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**

                   Reading: Chap 7

                   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](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](http://crssa.rutgers.edu/help/lab_sched.html)).

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<tr>
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Total 400 points