

Geography 690D Remote Sensing

Spring 2008
Class No. 18473
Mon, Wed. 2:00 – 4:05 p.m.
Sierra Hall 107

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Office Hours: MWF 11:00 a.m.– 12:00 p.m., M 4:00 – 5:00 p.m.

Description

In this course we will examine how the earth and its atmosphere can be viewed from aircraft and satellites using different parts of the electromagnetic spectrum, and how the images obtained can be analyzed to provide information on land use and features, and the composition of the atmosphere. There are hundreds of applications for such data including the monitoring of local and global environmental changes, weather forecasting, storm tracking, seismic analysis, land use, urban planning, the detection and monitoring of natural hazards, oil and mineral exploration, vegetation studies, crop classification, and oceanography.

In this course students will learn the principles of remote sensing, and gain hands-on experience in image analysis using *ERDAS Imagine*, a sophisticated image processing software package through the implementation of an image analysis project.

Attendance

Class attendance is required. Students will be listening to lectures, carrying out hands-on exercises and participating in a group project. Students are expected to be on time for class and to be respectful of others. Cell phones and beepers must be turned off.

Text

The text is optional. The text for the course is “Remote Sensing of the Environment” (2nd edition) by John R. Jensen (Prentice Hall, ISBN 0-13-188950-8). An earlier edition of the text is acceptable.

Grading

Students will be graded on a hands-on group project that they will carry out during the semester and on a term paper and presentation related to this.

Schedule of classes (for 407)

This class is scheduled concurrently with Geography 407/L, the undergraduate remote sensing class. Graduate students who have not taken Geog 407/L but still wish to take Geog 690D are expected to attend the lecture portion of the Geog 407 class as indicated below (“required attendance”). Some subject matter is optional (“optional attendance”). Students who have already taken the 407 class will be excused from the lecture portion of the class. Topics covered are listed below.

week 1	Jan 23	Introduction, basic principles, electromagnetic radiation	<i>Chpt 1, Chpt 2</i>	required attendance
week 2	Jan 28, 30	electromagnetic radiation, spectral reflectance	<i>Chpt 2</i>	required attendance
week 3	Feb 4, 6	ERDAS <i>Imagine</i> , remote sensing systems, spectral bands	<i>Chpt 2, Chpt 7</i>	required attendance
week 4	Feb 11, 13	orbits and satellites	<i>Chpt 7</i>	required attendance
week 5	Feb 18 Feb 20	satellites, visual image interpretation no lecture (project only)	<i>Chpt 7, Chpt 5</i>	required attendance
week 6	Feb 25, 27	image classification	<i>Imagine</i> Field Guide	required attendance
week 7	Mar 3, 5	image classification	<i>Imagine</i> Field Guide	required attendance
week 8	Mar 10, 12	aerial photography, cameras, film	<i>Chpt 4</i>	optional attendance
	Mar 17, 19	Spring Break		
week 9	Mar 24, 26	photogrammetry	<i>Chpt 6</i>	optional attendance
week 10	Mar 31 Apr 2	Holiday No lecture (project only)		
week 11	Apr 7, 9	orthorectification, digital elevation models	<i>Chpt 6</i>	optional attendance
week 12	Apr 14, 16	vegetation and other indices	<i>Chpt 11</i>	optional attendance
week 13	Apr 21, 23	thermal infrared remote sensing	<i>Chpt 8</i>	optional attendance
week 14	Apr 28, 30	RADAR (active and passive microwave) and LIDAR Graduate presentations	<i>Chpt 9, 10</i>	required attendance
week 15	May 5, 7	Graduate presentations		required attendance

Learning Outcomes and Assessment

Goal A: Knowledge

Students will understand the basic principles of remote sensing.

Students will learn the electromagnetic spectrum and its properties.

Students will learn the concepts of light transmission, reflection, scattering and absorption, and the roles of the atmosphere and the Earth's surface in these.

Students will understand how light reflection and scattering are applied in remote sensing experiments.

Students will learn the properties of the common satellite instruments.

Students will understand the mechanics of satellite orbits and the reasons for their selection.

Students will understand the spatial and spectral resolution of a variety of instruments and their importance for different applications.

Students will understand applications of remote sensing to earth observing and environmental monitoring.

Students will become well-acquainted with applications of remote sensing to global change, atmospheric monitoring, land use and land cover mapping, geologic and soil mapping, agricultural and forestry applications, hydrology and ecology.

- Assessment/Evaluation tool: Class discussion, hands-on project, oral presentation, term paper

Goal B: Acquiring Knowledge

Students will develop skills for acquiring new knowledge and reviewing literature.

Students will take comprehensive notes during class presentations.

Students will read material assigned and referenced in class.

Students will learn to find ancillary material from the Internet.

Students will read and analyze research articles from professional journals.

- Assessment/Evaluation tool: Class discussion, hands-on project, oral presentation, term paper

Goal C: Problem Solving Skills

Students will assimilate knowledge from different parts of the course and a variety of sources to understand how remote sensing is applied to environmental monitoring and surface mapping.

- Assessment/Evaluation tool: Class discussion, hands-on project, oral presentation, term paper

Goal D: Communicating Knowledge

Students will communicate the knowledge they have gained to analyzing and explaining journal articles describing remote sensing and its application.

Students will communicate the knowledge they have gained by describing a specific remote sensing application.

- Assessment/Evaluation tool: Class discussion, hands-on project, oral presentation, term paper