NR 759/859, Geography 759
Digital Image Processing for Natural Resources

Purpose of Course : The goal of this course is to examine the concepts and general techniques of digital image processing as they apply to natural resource management. This course is for graduate students and highly-motivated undergraduates.

Prerequisites: NR 757/857 or equivalent.

Instructor : Dr. Russell G. Congalton
Office: 217 James Hall
Phone: 862-4644 868-3688 (home)

Office Hours: MW 10-11am and T 9-11am or just knock

Examinations:
1. Mid-Term exam - Wednesday, March 12 -worth 100 points
2. Final exam (cumulative) – Mon., May 19, 10:30–12:30 -worth 200 points

Laboratories: 8 labs worth 15 points each - 120 points
Unless otherwise specified, all labs are due at the beginning of the next lab period.

Lab Project and Poster Presentation - 200 points -- Poster presentation on Monday, May 12 and report due at my office by 9 AM, Tues., May 13
Information about this project will be distributed separately.

Graduate Students will be required to make an oral presentation (PowerPoint) of more advanced material of their choosing. More details on this will be presented in a separate handout.

Homework: Due at the beginning of class on the date specified on the assignment.
3 assignments worth 10 points each - 30 points

Class Participation: 50 points (discussions, readings, web sites, and new article each week)
NOTE: A cumulative list of new articles must be handed in every Wednesday.

Lab Access: This lab is available 24 hours a day if a class is not using it.
Security and lab rules will be discussed in class.

Grading: (700 total points for undergrads, 800 total points for grads)
Used as a general guide for you and me. (+ and - grades will be used)

635 - 700 = A (90.7%)	725 - 800 = A (90.7%)
570 - 634 = B (81.4%)	655 - 724 = B (81.9%)
505 - 569 = C (72.1%)	580 - 654 = C (72.5%)
440 - 504 = D (62.9%)	500 - 579 = D (62.5%)

Text:

Jensen, John. 2005. Inroductory Digital Image Processing: A Remote Sensing Perspective, 3rd Edition. Prentice Hall. 526p.

Required Lab Supplies:

Memory stick for backing up/saving work

Course Objectives:

1. To insure that each student has a knowledge of the properties and characteristics of digital remotely sensed data, especially multispectral scanner data.

2. To insure that each student has knowledge of

   a. how to explore the characteristics of remotely sensed data for mapping natural resources, and

   b. the various classification procedures for using remotely sensed data to map natural resources, and

   c. how accurately and precisely natural resources can be mapped and/or measured from remotely sensed data.

3. To insure that each student has knowledge of

   a. how to define the type of remotely sensed data needed to fulfill the user's stated objectives, and

   b. where existing remotely sensed data which fulfills his/her objectives may be located, and

   c. how to obtain the remotely sensed data, if necessary.

4. To insure that each student has knowledge of

   a. current applications of remote sensing to natural resource management and related fields,

   b. future applications of remote sensing to natural resource management and related fields.

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Laboratory Outline

WEEK	TOPIC	READING (from ERDAS Field Guide)
1	No lab	
2	Introduction/Setup	
3	#1 Basics	Ch. 1 & 3 plus Commands
4	#2 Data Exploration	Ch. 4 &5 plus Commands
5	# 3 More Data Exploration	Ch. 4 &5 plus Commands
6	# 4 Pre and Post processing	Ch. 4 &5 plus Commands
7	# 5 More Pre and Post processing	Ch. 4 &5 plus Commands
8	#6 Unsupervised Classification	Ch. 6 plus Commands
9	Spring Break	
10	#7 Supervised Classification	Ch. 6 plus Commands
11	#8 Map Composition	Ch. 10 &11 plus Commands
12	Project	
13	Project	
14	Project	
15	Project	
16	Project	
17	Poster Presentations	

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Lecture Outline

WEEK	TOPIC	READING (from Jensen)
1	Conduct and motivation of course Introduction, definitions, terms	Ch. 1
2	Introduction and Review	Ch. 1
3	Fundamentals and Sensors	Ch 2 and 3
4 and 5	Data exploration and diagnostics	Ch 4, 5, and 8 Pick a diagnostic technique from the literature and be ready to discuss it
6 and 7	Pre and Post processing	Ch 6, 7, and 8 & EOSAT handout
8	Exam	
9	Spring Break	
10 and 11	Classification	Ch. 9 and 10 and a paper from the literature
12 and 13	Accuracy Assessment	Ch. 13, Congalton 1991, and a paper from the literature
14	Integration with GIS/ Change Detection	Ch. 12 and a paper from the literature
15	Hyperspectral Data	Ch. 11 and a paper from the literature
16	Thermal Imagery and RADAR	Pick a paper in the literature and be ready to discuss
17	Review for final exam	