faculty senate to be involved in the review of the changes through CourseLeaf approvals leading up to a Faculty Senate motion. My office will work with the program and participating departments to set up a review structure that is thorough, efficient, and fair.