Advanced Spatial Technologies, FO-8173 (3 hours credit, time/place TBA)

Instructor: David L. Evans

Prerequisites: An introductory course in remote sensing and/or geographic information systems, or consent of instructor.

YOU MUST CHECK WITH INSTRUCTOR IF YOU DO NOT SATISFY THE PREREQUISITES. FAILURE TO MEET THE PREREQUISITES OR OBTAIN INSTRUCTOR CONSENT COULD RESULT IN YOUR BEING DROPPED FROM THE COURSE.

Course Description:

Spatial context is an important, yet frequently lacking component considered in resource management. Spatial technologies include remote sensing, geographic information systems (GIS), and global positioning systems (GPS). These technologies are not generally used independently as they are complimentary for the derivation of meaningful information used for natural resource management.

Remote sensing is obtaining information about a target or phenomenon without physical contact. GPS provides the means to record the exact location for field observations and data collection. A GIS is a collection of geographically referenced data, personnel, and computational tools designed to efficiently provide information used to assist in spatial analysis and decision-making processes.

This course is designed to develop advanced skills and knowledge in the integration of spatial technologies for resource assessments. Emphasis is placed on augmentation of the image classification process with other spatial technologies. Concepts of use of geospatial data in decision support will also be examined. Specific examples of use of these technologies will be derived, whenever possible, based on the background and interests of students in the course. The general form of the course will be an open forum conducted in an interactive computer laboratory setting. The instructor and students will examine specific issues based on assigned reading materials and, by way of discussion of student research interests and hands-on exercises, will examine data analysis tools and data integration techniques appropriate to the topics being discussed.

This course places primary emphasis on digital data manipulations and analysis. It is imperative that each student have working knowledge of computers with windowing operating environments. Software functions and data analysis techniques will be taught and fundamental computer concepts reviewed with respect to the operating environments. Computational resources available to students in this class include both Unix and PC/XP platforms. You should not continue in this course if you are uncomfortable in using computer systems. Examples of concepts you should understand are: moving around in directory structures, creating and deleting directories, copying and deleting files, opening and closing windows, moving windows, starting and stopping windows applications.

Location: Due to the interactive nature of the course, class sessions will be held in the computer lab, room A300 of Thompson Hall unless otherwise instructed.

Course Objectives:

1. Discuss project organization and planning concepts.
2. Review use of GPS in rectification/validation of remote sensing products and collection of data for GIS.
3. Review and understand basic remote sensing / image analysis concepts.
4. Examine basic GIS concepts with emphasis on data integration from image and GPS sources.
5. Discuss and implement the use of GIS in image analysis/classification approaches.
6. Discuss and test advanced strategies for image analysis including hierarchical and hybrid classification approaches.
7. Discuss relevant current topics in LiDAR data analysis.
8. Discuss Geospatial Data Accuracy and implications in project implementation and management
9. Discuss and perform spatial data visualization and modeling procedures.
10. Provide experience in integration of spatial technologies through completion of class project(s) that is planned and carried out as a group.

Course Topics:	**# of Hours**	
1. Project Organization / Planning / Reporting	1	
2. GPS Concepts Review		1
3. Remote Sensing / Image Analysis Concepts Review		2
4. GIS Concepts Review		2
5. Spatial Technology Integration		3
6. Advanced Image Classification Strategies		6
7. LiDAR Analysis		6
8. Geospatial Data Accuracy Issues		3
9. Data Visualization and Geospatial Modeling for Decision Support	6	
10. Class Project Implementation/Discussion		9
	Total	39

Text: None - readings from current literature will be assigned as relevant to the topics of the course. Each student will be assigned to lead group discussions on the required readings for the course.

Grading: Student grades will be based on 2, exams (25% each), literature discussion (10%) and lab project(s) (40%). A 100 point scale will be used: A= 90-100, B=80-89, C=70-79, D=60-69 and F<60.

Office Hours: Use e-mail to make an appointment. dle@sitl.cfr.msstate.edu

Student Responsibilities: Students are reminded to adhere to the code of conduct of MSU and that misconduct will be dealt with harshly. I expect each student to make every effort to fully participate

in all aspects of the class discussion and interactive computer applications. Please arrive prepared for the day's topic by reading assigned material and by reviewing your notes. Students should inform the instructor in advance when they must miss class due to unavoidable meeting/research conflicts. In such cases, it is the student's responsibility to arrange to make up exams or assignments. Assistance outside of regular class hours may be obtained by appointment. Be aware of last drop days for the semester.

I welcome suggestions at any time on how to improve the course. This will help me refine the course both for you and students who will take it in future years. You need to take every opportunity to get the maximum benefit out of this learning experience.

WARNING: DO NOT WAIT UNTIL THE LAST MINUTE BEFORE PROJECTS ARE DUE TO START WORK. THERE WILL BE NO SYMPATHY DUE TO COMPUTER OR NETWORK FAILURES THAT ARE BEYOND YOUR CONTROL. YOU ARE EXPECTED TO TURN IN YOUR WORK ON TIME OR BE ASSESSED A SEVERE LATE PENALTY (ONE LETTER GRADE PER DAY).

SoRSC Laboratory Rules and Basic UNIX Applications

Please refer to the laboratory handout for laboratory rules, basic UNIX commands and applications. Your instructor will go over this handout and demonstrate how to login and get started. The instructor will also explain basic file structure and conventions used in Unix. Many of the basic functions on these machines are intuitively similar to other windows-based equipment. There are a large number of on-line help manuals for all software and some manuals on the bookshelves. **Please do not remove manuals from the lab and keep them orderly.** Abuse of this resource will result in removal of all printed manuals from the lab.

Setup

Turn on your monitor (if already on, move the mouse to view the login display window). Log in (type the user name you got from the instructor and **Enter**; then type the password and **Enter**). The instructor will demonstrate the basic functions of your desktop environment and how to become familiar with them through the various help tools and tutorials. You are expected to take time to go through these tutorials (hypertext based) and have a full understanding of how to manipulate your desktop functions. You should set up your desktop with the characteristics you prefer. The instructor will demonstrate the basic tools to accomplish this setup. We will probably also use some PC tools/software via SunPCI cards so these will also be demonstrated as appropriate.

Class Notes, Etc.

I will provide class notes and presentation materials on webCT. Time permitting, I may also put some of reading material on this resource. These are provided for your convenience and to use for class preparation and discussion. As these have not gone through formal editorial review and revision, no warranty is given or implied as to the correctness of the content. I hope they will serve as a useful reference for our weekly discussions.