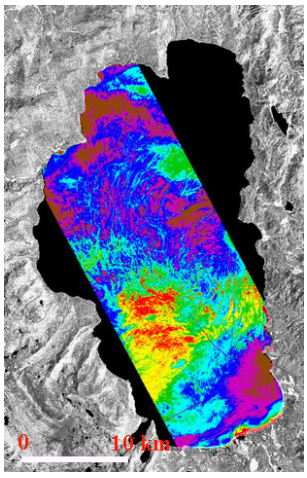
Remote Sensing (GEOL 409/509), 3 credits, Spring 2007



Instructor
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Class Schedule
1:00 pm – 2:15 pm Tuesday and Thursday
Sections: 01: Idaho Falls; 02: Pocatello; 03: Boise

Office Hours
Feel free to contact me anytime via phone or email. If I am busy, I would be happy to set up an appt when we can both meet.

Textbook
We will use the following textbook:

- Remote Sensing of the Environment, An Earth Resource Perspective, John R. Jensen, Pentice Hall, NJ, 2000 (**NOTE: This is NOT the Second Edition**). If you plan to keep the book and would like a more up to date version, feel free to purchase the Second Edition (note: more expensive). Either edition will work.

We will also use the following for references. One copy will be available in Idaho Falls, Pocatello, and Boise:

- Introductory Digital Image Processing, A Remote Sensing Perspective, 3rd Edition, John R. Jensen, Prentice Hall, NJ, 2005
- Remote Sensing and Image Interpretation, 5th Edition, Lillesand, Kiefer and Chipman, John Wiley and Sons, 2004
- Introduction to Remote Sensing, 4th Edition, Campbell, Guilford Press, 2007

On-line resources we will use:

- Remote Sensing Tutorial (RST): http://rst.gsfc.nasa.gov/
- John Jensen's on-line teaching materials: http://www.cas.sc.edu/geog/Rsbook/index.html

Software
ENVI 4.3 image processing software (http://www.ittvis.com/) will be used for homework/labs. We will use Moodle (https://moodle.itrc.isu.edu/) for ppt lectures, homework and lab submissions, etc. We will use Distance Learning (video conferencing) for class and Breeze for in class demonstrations: (http://breeze1.isu.edu/).

Course Goals

- To introduce students to the electromagnetic spectrum and its relationship to remote sensing in the ultraviolet, visible, infrared, and microwave
- To introduce students to the concept of digital imagery and to enable students to effectively manipulate digital images through image processing
- To help students with interpretation of digital images, and particularly how to design an image processing experiment to effectively extract desirable information from images
- To help students understand the current state of knowledge in remote sensing and sensor technology

Course Prerequisites
Computer, map reading, and quantitative skills are essential for this course. GIS is not a prerequisite but is encouraged.

Course Grading
A ≥ 93 %; A- = 90.0 % to 92.9 %
B+ = 87.0 % to 89.9 %; B = 83 % to 86.9 %; B- = 80.0 % to 82.9 %
C+ = 77.0 % to 79.9 %; C = 73 % to 76.9 %; C- = 70.0 % to 72.9 %
D+ = 67.0 % to 69.9 %; D = 63 % to 66.9 %; D- = 60.0 % to 62.9 %
F ≤ 59.9 %

Two exams = 20%
Final = 15%
Quizzes, class participation = 20%
Homework/lab assignments = 30%
Image processing and interpretation project (written) = 15%

You are responsible for attendance and if you miss class, it is up to you to make arrangements **ahead of time** for missed work (see quizzes).

Quizzes/Class Participation
Approximately 3 quizzes will be given, not necessarily with advance notice. Class participation includes attending class, participating in discussions, turning in assignments/quizzes/exams, and working collegially with your fellow classmates.

Homework/Labs
Out of class homework and labs will be assigned. We will give you an introduction to ENVI and guidance in class; however, you are responsible for learning the software in order to complete the labs. There will not be a separate designated lab time; however, the TAs will provide approximately 2 hours / week to help.

Image Processing and Interpretation Project (written)
You will complete an image processing and interpretation project. The project will include a written report with 1) a thorough review of the image processing technique (s) /subject (s) using peer-reviewed journal articles (not books); and 2) image processing and interpretation of data. Undergraduates will be given a dataset and guidelines (similar to a lab). Graduate students will be responsible for developing their own image processing experiment.

Graduate Students
Graduate students will read and report on supplemental journal articles throughout the semester. We may meet 2-3 times informally to discuss papers. See above regarding image processing experiment.

Our program is committed to all students achieving their potential. If you have a disability or think you have a disability (physical, learning disability, hearing, vision, psychiatric) which may need a reasonable accommodation, please contact the ADA Disabilities & Resource Center located in Graveley Hall, Room 123, 282-3599 as early as possible.

Tentative Schedule – Spring 2007 – Updated January 4, 2006

Week	Date	Topic	Reading Assignment	Lab/Homework Assignment
1	January 9	Syllabus, Schedule, & Intro. to Remote Sensing	RST – Intro	The Field of RS
	January 11	Intro. to Remote Sensing	RST – Intro	
2	January 16	Intro. to Remote Sensing	Chapter 1 / RST-Intro	
	January 18	Electromagnetic Spectrum	Chapter 2 / RST-Intro	Sensor Research
3	January 23	Sensors and Sources	RST – Intro & Ch. 7-9	
	January 25—no class			
4	January 30	Aerial Photography	Chapters 3, 4 & 6 / RST-10	
	February 1	Pocatello ENVI Lab	Boise – IF No Class	ENVI: Lab 1: Intro
5	February 6	Boise/IF ENVI Lab	Pocatello No Class	ENVI: Lab 2: Statistics
	February 8	Visual Image Interpretation/MS RS	Chapter 5	
6	February 13	Multispectral RS / Reflect	Chapter 7	
	February 15	MS RS / Reflect / Atm Corr	Chapter 7	
7	February 20	Hyperspectral RS / Review of First 6 weeks	Chapter 7 / RST-13	Review for Exam
	February 22	**Exam #1**		
8	February 27	Thermal RS	Chapter 8 / RST-9	ENVI: Lab 3: Thermal
	March 1	Thermal/Radar RS	Chapter 8 / 9 / RST-8	
9	March 6 – no class			
	March 8	Radar RS	Chapter 9 / RST-8	
Spring Break	March 13, 15	----------	----------	----------
10	March 20	LiDAR	Chapter 9 /	ENVI: Lab 4: Veg
	March 22	LiDAR/Remote Sensing of Vegetation	Chapter 9 / 10 – RST-3	
11	March 27	Remote Sensing of Water	Chapter 11 / 12 / RST-14	
	March 29	Remote Sensing of Geology and Soils	Chapter 13/ RST-2,5&17	
12	April 3	Radiometric and Geometric Correction		Review for Exam
	April 5	Spatial Filtering	RST – 1, App C	
13	April 10	Image Enhancement	RST- 1, App C	
	April 12	**Exam #2**		
14	April 17	Classification I	RST-1, App B	
	April 19	Classification II	RST-1, App B	ENVI: Lab 6: Unsupervised vs. Supervised
15	April 24	Classification II	RST-1, App B	
	April 26	Accuracy Assessment		ENVI: Lab 7: Change Detection
16	May 1– Closed Week	Change Detection / Review of Semester		
	May 3 – Closed Week			
17	May 8 – Finals Week	**FINAL**	**Tuesday May 8 12:30-2:30 pm**	

Reading Assignments

- RST = *Remote Sensing Tutorial:* *http://rst.gsfc.nasa.gov/*
- Remote Sensing of the Environment, An Earth Resource Perspective, John R. Jensen, Pentice Hall, NJ, 2000