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:  _X_ NEW  ____ MODIFY  ____ DELETE

Local Unit: SCS  
Graduate Council Approval Date:

Course Designation: EOS  
Course Number: 756

Full Course Title: Physical Principles of Remote Sensing

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

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

Repeatable for Credit?  
_ X _ D=Yes, not within same term  
_T=Yes, within the same term  
N=Cannot be repeated for credit

Up to hours

Activity Code (please indicate): _X_ 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+)  _X_

Maximum Enrollment: 20  
For NEW courses, first term to be offered: F04

Prerequisites: EOS 753 or Permission of Instructor

Catalog Description (35 words or less): This course emphasizes the fundamental physical and mathematical principles of remote sensing. It also provides an overview of the current Earth Observation System (EOS), as well as the National Polar-Orbiting Operational Environmental Satellite Systems (NPOESS), and the NPOESS Preparatory Project (NPP) missions.

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

Description of modification:

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.

<table>
<thead>
<tr>
<th>Unit:</th>
<th>Head of Unit’s Signature:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Graduate Council approval: __________________________ Date: __________

Graduate Council representative: __________________________ Date: __________

Provost Office representative: __________________________ Date: __________
1. COURSE NUMBER AND TITLE

EOS 756 Physical Principles of Remote Sensing

**Prerequisites:** EOS 753 or Permission of Instructor

**Catalog description:**

This course emphasizes the fundamental physical and mathematical principles of remote sensing. It also provides an overview of the current Earth Observation System (EOS), as well as the National Polar-Orbiting Operational Environmental Satellite Systems (NPOESS), and the NPOESS Preparatory Project (NPP) missions.

2. COURSE JUSTIFICATION

**Course objectives:** To provide physical and mathematical principles of remote sensing.

**Course necessity:** Currently, we do not have a course in the ESGS program covering these fundamental and critical topics on remote sensing and Earth observing.

**Course relationship to Exiting Programs:** The course will be an elective course for CSI Ph.D. students in the Earth observing area of concentration. There are no significant overlaps between the proposed course and existing courses in EOS.

**Course relationship to Other Existing Courses:** No such course is offered in the GMU community. The course can be taken by students in the CSI Ph.D. and ESS M.S. degree programs, and also by students in the Geography M.S. program who are interested in remote sensing/Earth observing.

3. APPROVAL HISTORY

NA

4. SCHEDULING AND PROPOSED INSTRUCTORS

**Semester of initial offering:** Fall 04

**Proposed instructors:** Dr. John Qu

**Syllabus:** See attached syllabus

*Physical Principles of Remote Sensing*

Syllabus
This course is designed to give students with limited Earth science satellite remote sensing background a thorough introduction to gathering the basic concepts and procedures of fundamentals of physical principles of remote sensing. The main emphasis of this course is on the physical and mathematical principles underlying the techniques, such as the atmospheric radiative transfer, satellite orbit and geo-location simulation, and science algorithm designing, calibration and atmosphere corrections. The emphasis will also provide a focus on the NASA recently launched Earth Observing System (EOS) instruments, such as the Moderate Resolution Imaging Spectroradiometer (MODIS), future National Polar-orbiting Operational Environmental Satellite System (NPOESS) and NPOESS Preparatory Project (NPP) missions.

Week one: Introduction to Earth science satellite remote sensing

Week two: Characteristics of solar radiation and the structure of atmosphere

Week three: Atmospheric extinction and emission

Week three: Atmospheric absorption and scattering

Week four: Platform for remote sensing

Week five: Satellite orbit and geo-location simulation (1)

Week six: Satellite orbit and geo-location simulation (2)

Week seven: Electro-optical systems

Week eight: Mid Term Exam

Week nine: Atmospheric corrections

Week ten: Surface albedo/BRDF

Week eleven: Vegetation index algorithms

Week twelve: LAI and LST algorithms

Week twelve: Pre-launch end-to-end simulations

Week thirteen: Post-launch scientific algorithm validation
Week fourteen: Final meeting (student presentations)

Instructor: Dr. John Qu
ST I Room 101A
CEOSR/SCS
E-mail: jqu@gmu.edu or john.qu@gsfc.nasa.gov
Phone: 703-993-3859 or 301-614-6856

Office Hours: Stop by or by appointment or email

Grading:

 Mid Term Exam: 30%
 Homework: 20%
 Final Project: 50%

(A = 90 -100, B = 80 - 89, C = 70 -79, D = 60 - 69, F = <60)

Prerequisities: EOS 753 or Permission of Instructor

Textbook:

Reference books:
4. Some EOS, NPOESS, and NPP Algorithm Theoretical Basis Documents (ATBDs) will be used during this class.