

PROPOSAL TO CREATE A REMOTE SENSING OF THE ENVIRONMENT GRADUATE CERTIFICATE

1. Add the following Remote Sensing of the Environment Graduate Certificate:

Remote Sensing of the Environment Academic Graduate Certificate

GEOG 583	Remote Sensing/GIS Integration	3
NRS 472	Remote Sensing of the Environment	4
or FOR 472		
NRS 552	Current Literature in Environmental Remote Sensing	1
or FOR 552		
Select two of the following courses:		6
FOR 535	Remote Sensing of Fire	
GEOG 524	Hydrologic Applications of GIS and Remote Sensing	
NRS 578	LIDAR and Optical Remote Sensing Analysis	
Total Hours		14

Courses to total 20 credits for this certificate

Rationale: Add a graduate-level certificate in Remote Sensing of the Environment. An undergraduate certificate already exists in this area. Faculty teaching courses in this certificate met on October 30, 2018 and again on September 20, 2019 to assess the undergraduate certificate, and as an outcome we also found that there was interest and support for a graduate level certificate offering as well.

All of these courses currently exist or have already successfully been taught twice as experimental courses, and we are packaging them together so that they can add value to the student as well as meet stakeholder/employer requests for a coordinated curriculum in this growing area of study.

PROGRAM COMPONENT (Group B) OR NON-SUBSTANTIVE REQUEST FORM
(Fill out this form if you have a program component change as defined by Board Policy III.G.d.)

SELECT THE BOX OR BOXES THAT DESCRIBE YOUR REQUEST:

- | | |
|---|---|
| <input type="checkbox"/> 1. New component (option, minor, emphasis, concentration or specialization) | <input type="checkbox"/> 5. Discontinuation of a certificate (30 credits or less) |
| <input checked="" type="checkbox"/> 2. New certificate (30 credits or less) | <input type="checkbox"/> 6. CIP Code change |
| <input type="checkbox"/> 3. Change to program name or title, degree, department, division, college or center | <input type="checkbox"/> 7. Other, please describe: |
| <input type="checkbox"/> 4. Discontinuation of a component (option, minor, emphasis, concentration or specialization) | |

REQUIRED INFORMATION FOR ALL SELECTIONS:

Dept Chair Name:	Lee Vierling	Email:	leev@uidaho.edu
Department/Unit:	Natural Resources and Society		
College:	College of Natural Resources		
Current Program Name:	n/a	<input type="checkbox"/>	Graduate
		<input type="checkbox"/>	Undergraduate
Current program credits:			
Primary Point of Contact (if different from above):		Email:	
Briefly describe the change you are requesting:	Add a graduate-level certificate in Remote Sensing of the Environment. An undergraduate certificate already exists in this area. Faculty teaching courses in this certificate met on October 30, 2018 and again on September 20, 2019 to assess the undergraduate certificate, and as an outcome we also found that there was interest and support for a graduate level certificate offering as well.		
CIP Code:	03.	New (list requested code):	
	01 04		
What is the financial impact of the requested change:	<input type="checkbox"/>	Greater than \$250,000 per FY;	x
	<input type="checkbox"/>	Less than \$250,000 per FY;	

Describe the financial impact:	All of these courses currently exist or have already successfully been taught twice as experimental courses, and we are packaging them together so that they can add value to the student as well as meet stakeholder/employer requests for a coordinated curriculum in this growing area of study.			
Implementation/effective date of change or new component:	Catalog year 2020-21			
Can 50% or more of the curricular requirements of this program be completed via online or distance delivery?	x	Yes		No
If yes can 100% of the curricular requirements of this program be completed via online or distance delivery?		Yes	x	No
Please write the geographical location that this program will be offered:	Moscow			

**NEW PROGRAM COMPONENTS AND CERTIFICATES – FILL OUT THIS SECTION IF YOU SELECTED #1
OR #2 ABOVE**

Name of new component or certificate:	Remote Sensing of the Environment			
Number of credits:	14			
Describe proposed new program component or certificate to include overview of program and credit requirements:	<p>Graduate Certificate in Remote Sensing of the Environment</p> <p>Requirement A The three following courses (8cr):</p> <p>NRS/FOR 472 Remote Sensing of the Environment (4cr) GEOG 583 Remote Sensing/GIS Integration (3cr) NRS/FOR 552 Current Literature in Environmental Remote Sensing (1cr)</p> <p>Requirement B Two of the following courses (6cr)</p> <p>GEOG 524 Hydrologic Applications of GIS and Remote Sensing (3cr) FOR 535 Remote Sensing of Fire (3cr) NRS 5XX (578?) Lidar and Optical Remote Sensing Analysis Using Open Source Software (3cr)</p> <p>Courses to total 14 credits for this certificate</p>			
Are there curriculum changes needed and/or do new courses need to be created:		Yes – if you select yes to this question, please attach all curriculum and course documents related to this.		No
List the intended learning outcomes for the program component. Use learner centered statements that indicate what will students know, be able to do, and value or appreciate as a result of completing the program:				
Context: Faculty who contribute to teaching courses included in this proposed certificate met on October 30, 2018 to address three goals: 1) evaluate the required course sequence and options, 2) identify additional teaching needs and				

opportunities to expand program options so as to support additional enrollment in the certificate, and 3) discuss program learning outcomes and assessment planning. This was an important meeting because it catalyzed a series of outcomes. First, we learned that courses in the existing undergraduate sequence were sporadically offered with a schedule that might prohibit successful program completion by students. Second, we identified several areas of need for expanded course offering to both expand student options and increase the scope and sequence available in each semester (in addition to summer session). Third, we had follow-up meetings with additional faculty and secured at least two new courses added to the program offering. Finally, we discussed how we might assess student performance in the certificate when not all students enrolled in these courses are in fact pursuing the certificate program. The upshot of these discussions led us to develop this new course sequence and we affirmed this during a meeting this fall. With recent faculty hires in this area, more courses are likely to be added to this list in future years as they make the transition from experimental to permanent status.

Learn and Integrate (1): **Students in the Remote Sensing of the Environment Graduate Academic Certificate program will be able to integrate fundamental knowledge of electromagnetism, sensor design, atmospheric science, and understanding of radiation interactions with the environment into graduate-level research.** Direct measures: Indicator assignments will be used in the required course NRS/FOR 472. Specifically, students will conduct two laboratory experiments designed to show the integration of physics, sensors, the atmosphere, and the physical environment, and be asked to interpret the results in ways that demonstrate adequate understanding of these topics. **In addition, students will present and be assessed on their performance on primary remote sensing literature analyses in NRS/FOR 552. The number of graduate level research projects completed by students that involve the use of remote sensing instrumentation will be another direct measure.**

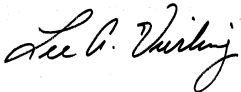
Learn and Integrate (2): **Students in the Remote Sensing of the Environment Graduate Academic Certificate program will be able to will incorporate at least one application of remote sensing science in environmental monitoring and management to a graduate-level research project.** Direct Measures: Indicator assignments in NRS/FOR 472, GEOG 583, and NRS 578) will be developed that underscore the application of remote sensing in environmental monitoring and management. **The number of graduate level research projects completed by students that involve remote sensing will be another direct measure.** In addition, faculty teaching in this certificate program have met and with new faculty hires in this area in the Colleges of Science, Natural Resources, and Agricultural/Life Sciences, plan to expand the number application-based courses that can be integrated in this certificate to broaden student opportunity. One such course (focused on Unmanned Aerial Systems, or “Drones”) is being taught as an experimental course this fall with the intention of making it a permanent course.

Clarify Purpose and Perspective: **Students in the Remote Sensing of the Environment Graduate Academic Certificate program will incorporate remote sensing into an interdisciplinary topic on the relationship between remote sensing technology and society in a graduate-level research project.** Direct measures: A new indicator assignment will be developed in the required course NRS/FOR 472. Specifically, students will be asked to interpret imagery collected in their home town and in the Moscow/Pullman area and be asked to interpret the results in ways that demonstrate adequate understanding of these topics. **We will also conduct exit interviews with graduate students completing the certificate to determine whether they incorporated remote sensing into any interdisciplinary topics involving social sciences in conducting their research work.**

Performance Target (the performance the program wants to see; this represents success for achieving the program-level learning outcome) That students find enough value in this certificate through quality course offerings so that the certificate is enrolled by 4 students in the inaugural year of 2020-21 and increases by at least 1 student in each of the following years until enrollment stabilizes around 15-20 students.

Describe the assessment process that will be used to evaluate how well students are achieving the intended learning outcomes of the program component:
We will attempt to determine which students enrolled in NRS/FOR 472 and NRS/FOR 552 are also enrolled in the certificate program, and report laboratory scores of these students. Our performance target is that these students average a B performance on these assignments.
How will you ensure that the assessment findings will be used to improve the program?
Faculty teaching these courses will meet once each year to discuss program status and assessment data. We will work to identify students who are enrolled in the certificate and gather their feedback through questionnaires and exit interviews. The Department Head of NRS will report assessment findings and plans annually.
What direct and indirect measures will be used to assess student learning?
Direct Measures: Please see above where the Direct Measures are listed and described relative to each program learning outcome. We have added measures specific to how students integrate their learning of remote sensing topics into their graduate level research.
Indirect Measures: Number of students enrolled in applications-based courses.
When will assessment activities occur and at what frequency?
Course-based assessments will occur annually, program faculty meetings will occur annually, student feedback and exit interviews will occur annually, and reporting assessment status and future adjustment/implementation of new strategies will occur annually.

SIGNATURES – REQUIRED FOR ALL SELECTIONS:

Dept/Unit Curriculum Committee Approval Date:	9/16/2019	Vote Record:	Unanimous
Dept Chair Signature of Approval			
College Curriculum Committee Approval Date:		Vote Record:	
Dean Signature of Approval			