March 31, 2014

MEMORANDUM

TO: John Townshend
   Dean, College of Behavioral and Social Sciences

FROM: Elizabeth Beise
      Associate Provost for Academic Planning and Programs

SUBJECT: Proposal to Establish a Minor in Remote Sensing of Environmental Change (PCC Log no. 13042)

At its meeting on March 7, 2014, the Senate Committee on Programs, Curricula, and Courses approved your proposal to establish a Minor in Remote Sensing of Environmental Change. A copy of the approved proposal is attached.

The change is effective Fall 2014. Please ensure that the change is fully described in the Undergraduate Catalog and in all relevant descriptive materials, and that all advisors are informed.

MDC/

Enclosure

cc: Marilee Lindemann, Chair, Senate PCC Committee
    Barbara Gill, Office of Student Financial Aid
    Reka Montfort, University Senate
    Erin Howard, Division of Information Technology
    Pam Phillips, Institutional Research, Planning & Assessment
    Anne Turkos, University Archives
    Linda Yokoi, Office of the Registrar
    Doug Roberts, Undergraduate Studies
    Katherine Russell, College of Behavioral and Social Sciences
    Christopher Justice, Department of Geographical Sciences
College/School: BSOS  
Please also add College/School Unit Code-First 8 digits: 01202800  
Unit Codes can be found at: https://hypprod.umd.edu/Html_Reports/units.htm

Department/Program:  
Please also add Department/Program Unit Code-Last 7 digits: 1281501

Type of Action (choose one):  
☐ Curriculum change (including informal specializations)  
☐ Curriculum change for an LEP Program  
☐ Renaming of program or formal Area of Concentration  
☐ Addition/deletion of formal Area of Concentration  
☐ Suspend/delete program  

Summary of Proposed Action:  
The Geographical Sciences Department proposes a new undergraduate minor in Remote Sensing of Environmental Change as part of the College of Behavioral and Social Sciences (BSOS). Remote Sensing and Environmental Change are becoming more common in this time of global environmental change and it is essential that today’s students be equipped with the knowledge and skills to be leaders in understanding the upheaval that these extreme environmental events are causing. The Remote Sensing of Environmental Change minor program is designed to build students’ understanding of Remote Sensing and Environmental Change in order to assess their impacts on the physical and human landscapes, and to use remote sensing as an analytical tool for identifying the impacts. Students in the minor program will receive technical training in remote sensing to examine how Remote Sensing and Environmental Change shapes human society and ecosystems from the interdisciplinary perspective afforded by the field of Geography. The minor will provide students with the necessary knowledge and skills to apply the latest geographic science concepts and techniques in exploring, planning for, and responding to environmental events. These skills are in great demand in fields such as public policy, sustainable development, disaster preparedness, mitigation, and adaption, in the private, nonprofit, and governmental sectors.

Departmental/Unit Contact Person for Proposal:  Ronaldo Luna  

APPROVAL SIGNATURES - Please print name, sign, and date. Use additional lines for multi-unit programs.

1. Department Committee Chair  
   Ralph Bulter  
   10/25/13

2. Department Chair  
   Charles Stango  
   11/5/13

3. College/School PCC Chair  
   Jonathan Russell  
   2/3/14

4. Dean  
   Katherine F. Russell  
   2/3/14

5. Dean of the Graduate School (if required)  

6. Chair, Senate PCC  
   3/1/14

7. University Senate Chair (if required)  

8. Senior Vice President and Provost  
   3/31/2014
Mission:
The Geographical Sciences Department proposes a new undergraduate minor in Remote Sensing of Environmental Change as part of the College of Behavioral and Social Sciences (BSOS). Remote Sensing of Environmental Change is becoming more common in this time of global environmental change and it is essential that today's students be equipped with the knowledge and skills to be leaders in understanding the upheaval that extreme environmental events are causing. The Remote Sensing of Environmental Change minor is designed to build student's understanding of Remote Sensing and Environmental Change in order to assess the impact of extreme environmental events and changes on the physical and human landscapes, and to use remote sensing as an analytical tool. Students in the minor program will be offered technical training in remote sensing to examine how Remote Sensing and Environmental Change shapes human society and ecosystems from the interdisciplinary perspective afforded by the field of Geography. The Remote Sensing of Environmental Change Minor Program is designed to equip students who are interested in working for USAID, USDA, FEMA, NASA, USGS, EPA, and other governmental and non-governmental agencies, with a competitive edge through the minor's coursework. Students are encouraged to seek internship experiences with relevant agencies to gain practical experience. These skills are in high demand in fields such as public policy, sustainable development, disaster preparedness, mitigation, and adaptation, in the private, nonprofit, and governmental sectors.

Learning Outcomes:
Upon the completion of the Remote Sensing of Environmental Change Minor:
- Students will demonstrate the ability to use remotely sensed imagery to examine how the Remote Sensing of Environmental Change shapes human society and ecosystems.
- Students will demonstrate awareness and understanding of multi-scale Remote Sensing of Environmental Change resulting from social and environmental processes.
- Students will demonstrate an awareness of the human and physical dimensions of the upheaval that Environmental Changes are causing.
- Students will have a concrete global perspective on human and environmental systems.
- Students will be able to communicate cross-culturally because the language of satellite imagery is global.
- Students will have the ability to analyze the effects of processes and interactions across borders, and study how groups and institutions within societies shape those processes and interactions.
- Students will demonstrate their understanding of what it means to be a globally engaged citizen.

The Curriculum:
Students are required to take the following required courses (18 credits):

Foundation Geography Course (3 credits)
GEOG 140 Natural Disasters: Earthquakes, Floods, and Fires (3 credits). Students will examine how CEEs shape human society and ecosystem from the interdisciplinary perspective afforded by the field of Geography. Students will use the latest geographic science concepts and techniques in exploring these events. Using satellite imagery, they will gain a multi-scale perspective of the ecological and societal aspects of the events.
GEOG170 Introduction to Methods of Geospatial Intelligence and Analysis

- Introduction to technical methods used in gathering, analyzing, and presenting geospatial information, addressing the needs of geospatial analysis, such as environmental monitoring, situational awareness, disaster management, and human systems. Topics include basics of locational reference systems, map projections, satellite and airborne remote sensing, global positioning systems, geographic information systems, cartography, and introductory statistics and probability. The course is a gateway to more advanced technical classes in geoinformatics.

Technical Geography Courses (6 credits)

- GEOG 372 Introduction to Remote Sensing (3 credits). Principles of remote sensing in relation to photographic, thermal infrared and radar imaging. Methods of obtaining quantitative information from remotely-sensed images. Interpretation of remotely-sensed images emphasizing the study of spatial and environmental relationships.

- GEOG 472 Advanced Remote Sensing (3 credits). Prerequisite: GEOG372 or GEOG306. Digital image processing and analysis applied to satellite and aircraft land remote sensing data. Consideration is given to preprocessing steps including calibration and georegistration. Analysis methods include digital image exploration, feature extraction, thematic classification, change detection, and biophysical characterization. One or more application examples may be reviewed.

Physical Geography (3 credits)


- GEOG 342 Introduction to Biogeography (3 credits). Prerequisite: GEOG201. The principles of biogeography, including the patterns, processes and distributions of living organisms from local to global scales, aspects of eco-physiology, population and community ecology and evolutionary biology. Spatial processes in the biosphere will be covered.

- GEOG 345 Introduction to Climatology (3 credits). The geographic aspects of climate with emphasis on energy-moisture budgets, steady-state and non steady-state climatology, and climatic variations at both macro- and micro-scales.

- GEOG 398F Desertification: Science and Myth (3 credits).

Human Dimensions of Global Change course (3 credits)

- GEOG 313 Latin America (3 credits). A geography of Latin America and the Caribbean in the contemporary world: political and cultural regions, population and resource distribution, historical development, current levels of economic and social well-being, urbanization, development policies, migration trends, physical features and climates.

- GEOG 3328B Regional Geography: China (3 credits).

- GEOG 3328C Regional Geography: Sub-Saharan Africa (3 credits).

- GEOG 330: Society and Sustainability (3 credits). Cultural geography course on society and sustainability. Culture is the basic building block that is key to sustainability of societies. Course will cover sustainability of societies on different scales, examining local, regional,
and worldwide issues. Sustainability will be examined as a key element of environmental sustainability. How societies adjust to rapid world change will be examined as a positive and/or negative factor in sustainability.

- GEOG 331: Introduction to Human Dimensions of Global Change (3 credits). Introduction to global-scale interrelationship between human beings and the environment. The development of global issues including but not limited to the environment, food, energy, technology, population, and policy.
GEOG 332: Economic Geography (3 credits). Principles of managing scarce resources in a world where everyone faces tradeoffs across both time and space. Focuses on the relationship between globalization processes and changing patterns of locational advantages, production, trade, population, socioeconomic and environmental grace and sustainability.

Advanced Integrated Geography course (3 credits)

GEOG 415: Land Use, Climate Change, and Sustainability (3 credits). The issues of climate change and land use change as two interlinked global and regional environmental issues and their implications for society and resource use are explored.

GEOG 416: Modeling Human-Environment Interactions (3 credits). Develops skills to carry out research that integrates environmental and economic aspects of sustainability by introducing extensively used quantitative tools for analyzing human-environment interaction in the field of ecological economics. These include, e.g., index number calculations and decomposition analysis, Environmental Kuznets Curve (EKC), environmental input-output analysis and life-cycle analysis, and multi-criteria decisions aid.

GEOG 431: Culture and Natural Resource Management (3 credits). Basic issues concerning the natural history of humans from the perspective of the geographer. Basic components of selected behavioral and natural systems, their evolution and adaptation, and survival strategies.


GEOG 442: Biogeography and Environmental Change (3 credits). Prerequisite GEOG 342. Biogeographical topics of global significance, including a consideration of measurement techniques, and both descriptive and mechanistic modeling. Topics may include: scale in biogeography, climate and vegetation, global carbon cycle, biodiversity, interannual variability in the biosphere, land cover, global biospheric responses to climate change, NASA's Mission to Planet Earth and Earth Observation System.

Special Programming:
Geographical Sciences Undergraduate Symposium Day: Remote Sensing of Environmental Change students will be encouraged to present a poster at the Undergraduate Symposium. This will give the Remote Sensing of Environmental Change students the opportunity to interact with other students in Geographical Sciences who will be presenting on that day as well as with faculty. Two students will be selected as winner of this research symposium and will receive monetary award as well as be provided with the opportunity to present at the Annual Meeting of the Association of American Geographers.

Size of Program:
Open. No cap.
Budget and Staffing Requirements:

($32,296) Two TA positions for two lab sections will be provided by the Department of Geographical Sciences.

This minor will require TA positions in addition to those available for the Geographical Sciences Major. Students will be charged a $40 lab fee for technical courses.
**The Remote Sensing of Environmental Change Minor**

Extreme environmental events are becoming more common in this time of global environmental change and it is essential that today's students be equipped with the knowledge and skills to be leaders in understanding the upheaval that these extreme environmental events are causing. The Remote Sensing of Environmental Change minor program is designed to build students' understanding of Remote Sensing of Environmental Change in order to assess their impacts on the physical and human landscapes, and to use remote sensing as an analytical tool for identifying the impacts. Students in the minor program will receive technical training in remote sensing to examine how extreme environmental events shape human society and ecosystems from the interdisciplinary perspective afforded by the field of Geography. The minor will provide students with the necessary knowledge and skills to apply the latest geographic science concepts and techniques in exploring, planning for, and responding to environmental events. These skills are in great demand in fields such as public policy, sustainable development, disaster preparedness, mitigation, and adaption, in the private, nonprofit, and governmental sectors.

**The Required Curriculum: (18 cr)**

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<tr>
<th>Foundation Course (3 cr)</th>
<th>Technical Geography Courses (6 cr.)</th>
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<tr>
<td>Or</td>
<td>Advanced Remote Sensing: GEOG 472 (3 cr).</td>
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<tr>
<td>Introduction to Methods of Geospatial Intelligence and Analysis: Geog 170 (3 cr)</td>
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Choose one Physical Geography Course (3 cr.)

| Geomorphology: GEOG 340 (3 cr) |
| Biogeography: GEOG 342 (3 cr.) |
| Climatology: GEOG 345 (3 cr) |
| Desertification: GEOG 398F (3 cr) |

Choose one Human Dimension of Global Change Course (3 cr)

| Regional Geography: China GEOG328B (3 cr) |
| Regional: Sub-Saharan Africa: GEOG328C (3 cr) |
| Regional: Latin America: GEOG313 (3 cr) |
| Society and Sustainability: GEOG330 (3 cr) |
| Intro to Human Dimensions of Global Change: GEOG 331 (3 cr) |
| Economic Geography: GEOG332 (3cr) |

Choose one Advanced Integrated Course (3 cr.)

| Land Use, Climate Change, and Sustainability: GEOG 415 (3 cr) |
| Modeling Human-Environment Interactions: GEOG416 (3cr) |
| Cultural and Natural Resource Management: GEOG 431 (3 cr) |
| Coastal Oceans: GEOG 441 (3 cr) |
| Biogeography & Environmental Change: GEOG 442 (3cr) |

**Admission to the Program:**

There are no special requirements for the Minor Program in Remote Sensing of Environmental Change. The Department of Geographical Sciences welcomes students from every area of study. GIS and ENSP students are also welcome to enroll in this minor. Geography students are not eligible but are encouraged to pursue the related Environment Systems and Natural Resources Track and/or the GIS minor.

**Requirements:**

- All credits for the minor must be taken in the Department of Geographical Sciences at the University of Maryland, College Park.
- All courses must be completed with a grade of “C-” or better.
- No more than six credits are to be included in the Minor and student's major, supporting courses, and college requirements.

Application form attached.

Return to Advising Office, Lefrak Hall 2181M
Email: geog-advice@umd.edu
Phone: 301-405-4073

**Professional Opportunities:**

The Remote Sensing of Environmental Change Minor Program is designed to equip students who are in interested working for USAID, USDA, FEMA, NASA, USGS, EPA and other governmental and non-governmental agencies, with a competitive edge through the minor's coursework. Students are encouraged to seek internship experiences with relevant agencies to gain practical experience. Please see the Geographical Sciences' Career Resources webpage for more information:

http://www.geog.umd.edu/content/other-
MINOR IN REMOTE SENSING OF ENVIRONMENTAL CHANGE
MINOR APPLICATION

NAME OF STUDENT ____________________________________________________________

UNIVERSITY I.D. NUMBER ___________________________________________________

MAJOR __________________________________SEMESTER DECLARED: ____________

TELEPHONE WHERE YOU CAN BE REACHED DURING THE DAY ____________________

E-MAIL ____________________________________________________________

EXPECTED DATE OF GRADUATION ____________________________________________

REASON WHY DECLARING THIS MINOR (EXPAND ON YOUR SELECTION)?

FRIENDS CLASS INSTRUCTOR WEBSITE

JOB POTENTIAL CURRICULUM STRUCTURE

OTHER ________________________________________________________________

COURSES COMPLETED TOWARD MINOR

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<th>REQUIRED:</th>
<th>DATE</th>
<th>GRADE</th>
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<td>Foundation</td>
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<tr>
<td>1. GEOG 140</td>
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<td>or GEOG 170</td>
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<td>Technical</td>
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<td>4. GEOG 340, 342, 345, 398F</td>
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<td>Human Dimensions</td>
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<td>5. GEOG 328B, 328C, 313, 330, 331, 332</td>
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<td>6. GEOG 415, 416, 431, 441, 442</td>
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REMINDER: STUDENT MUST ACHIEVE A "C-" OR BETTER IN EACH COURSE APPLIED TO MINOR IN GEOGRAPHICAL SCIENCES.

_____________________________________________________________________

THIS STUDENT HAS COMPLETED ALL THE REQUIREMENTS FOR A MINOR IN REMOTE SENSING OF ENVIRONMENTAL CHANGE

_____________________________________________________________________

SIGNATURE OF GEOGRAPHICAL SCIENCES ADVISOR DATE
Department of Geographical Sciences
University of Maryland, College Park

MINOR IN REMOTE SENSING OF ENVIRONMENTAL CHANGE
FACULTY OVERSIGHT
ADVISING STRUCTURE

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