FUNDAMENTALS OF REMOTE SENSING – GEOG 418/518

Fall 2011 Term, University of Oregon
Course Registration Number: GEOG 418 – 17594, GEOG 518 -- 17595
Lecture: 10:00am – 10:50am Tuesday & Thursdays, 442 McKenzie (SSIL Lab)
Lab: 11:00am – 11:50am Tuesday & Thursdays, 442 McKenzie (SSIL Lab)
Instructor, Mark Fonstad, Condon 107E, fonstad@uoregon.edu, 541-346-4555
Instructor Office Hours: Tuesday 1:00pm – 2:00pm, Thursday 9:00am – 10:00am
GTF: James Dietrich, Condon 105, jdietric@uoregon.edu, 541-346-4564
GTF Office Hours: Tuesdays and Thursdays 9:00am – 10:00am, SSIL Lab

Geog 418/518 introduces you to remote sensing with digital imagery. The course will cover: (1) The electromagnetic spectrum, interactions between light and matter (including atmospheric effects) and the resultant electromagnetic signals; (2) The basic concepts and devices used to record electromagnetic signals and their relative advantages and disadvantages; (3) Components of a digital image processing, including: (a) sources of image distortion and techniques used for image restoration, (b) techniques for enhancing images to better visualize spectral signals and patterns, and (c) the use of digital electromagnetic data for classification, mapping, and monitoring hydrologic and biologic processes and environmental change.

Lectures will cover all of the above topics. Lab sessions will focus on learning to navigate through the software, on understanding how digital data can be translated into effective visualizations of the environment (image enhancement), on techniques for correcting problems with the imagery (image restoration), and on approaches for land cover mapping with remotely sensed imagery (image classification).

REQUIRED READINGS

The required textbook for this class is: Campbell, J.B. and Wynne, R.H. 2011. Introduction to Remote Sensing (5th Edition). New York. The Guilford Press. 667 p. It incorporates many changes and additions from the previous editions, so make sure you have this 5th edition.

REQUIRED BACKGROUND

To enroll in this class you must have taken Maps & Geospatial Concepts (GEOG 311). If you have not taken GEOG 311, you should withdraw from this class.

GRADES

There will be two exams in the class (a midterm and a final exam), each worth 25% of your total grade. Neither are open-note/open-book. Labs will make up the remaining 50% of the grade for undergraduates. Labs will make up 30% of the grade for graduates. In addition, graduate students will produce an applied remote sensing project that makes up 20% of their grade. This project will comprise of a research question, digital image acquisition and processing to answer the research question, and a significant write-up of what was done, why it was done, and how well it worked. The final grade scale is as follows: A: 90-100; B: 80-89; C: 70-79; D: 60-69; F: <60.

LABS AND LAB GRADES

Labs provide practical experience that is typical of what you will encounter on most any remote sensing project. All labs will be done using ERDAS Imagine, the most widely used remote sensing software. Early labs will familiarize you with the basic structure of the software. Later labs will introduce you to subjects such as image enhancement (visualization) techniques, techniques for adding geographical coordinates to images, data transformation approaches to extract specific types of information, and classification approaches for mapping land cover.

Laboratory sessions will be in SSIL. I really want you to work with one another on these assignments in order to exchange knowledge with your partners. However, you should complete your own work and turn in your own work for grading. You are encouraged to collaborate on labs with other teams and help one another out, but do not copy each others' written answers. I expect all answers to be written in complete sentences with all words correctly spelled.

The dates below are the date each lab begins. Labs must be turned in digitally on Blackboard one week after they are assigned -- otherwise you will receive a ZERO on the assignment unless you have made arrangements with me beforehand. It is essential that you complete the labs because many of them are sequential and build on knowledge you have gained from the previous lab.

Always bring a USB flash drive to lab to back up your work at the end of class. The shared drives at SSIL will be available to you, but it is always good to have a backup nonetheless.

ACADEMIC DISHONESTY

I *will not* tolerate cheating or academic misconduct/dishonesty in my courses; examples of these behaviors include (but are not limited to):

• Plagiarism (passing off the work of another as that of your own)
• Copying answers from your neighbors during exams/activities
• Dishonesty concerning reasons for absence from class
• Any other actions that might give you an unfair advantage over your classmates.

All cases of academic dishonesty/misconduct will be referred immediately to the Student Judicial Affairs Office. The penalties for engaging in academic dishonesty and/or misconduct can range from a grade of "F" for an assignment to an automatic failure of the course. Please consult the university policy at http://studentlife.uoregon.edu/judicial/conduct/sai.htm.

LATE/MAKE-UP WORK

Late labs will not be accepted and make-up work will not be assigned, except in extreme circumstances and where you have documentation (i.e. doctor's note). If you must miss a lab section or exam due to illness or other unavoidable circumstances, you **MUST** notify the instructor prior to missing if possible.

DISABILITY SERVICES NOTICE

I work hard to ensure a quality learning experience for all students. If you need specific accommodations to get the most out of this class, please let me know by (1) informing me of your particular needs, and (2) providing the appropriate documentation from the campus learning services office. I will make every effort to accommodate your needs, but you must notify me by the first week of class if you need special arrangements.

NOTE: I consider this syllabus a contract between myself and the students in this course. In writing this syllabus, I have obligated myself to follow the policies and procedures contained herein. You are responsible for understanding and following these policies as well. I reserve the right to make changes to this syllabus. You will receive verbal and written notification of major changes to course policies, procedures and content.

TENTATIVE SCHEDULE

DATE	TOPIC	READINGS	LAB
27-Sep	Intro, History, Scope	1	(1) Intro to the SSIL Lab & Erdas Lab
29-Sep	EM Radiation	2	
4-Oct	Mapping Cameras	3	(2) Image Interpretation & Comparison Lab
6-Oct	Digital Imagery	4	
11-Oct	Image Interpretation	5	(3) Image Enhancement Lab
13-Oct	Land Observation Satellites	6	
18-Oct	Active Microwave	7	(4) Landsat Lab
20-Oct	Lidar	8	
25-Oct	Thermal Imagery	9	(5) Digital Camera Lab
27-Oct	MIDTERM EXAM		
1-Nov	Image Resolution & Preprocessing	10 & 11	(6) Image Preprocessing Lab
3-Nov	Image Classification	12	
8-Nov	Field Data	13	(7) Landsat Classifications Lab
10-Nov	Accuracy Assessment	14	
15-Nov	Hyperspectral Remote Sensing	15	(8) Accuracy Assessment Lab
17-Nov	Change Detection	16	
22-Nov	Application: Plant Sciences	17	(9) Change Detection 1 Lab
24-Nov	NO CLASS (Thanksgiving Holiday)		
29-Nov	Application: Hydrospheric Sciences	19	(10) Change Detection 2 Lab
1-Dec	Application: Land Use and Land Cover	20	
6-Dec	NO CLASS		
8-Dec	FINAL EXAM, 8 AM		