DEPARTMENT OF GEOLOGY AND GEOPHYSICS, UAF

GEOS 422: Geoscience applications of Remote Sensing (Instructor: Anupma Prakash)

Class Schedule : Fall 2006 (Version: September 06, 2006)

(lectures 4.40 - 5.40 pm NSF 233; labs 3.40 - 6.50 pm NSF* 316)*

Date	Day	Lecture/Lab No.	Topic	Comments
Aug-31-06	Thursday		No lab this week	
Sep-04-06	Monday		Labor day holiday	
Sep-06-06	Wednesday	Lecture 1	Introduction to Remote Sensing	Read chap. 1, pp. 1-23 (for lec 2-4)
Sep-07-06	Thursday	Lab 1	Remote sensing and image resources	web resources view and compilation
Sep-11-06	Monday	Lecture 2	The Electromagnetic Spectrum	
Sep-13-06	Wednesday	Lecture 3	Principles of Remote Sensing -1	Read chap. 6, pp.397-485 (for lec 5 & HW1)
Sep-14-06	Thursday	Lab 2	Introduction to projects + ERDAS Imagine	discuss your ideas
Sep-18-06	Monday	Lecture 4	Principles of Remote Sensing -2	Read chap. 4, pp.193-205 (for lec 7)
Sep-20-06	Wednesday	Lecture 5	Sensors/platforms	
Sep-21-06	Thursday	Lab 3	EDG search + data mining	data from ASF, GINA, USGS, NASA, etc.
Sep-25-06	Monday	Lecture 6	Aerial Photography	
Sep-27-06	Wednesday	Lecture 7	Elements of Visual Image Interpretation	Lecutrer: Bill Witte
Sep-28-06	Thursday	Lab 4	Data import/export, display, management	time intensive lab! By TA and Bill Witte
Oct-02-06	Monday	Lecture 8	Digital Image Processing -1	Read chap 7 (for lec 8-14)
Oct-04-06	Wednesday	Lecture 9	Digital Image Processing -2	HW assignment 2: satellites and sensors
Oct-05-06	Thursday	Lab 5	Statistics and vector data handling	more practise with software interface
Oct-09-06	Monday		QUIZ	closed book quiz
Oct-11-06	Wednesday	Lecture 10	Operations on multiband images	
Oct-12-06	Thursday	Lab 6	Data stretching and arithmetic operations	apply techniques on your own data sets t
Oct-16-06	Monday	Lecture 11	Image rectification (geometric)	
Oct-18-06	Wednesday	Lecture 12	Image rectification (radiometric)	
Oct-19-06	Thursday	Lab 7	Image rectification (radiometric + geometric)	carry out project work in parallel
Oct-23-06	Monday	Lecture 13	Image Enhancements	Lecturer: Rudi Gens
Oct-25-06	Wednesday	Lecture 14	Test 2 (take home test)	Prakash at GSA
Oct-26-06	Thursday	Lab 8	Student presentations on sensor + AVO visit	
Oct-30-06	Monday	Lecture 15	Image Classification	
Nov-01-06	Wednesday	Lecture 16	Image fusion	Read chap 5, pp.347-393 (for lec 18-19)

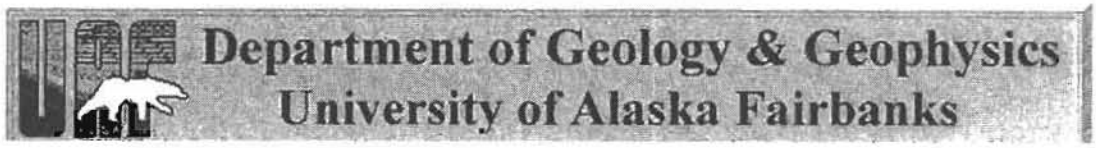
Nov-02-06	Thursday	Lab 9	Image Classification	
Nov-06-06	Monday	Lecture 17	Radar remote sensing	also go through ASF outreach CD
Nov-08-06	Wednesday	Lecture 18	Thermal remote sensing	HW assignment 3: image interpretation
Nov-09-06	Thursday	Lab 10	Image fusion	Also go through image fusion tutorial
Nov-13-06	Monday	Lecture 19	Hyperspectral remote sensing	
Nov-15-06	Wednesday	Lecture 20	Application: geologic mapping	
Nov-16-06	Thursday	Lab 11	Project work	instructor supervision available
Nov-20-06	Monday	Lecture 21	Application: volcanoes	Guest: John Dehn
Nov-22-06	Wednesday	Lecture 22	Application: Snow Ice and Water	Guest: Martin Jeffries
Nov-23-06	Thursday		Thanksgiving	
Nov-27-06	Monday	Lecture 23	Application: natural hazards	
Nov-29-06	Wednesday	Lecture 24	Application: Planetary Science	Guest: Robby Herrick
Nov-30-06	Thursday	Lab 12	Project work	
Dec-04-06	Monday	Lecture 25	Project reporting: tips and tricks	
Dec-06-06	Wednesday	Lecture 26	Recap + discussions + any other concerns	
Dec-07-06	Thursday	Lab 13	Make project presentation and backup	
Dec-11-06	Monday	Free	Final exam preparation	
Dec-13-06	Wednesday		Final Exam	Time and scheddule TBA
Dec-14-06	Thursday		Final Exam	Time and scheddule TBA

Basic Principles
Digital Image Processing
Applications
Exam
No Class

Text Book: Remote Sensing and Image Interpretation, fifth edition

by Lillesand, Kiefer and Chipman

* NSF = Natural Science Facility; HW = Homework; GSA = Geolgoical Society of America;



Geos 422 – Geoscience Applications of Remote Sensing

General information:

Title	: Geoscience Applications of Remote Sensing
Level	: Upper Undergraduate
Credits	: Three (3)
Lectures	: Two one-hour-lectures per week
Lab	: One three-hour lab per week
Meets	: Natural science degree requirements with lab
Prerequisites	: GEOS378, PHYS 104X or 212X, or permission of instructor
Instructor	: Anupma Prakash
Delivered	: Every Fall (Please note that the 2003-2004 printed catalog wrongly lists the course as a spring course).
Evaluation	: Grade letters
Web site	: http://www.gi.alaska.edu/~prakash/teaching/geos378/index.html
Important	**: This class is not available for 'Audit'**

Salient features of the GEOS 422 course:

The course 'Geoscience Applications of Remote Sensing' is tailored for an upper undergraduate audience and is designed to provide a balanced proportion of theoretical lectures and practical hands-on exercises to the students. The course starts with lectures explaining the physical principles underlying remote sensing. This is followed by an equally long session on the concepts and techniques of digital image processing of remote sensing data. The last part of the course is dedicated to presenting a variety of geoscience and environmental applications where remote sensing data are practically used.

Students from other disciplines, who are interested in studying large areas, changes occurring over time, or in handling of digital data, will also find this course very useful. The lab component of the course is computer intensive. The main software package used for image processing is Erdas IMAGINE version 8.7.

Evaluation is based on class participation, home work, quiz, theory exam and successful completion of an individual class project. Students work on this project in parallel with the regular lectures and labs. The assessment of the project work is based on the final report and presentation made by the student.

Grading criteria for GEOS 422 Final Project (40 points)

Criterion: The student was able to	Professional quality	Above average	Satisfactory	Needs much improvement	No evidence
Problem definition: define an approprite problem/application where remote sensing can be put to use	2	1.5	1	0	0
Data acquisition: identify the data needed to address the problem and acquire relevant/available data (web data portals, personal contacts, library, etc.)	4	3	2	1	0
Method outline: outline an appropriate and feasible data processing and analysis strategy, given the available data	2	1.5	1	0.5	0
Data processing: carry out the processing successfully. If not, the student was able to demonstrate where and why the proposed strategy did not work and adopted an alternate strategy	8	7	5	2	0
Analysis and presentation of results: analyze the results and present the results effectively with the help of processed images (appropriately labelled), tables, graphics, and or explanatory text.	8	7	5	2	0
Discussion: discuss the advantages, limitation, future directions of the work. Specific to presentation: satisfactorily respond to the questions from peers and audience.	2	1.5	1	0.5	0
Specific to presentation: deliver a presentation that was well structured, well timed, conveyed important information and conformed to the guidelines provided.	4	3.5	2.5	1	0
Specific to report: prepare a final report that was prefessionally put together with respect to content, structure, layout, neatness, spelling, grammar, references, etc. (conformed to guidelines provided)	4	3.5	2.5	1	0
Background reference: demonstrate an effort to consult work of other researchers in defining and implementing the project	2	1.5	1	0.5	0
Overall: demonstrate a rigorous approach and systematic work. Presentation, report and digital backup were submitted in a timely manner	4	3.5	2.5	1	0
	40	33.5	23.5	9.5	0

Grading criteria for lecture and lab participation (20 points)

	Excellent	V. Good	Average	Poor	V. poor
Systematic/timely work on project	5	4	2	1	0
Attendance in lectures and labs	5	4	2	1	0
Revision of what has been taught	3	2.5	2	1	0
Participation in class discussions	3	2.5	2	1	0
Lab exercises	4	3	2	1	0
	20	16	10	5	0

Grading criteria for quiz (15 points)

Closed book
15 questions; 1 point each

Grading criteria for GEOS 422 Test 2 / home work (25 points)

	Excellent	V. Good	Average	Poor	V. poor
Home work 1: image interpretation: (Criterion: student was able to use all elements of visual interpretation to make a meaningful interpretation)	4	3.5	2.5	1	0
Homework 2: satellite and sensors (excel speadsheet + presentation)	8	7	5	2	0
Homework 3: image interpretation (Criterion: student was able to demonstrate the understanding of spectral signatures and multipectral data interpretation)	4	3.5	2.5	1	0
Test 2: take home test (Criterion: student was able to demonstrate the overall understanding of what has been taught in this course)	9	7	5	2	0
	25	21	15	6	0

Grading Index

85-100	= A
75-84	= B
65-74	= C
50-64	= D
Below 50	= Fail