Subject: GPGN   Number: 470/570

Course Title: Applications of Satellite Remote Sensing

Section: A

Semester/year: Spring/2016

Instructor or Coordinator: Ed Nissen
Contact information: Green Center room 260G
e-mail: enissen@mines.edu

Office hours: M 10:00-12:00 am or by appointment

Class meeting days/times: MW 2:00-2:50, F 1:00-2:50

Class meeting location: Green Center room 211 (lecture)
                         CTLM room B56 (lab)

Web Page/Blackboard link (if applicable):
                                      Blackboard page for GPGN470

Teaching Assistant (if applicable): TBD
Contact information: TBD

Instructional activity: 3 hours lecture    0 hours lab    3 semester hours
Course designation: ___ Common Core   ___ Distributed Science or Engineering
                    ___ Major requirement    X Elective     ___ Other (please describe ____________)

Course description from Bulletin:
This course provides an introduction to geoscience applications of satellite remote sensing of the Earth and planets. The ultimate goal of this class is to enable the students to address problems in geology, geophysics, planetary science, environmental science, or resource management by identifying and obtaining the relevant remote sensing data sets, analyzing the data, and interpreting the results. The lectures provide background on satellites, sensors, methodology, theory, and diverse applications. Topics include visible, near infrared, and thermal infrared passive sensing, active microwave and radio sensing, and geodetic remote sensing. Lectures and labs involve use of data from a variety of instruments, as several applications to problems in the Earth and planetary sciences are presented. The culmination of the course is an independent project to be designed and executed by the students.

Textbook and/or other requirement materials:
Required text: Introduction to the Physics and Techniques of Remote Sensing (Elachi & Van Zyl)
Other required supplemental information: Lab handouts

Student learning outcomes: At the conclusion of the class students will have...

   b. an ability to design and conduct experiments, as well as to analyze and interpret data

Brief list of topics covered:
   EM waves
   Satellite and airborne platforms, orbits and sensors
   Visible-Near IR
   Surface interactions
Surface Classification
Thermal remote sensing
Microwave remote sensing
Radar and InSAR
Lidar
Altimetry
Gravity

Policy on academic integrity/misconduct: The Colorado School of Mines affirms the principle that all individuals associated with the Mines academic community have a responsibility for establishing, maintaining an fostering an understanding and appreciation for academic integrity. In broad terms, this implies protecting the environment of mutual trust within which scholarly exchange occurs, supporting the ability of the faculty to fairly and effectively evaluate every student’s academic achievements, and giving credence to the university’s educational mission, its scholarly objectives and the substance of the degrees it awards. The protection of academic integrity requires there to be clear and consistent standards, as well as confrontation and sanctions when individuals violate those standards. The Colorado School of Mines desires an environment free of any and all forms of academic misconduct and expects students to act with integrity at all times.

Academic misconduct is the intentional act of fraud, in which an individual seeks to claim credit for the work and efforts of another without authorization, or uses unauthorized materials or fabricated information in any academic exercise. Student Academic Misconduct arises when a student violates the principle of academic integrity. Such behavior erodes mutual trust, distorts the fair evaluation of academic achievements, violates the ethical code of behavior upon which education and scholarship rest, and undermines the credibility of the university. Because of the serious institutional and individual ramifications, student misconduct arising from violations of academic integrity is not tolerated at Mines. If a student is found to have engaged in such misconduct sanctions such as change of a grade, loss of institutional privileges, or academic suspension or dismissal may be imposed.

The complete policy is online.

Grading Procedures: Grading will be based on weekly lab reports and a final term project.

Labs: 65%
Final term project: 35%

Final course grades will be set “on a curve”, based on the students’ performance relative to the rest of the class.

Labs: The labs will involve the analysis and manipulation of satellite remote sensing data sets, providing hands-on experience to compliment the lectures. The majority of the labs will use the ENVI remote sensing software, which is the leading package for remote sensing data analysis in use in both industry and academia. Students are encouraged to discuss the lab assignments, but each student must do their own work and write their own report. These labs will likely require work beyond the lab period itself to complete. The labs will be cumulative, with each lab building on the skills learned in the previous lab. Expectations will vary by lab with either “half reports” and “full reports” required. Full reports will require a formal write-up, while half reports require only answers to the questions in the lab report, as will be explained during the semester. At least one of the full reports will involve a review and revision cycle.

Final Project: The culmination of the course will be the completion of a final project of the student’s own choosing. The project will involve analysis of one or more of the types of data discussed during the class (additional types of data may also be included) to address a real problem in the geosciences (including geohazards, geoengineering, etc). Projects can be tailored towards either a scientific question or an engineering application of remote sensing. Students must submit a project proposal, including a statement of the problem or question to be addressed, the datasets and techniques to be employed, and a brief description of the work to be done. The final projects will be evaluated based upon a 5-minute in-class presentation in the last week of class, and a term paper describing the work. Term papers are expected to be ~10 pages long (~15 for students enrolled in 570), double spaced, not counting figures and references which are to be placed at the end of the paper.

Graduate/Undergraduate enrollment: This class can be taken for either undergraduate or graduate credit. It is generally expected that undergraduates and graduates will enroll at the 400 and 500 levels,
respectively. A higher caliber of work will be expected from all students enrolled in 570. In particular, the expectations for the final project will be higher for 570 students.

**Coursework Return Policy:** Graded assignments will be returned to students within 2 weeks.

**Absence Policy** (e.g., Sports/Activities Policy): Attendance is required, with the exception of excused absences or by permission of the instructor.

**Homework:**
- Assignments must be turned in prior to the laboratory period on the day in which they are due
- Assignments must be in pdf format (file size <1 MB)
- Assignments should be e-mailed to the TA unless otherwise specified
- Late labs will be penalized 15% the first day they are late, and 5% each subsequent day up to a maximum penalty of 50%.