11:216:371 Introduction to Remote Sensing Image Analysis Fall 2016

Class Meets: M - Th 12:35-1:55 PM ENR 123
CRSSA Teaching Lab Demos meet in Rm 237 ENR

Instructor: Prof. Rick Lathrop (lathrop@crssa.rutgers.edu)

Objective: the course will introduce students to the principles of visual interpretation, taking simple measurements and mapping from aerial photographs and remotely sensed imagery for environmental applications. The course will be a mix of lecture and hands-on labs.
Textbooks: John Jensen, 2007, Remote Sensing of the Environment 2nd ed

For course information: https://ecompanion.rutgers.edu

Course Learning Goals:
1) To recognize and understand basic terms and concepts in remote sensing.
2) To understand the basic physics determining how electromagnetic radiation is transmitted, reflected or absorbed and how various earth surface features differentially transmit, reflect or absorb EMR.
3) To understand how spatial/spectral/temporal/radiometric resolution impacts the remote sensing process.
4) To be able to interpret earth surface features (geology, terrain, land cover) from various types of remotely sensed imagery.
5) Be able to digitize and create well designed map products.
6) To be able to write in scientific language appropriate to the field of remote sensing and to be able to evaluate peer-reviewed scientific articles for their scientific merit and be able to summarize conclusions effectively.

Lecture Outline

Section A. Principles of Remote Sensing

Sept 8 Introduction: Overview of Remote Sensing
Reading: Chap 1
Project 1: Review/critique of Remote Sensing Article start

Sept 12 Lecture 2: EMR principles
Reading: Chap 2
Homework 1: EMR principles

Sept 15 Lecture 3: Basics of Imaging Systems
Reading: Chap 4

Sept 19 Lecture 4: Camera Film - Filter Systems
Reading: Chap 4
Homework 2: Camera Systems

Sept 22 Lecture 5: Principles of RS Image Interpretation
Reading: Chap 5
Homework 3: Cook Field ID

Sept 26 Lecture 6: Principles of Photogrammetry: scale
Reading: Chap 6
Homework 4: Scale

Sept 29 Lecture 7: Principles of Photogrammetry: stereoscopic parallax
Reading: Chap 6

Oct 3 Lecture 8: Acquisition of Airborne RS Imagery
Reading: Chap 3; Chap 4:116-117
Homework 5: Flight Planning
Project 1: Article Review/Critique Due

Section B. Image Interpretation

Oct 6 Lecture 9: Land use/land cover mapping: lecture/lab
Reading: Chap 10

Oct 10 CRSSA Teaching Lab Demo: On-screen interpretation of LU/LC

Oct 13 CRSSA Teaching Lab Demo: On-screen digitizing
Project 2: On-screen LU/LC Mapping Project start

Oct 17 **Exam I (On material up through Sept 26)**

Oct 20 Remote Sensing of Vegetation: lecture/lab

Oct 24 Remote Sensing of Vegetation: Survey of World Biomes/Wetlands lab

Oct 27 Field Trip to Helyar Woods – meet in Log Cabin Parking Lot

Oct 31 Lecture 10: Remote Sensing of Water: lecture/lab
Reading: Chap 11

Nov 3 Remote Sensing of Cultural Features: lecture/lab
Reading: Chap 12
Project 3: Impervious Surface Mapping Project start

Nov 7 Lecture 11: Soils/Hydrology mapping: lecture/lab
Reading: Chap 13
Project 2: LU/LC Mapping project Due

Nov 10 Lecture 12: Geological Features – Bedrock Landforms Part A
Reading: Chap 13

Nov 14 Soils mapping: lab
Project 4: NJ Geography Virtual Field Trip Project start

Nov 17 Geological Features - Bedrock Landforms Part B

Nov 21 Lecture 13: Geological Features – Dynamic Processes Part A

Nov 22 Geological Features – Dynamic Processes Part B
Project 3: Impervious Surface Mapping Project Due

Nov 24 Thanksgiving Holiday

Nov 28 CRSSA Teaching Lab Demo: Geology of New Jersey

Dec 1 Geological Features - Survey of North American Geology

Section C. Introduction to Satellite Remote Sensing

Dec 5 Lecture 14: Space-borne Remote Sensing Systems: VIS-NIR
Reading: Chap 7

Dec 8 Lecture 15: Space-borne Remote Sensing Systems: Thermal IR
Reading: Chap 8
Project 4: Geography Virtual Field Trip Project Due

Dec 12 Lecture 16: Space-borne Remote Sensing Systems: Microwave
Reading: Chap 9

Dec 22 Exam II **(Focus on material from Oct 1 through Dec 10) 12-3 PM**

COURSEWORK EXPECTATIONS:

Reading assignments are expected to be read prior to the class date that is listed in the syllabus above. Students are expected and encouraged to ask questions concerning the reading assignments and lecture material. **If you don't ask, I won't know you don't understand.**

Homework assignments have been designed to supplement the lecture material and give the student added preparation in some of the details. Homework will be due 1 week after it was handed out in class. Homework will be graded on a 4 point scale. Late homework will be downgraded by 2 points. There will be one mid-term exam and one final exam. These exams will test on the material covered in lecture, lab and the reading. The final exam is cumulative. There will be 4 project assignments: 1) article review/critique; 2) digital land use/land cover map using the GIS/image processing software ; 3) an impervious surface map; and 4) a virtual air photo/geography field trip. A separate handout concerning the projects will be distributed later in the semester.

During scheduled lab/demo periods, students will work in groups (of 2 to 3) to complete the exercises. The work to complete the project assignment will be done outside of normal class meeting times. Each student is expected to complete the project independently. You can confer with other students on different approaches, techniques used, etc., but the interpretation and final map product should be your own. Likewise, the article summary and critique should be your own work. You should not directly "cut and paste" from another source. If you do quote directly you should use standard citation procedures.

The syllabus and copies of assignments will be posted on line at https://ecompanion.rutgers.edu

You are free to work on the ERDAS Image Processing systems during CRSSA's normal posted hours (for schedule, see http://crssa.rutgers.edu/help/lab_sched.html).

GRADING:	Homework(4pt/assign)	20 points
	Project I	45 points
	Project II	45 points
	Project III	45 points
	Project IV	45 points
	Midterm Lecture Exam	100 points
	Final Exam	100 points
	Total	400 points