GEOG 481/581: Digital Image Analysis I

Course Objectives

This course teaches the theory, applications, and methods of digital image processing. We will explore the principles of electromagnetic radiation, satellite remote sensing platforms and sensors, image statistics extraction, radiometric and geometric correction, image enhancement, and thematic classification. Computer processing of digital satellite images will be a central part of the course. Many different satellite image data sets will be processed using the ENVI image processing software package.

Textbooks

The required textbook for this course is:

Mather, Paul M., and Magaly Koch. Computer processing of remotely-sensed images: an introduction. John Wiley & Sons, 2011.

Practical Component

Students will do image processing exercises on the computers. These practical exercises provide a way to acquire skills using ENVI and to apply the course concepts to real data.

Grading

The instructor will grade graduate and undergraduate students based on separate distribution curves. The components of a student's grade are listed in the table below.

	Undergraduates	Graduate Students
Lab Assignments	50%	50%
Midterm	20%	15%
Class Participation	10%	10%
Class Topic Presentation	NA	10%
Final	20%	15%

Class Participation (10%)

All students are expected to come to class prepared to share ideas, experiences, and knowledge with their peers.

Exams (40% undergraduate, 30% graduate)

Both mid-term and final exam will be in-class, closed-book exams. Unscheduled in-class quizzes will be administered without notifications. Completion of these quizzes will be counted toward class participation.

Class Topic Presentation (10% graduate students only)

All graduate students are required to select a topic from a list provided by the instructor and give a **10 minutes** presentation on that topic to the class. You must prepare a PowerPoint presentation and send it to the instructor by **3:30pm on your presentation day.** The presentation should be mainly based on the assigned readings. I strongly encourage you to put additional relevant materials you find on the internet or from other references that might help students understand the topic.

Lab Assignment (50%)

You will do practical digital image analysis exercises on the computers. If you do not finish the labs during the assigned time periods, the lab also has open hours. The practical exercises provide a way to acquire skills using ENVI software packages and to apply the course concepts to satellite imagery. Lab exercises are due by **5:40pm on the following Monday**. Make sure you pace your lab exercises appropriately to prevent turning them in late.

Course Schedule

Date	Topic	Exercise
1/8	Remote Sensing: Basic Principles	Lab 1: Introduction to ENVI, Fundamentals of EMR
1/15	**No Class**	
1/22	Platforms and Sensors	Lab 2: Download Landsat Image, Construct a time series from Landsat images
1/29	Preprocessing: Image rectification and restoration	Lab 3: Image registration
2/5	Radiometric Enhancement	Lab 4: Radiometric Enhancement
2/12	**Midterm Exam**	(Lab 4: continued)
2/19	Spatial Enhancement	Lab 5: Spatial Enhancement
2/26	Multi-image Manipulation	Lab 6: Data fusion
3/5	Image Classification I	Lab 7: Classification I
3/12	Image Classification II, Accuracy Assessment	Lab 8: Classification II
3/19	**Final exam (17:30-17:20 CH 469)**	