Remote Sensing of Environment

Course Description and Objectives:
This course has two distinct components, the first relates the theory of remote sensing and radiation to their application in the fields of atmospheric science and oceanography and the second gives students hands on experience analyzing remote sensing data. The theoretical courses discusses the history of remote sensing, a basic overview of atmospheric radiation and transfer, satellite imaging, radar and lidar. The laboratory component of the course leads students on a step-by-step tutorial learning remote sensing software. It is a compilation of tutorials that help you learn how to use ERDAS IMAGINE software. Each lab topic takes you step-by-step through an entire process. The design of the lab topics are not intended to tell you everything there is to know about any one topic, but to show you how to use some of the basic tools you will need to get started.

In this class students will:
1. Learn the general concepts of environmental remote sensing concepts and techniques.
2. Be exposed to remote sensing platforms and sensors. (Note: does not include aerial photos).
3. Perform satellite image processing using ERDAS Imagine software.
4. Conduct basic research on environmental problem using raw satellite data, process and analyze them, and gain experience with technical writing but producing a full report on their progress.
5. Review literature on remote sensing and get experience presenting relevant material to a diverse audience (graduate students).

Course Prerequisites:
- None

Instructor:
Ling Liu, Lecturer, School of Marine and Atmospheric Science
Owen Doherty, Lecturer, School of Marine and Atmospheric Science

Class Time:
Lecture: M & W, 3:50 to 5:10pm Challenger Hall 165 (Library)
Lab: M & W, 5:20 to 6:40pm Challenger Hall 165 (Library)
Contact Information

Offices: Our offices are located on South Campus, School of Marine and Atmospheric Science in Stony Brook.
Liu: 147 Discovery Hall
Doherty: 103 Discovery Hall

Phone: n/a
Email: Liu: Ling.Liu@stonybrook.edu
Doherty: Owen.Doherty@stonybrook.edu

Office Hours:
Liu: Friday 10:00am – 11:00am
Doherty: Wednesday, 1:30pm – 2:30pm
Additional office hours by appointment.

Class Support Material:
Text Book: There is no required textbook for this course. There are two supplemental textbooks that students may find helpful in their studies:

A First Course in Atmospheric Radiation, Second Edition, Grant Petty, Sundog Publishing. This book can be found online new for $36.

Satellite Meteorology: An Introduction (International Geophysics), Kidder and Harr, Academic Press. ISBN: 978-0124064300. (Note this text is slightly outdated but covers the basic premise of remote sensing well).

Grading: Exams: A mid-semester exam will be administered approximately midway through the semester. It will cover all the theoretical topics discussed in the course.

Makeup exams will be permitted only with appropriate documentation of excuse or by prior permission of the instructor.

Final Project: A final project will be submitted by the end of the semester December 5th. Full details of the final project will be announced in class.

Final projects submitted late will only be accepted with appropriate documentation of excuse or by prior permission of the instructor.

Quizzes: In class quizzes will be given periodically over the course of the semester. Quizzes will be announced in the class prior.

Makeup quizzes will be permitted only with appropriate documentation of excuse or by prior permission of the instructor.
**Problem Sets:** Problem sets may be handed out on irregular intervals to assess learning on both theoretical and laboratory aspects of the class. Students will have one week to complete each homework assignment.

Late homework assignments will not be accepted without appropriate documentation.

**Breakdown of Final Grades:**
30% Quizzes, Problem Sets and Presentations (graduate students only)
10% Class Participation and Attendance
25% Midterm Exam
35% Final Project

**Extra Credit:** Extra credit will be offered as class related, suitable opportunities for student involvement in extra curricular activities present themselves. Extra credit will never be available by student request. Extra credit will be applied to the student’s problem set average at the interpretive discretion of the instructor.

**Web site:** This course has a website on Blackboard. Students can log onto the website at [http://blackboard.stonybrook.edu/](http://blackboard.stonybrook.edu/) Instructions for doing this as well as a list of campus SINC sites that provide access to the Web will be given in class. We will use the web site to provide supplementary information to the lectures, distribute homework assignments, announce grades etc. It is imperative that you check the blackboard website and your Stony Brook e-mail address regularly.

**Important Dates in the Semester:**
- 9/2 Add / Drop Deadline
- 9/3 Labor Day (No Class)
- 11/21 Thanksgiving (No Class)
- 12/5 Last Class

**Lecture Topics:**
- Radiation and Remote Sensing
- Electromagnetic Spectrum
- Reflected Radiance
- Satellite Imaging Using Reflected Radiance
- IR and Microwave Imaging From Space
- Atmospheric Transmittance and Remote Sensing
- Atmospheric Scattering
- Radar
- Satellite Application of Atmospheric Scattering
Lab Topics:

- Introduction to ERDAS
- Band combination, contrast enhancement
- Importing & subsetting
- Georeferencing & Mosaicing
- Filtering & Convolution
- Unsupervised Classification
- Supervised Classification
- Model maker
- Map Composition
- Orthorectification
- Analysis of results

A Special Note On Academic Integrity

“Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Any suspected instance of academic dishonesty will be reported to the Academic Judiciary. For more comprehensive information on academic integrity, including categories of academic dishonesty, please refer to the academic judiciary website at http://www.stonybrook.edu/uaa/academicjudiciary/ “ Adopted by the Undergraduate Council September 12, 2006

Submitting written work that is not your own is plagiarism, and because it undermines the opportunity for a university to develop thinking and writing skills, and because it gives unfair advantage in grading to students who commit plagiarism, it is not tolerated. Upon entry to SUNY Stony Brook, you are held responsible for knowing what plagiarism is and for adhering to this policy. If there is any uncertainty in a written assignment about what an instructor allows, you must ask him or her for clarification. Otherwise, you should avoid all of the following. Violating any of these standards or assisting someone else in doing so would be grounds for formal action against you by the university.

You may not represent the writing or ideas of anyone else as your own. This includes but is not limited to

- copying someone else's writing word-for-word, even if it constitutes only some of your paper.
- paraphrasing someone else's writing too closely, even if it constitutes only some of your paper. If there is any doubt about whether your submission is too close of a paraphrase, check with your instructor before turning it in.
- downloading from electronic databases, encyclopedias, or web sites and submitting the product as your own work, even if it constitutes only some of your paper.
- writing a paper together with someone else in the course (unless the instructor expressly allows collaborative work).
- allowing someone else to write your paper or part of it.
- submitting all or part of a paper obtained from a commercial "paper mill."
- presenting someone else's idea as your own without properly citing it.
- submitting the same paper in more than one course without permission of the instructors.

As is true in any scholarly work, quoting someone else's writing is allowable, but only if the formal conventions for quoting and citing are strictly followed. Remember, however, that a paper assignment that asks you to develop an idea and express it in your own words should, if it quotes other people's work at all, do so sparingly.
You are responsible for being familiar with and for adhering to the standards referred to in this document. Any violation can be taken as a deliberate act of cheating and will be actionable. Instances of plagiarism in this course will be referred to the Academic Judiciary for action. Information on the penalties and procedures that will be followed for plagiarism and other types of academic dishonesty is available on the Academic Judiciary page at the SUNY-Stony Brook web site (http://www.sunysb.edu). If you have any questions about policies for this course, speak to one of us.

**Americans with Disabilities Act**

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, room 128, (631) 632-6748. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential. Students requiring emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information, go to the following web site:

http://www.ehs.sunysb.edu/fire/disabilities/asp