George Mason University
Graduate Course Approval/Inventory Form

Please complete this form and attach a copy of the syllabus for new courses. Forward it as an email attachment to the Secretary of the Graduate Council. A printed copy of the form with signatures should be brought to the Graduate Council Meeting. Complete the Coordinator Form on page 2, if changes in this course will affect other units.

Please indicate:  ____ NEW  ___ X ___ MODIFY  ____ DELETE

Local Unit: SCS  Graduate Council Approval Date:

Course Designation: EOS  Course Number: 760

Full Course Title: Advanced Remote Sensing Applications

Abbreviated Course Title (24 characters max.): Advanced Remote Sensing

Credit hours: 3  Program of Record: ESS M.S., CSI Ph.D.

Repeatable for Credit?  ___ D=Yes, not within same term  Up to hours
___ T=Yes, within the same term  Up to  hours
___ N=Cannot be repeated for credit

Activity Code (please indicate):  ___ Lecture (LEC)  ___ Lab (LAB)  ___ Recitation (RCT)
___ Studio (STU)  ___ Internship (INT)  ___ Independent Study (IND)  ___ Seminar (SEM)

Catalog Credit Format  3: 3: 0  Course Level: GF(500-600)  ____ GA(700+)  ___

Maximum Enrollment: 20  For NEW courses, first term to be offered: Fall 04

Prerequisites: EOS 753 or GEOG 580 and GEOG 579

Catalog Description (35 words or less): This course focuses on the applications of remote sensing in various important areas of Earth systems science, such as analysis of the surface radiation budget, land cover, inland/coastal waterways, and soil moisture. Algorithms/techniques and examples are discussed in detail.

For MODIFIED or DELETED courses as appropriate:
Last term offered:  Previous Course Abbreviation:  Previous number:

Description of modification: Title, prerequisites, syllabus changed.

APPROVAL SIGNATURES:
Submitted by:  ________________________________ email:  ________________________________
Department/Program:  ________________________________ Date:  __________________
College Committee:  ________________________________ Date:  __________________
Graduate Council Representative:  ________________________________ Date:  __________________
GEORGE MASON UNIVERSITY  
Course Coordination Form

**Approval from other units:**

Please list those units outside of your own who may be affected by this new, modified, or deleted course. Each of these units must approve this change prior to its being submitted to the Graduate Council for approval.

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Graduate Council approval: ________________________________ Date: __________

Graduate Council representative: __________________________ Date: __________

Provost Office representative: ____________________________ Date: __________
1. COURSE NUMBER AND TITLE:
EOS 760 Advanced Remote Sensing Applications

Prerequisites: EOS 753 or GEOG 580 and GEOG 579

Catalog description: This course focuses on the applications of remote sensing in various important areas of Earth systems science, such as analysis of the surface radiation budget, land cover, inland/coastal waterways, and soil moisture. Algorithms/techniques and examples are discussed in detail.

2. COURSE JUSTIFICATION

Course objectives: This course will focus on the applications of remote sensing in some important areas of the earth system studies. The first three sessions of the course will be of introduction/review nature. The rest of the course will be in-depth discussions of remote sensing applications to such areas as surface radiation budget, land use/cover, forest, inland and coastal waters, and soil moisture. For each application area, there will be two parts: a) the nature of the problem and the theoretical bases of the applicable algorithms/techniques; and b) review and discussion of actual application examples, including methodology, implementation procedures, results, discussions, and summary/conclusions.

Course necessity: Many remote sensing/Earth observing courses in the School address the physical theories and scientific foundations of remote sensing technology. Some courses do use some remote sensing applications to illustrate the concepts, but no course is completely dedicated to provide an in-depth overview and selective detailed discussions of remote sensing applications. This course complements our existing courses.

Course relationship to Exiting Programs: This will be an elective course for MS in ESS and Ph.D. in CSI in the Earth Observing track. It may also be taken by MS students in the Geography program.

Course relationship to Other Existing Courses: Some existing courses in SCS include limited remote sensing applications as illustrations of the general principles of remote sensing. The proposed course will select remote sensing application topics not covered by the existing courses, and will present those topics at a more advanced level. The Geography Department in CAS offers GEOG 579, which also includes remote sensing applications and is a prerequisite for the proposed course.

3. APPROVAL HISTORY

4. SCHEDULING AND PROPOSED INSTRUCTORS

Semester of Initial Offering: Fall 2004

Proposed instructors: Dr. Wenli Yang

5. TENTATIVE SYLLABUS: see attached
EOS 760

Course Title: Advanced Remote Sensing Applications

Instructor:

Dr. Wenli Yang
Phone: 301-552-9360
Email: wyang@laits.gmu.edu
http://laits.gmu.edu/
Office: 9801 Greenbelt Road, Lanham, MD 20706
Office hours: stop by or by appointment or email

Course description:

This course will focus on the applications of remote sensing in some important areas of the earth system studies. The first three sessions of the course will be of introduction/review nature. Materials covered in these sessions will include operational remote sensing systems (platforms and sensors), data acquisition techniques, calibration and correction of remote sensing data, principle of microwave remote sensing. The rest of the course will be in-depth discussions of remote sensing applications to such areas as surface radiation budget, land use/cover, forest, inland and coastal waters, and soil moisture. For each application area, there will be two parts: a) the nature of the problem and the theoretical bases of the applicable algorithms/techniques; and b) review and discussion of actual application examples, including methodology, implementation procedures, results, discussions, and summary/conclusions.

Course materials:

The course will primarily use journal articles in the related application areas as discussion materials. No textbook is required but students are encouraged to read the following reference books:


Assignments:

1. Critiques: For each of the five application areas, each student will select one article, write a 2-page critique, and make a 3- to 5-minute presentation.
2. Course project: Each student will design and conduct a project in his/her interested application area, write a 15- to 20-page project report and give a 20-minute presentation at the end of the semester.

Grading:

Critiques: 40 (8 for each critique)
Course project: 60
A: 90-100
A-: 85-90
B: 80-84
B-: 75-79
C: 70-74
D: 60-69
F: <60

Class schedule:

Week 1: Introduction
   a) Scope of the course
   b) Remote sensing as source of information and data acquisition techniques
   c) Operational remote sensing systems.

Week 2: Correction and calibration of optical remote sensing data
   a) Atmospheric effects and corrections
   b) Radiometric calibration
   c) Geometric distortions and corrections

Week 3: Principle of microwave remote sensing
   a) Theoretical base
   b) Fundamentals of imaging radar

Weeks 4 and 5: Radiation budget
   a) Theoretical bases and algorithms
   b) Retrieval of albedo and land surface temperature, energy balance modeling

Weeks 6 and 7: Forest
   a) Theoretical bases and algorithms
   b) Forest structure, classification, and productivity

Weeks 8 and 9: Land use/cover
   a) Theoretical bases and algorithms
   b) Land use/cover classification schema
   c) Land use/cover classifications and change detection

Weeks 10 and 11: Inland and Coastal waters
   a) Theoretical bases and algorithms
   b) Suspended sediments, chlorophyll, and biomass concentrations

Weeks 12 and 13: Microwave remote sensing application
   a) Soil moisture
   b) Agriculture and forestry
   e) Other applications (time permit)

Week 14: Student presentations