

ENVE 155/ES 292: Decision Analysis in Management

Instructor: Prof. Jeffrey Jenkins

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Course meeting times: Tuesday and Thursday 10:30-11:45, Kolligan 202

Office Hours: Tuesdays 1:30-3, or by apt., SSM 202B

Course abstract

This course is an introduction to geographic information systems (GIS) for sustainability management as the technology of processing spatial data, including input, storage and retrieval; manipulation and analysis; reporting and interpretation. Emphasizes GIS as a decision support tool for problem solving in natural resource management, conservation, forestry, water resources, agriculture, and other sustainability fields. The course will utilize modules that incrementally build up a geospatial skill set using basic model building, experimental design, and database management. Students can expect to leave the course with a working knowledge of GIS as a support tool for future projects and inquiry.

Course learning objectives:

- Provide a basic understanding of theories of modeling, organization, and visualization of geographic information.
- Facilitate an understanding of the unique nature of spatial data including raster/vector, topology, spatial geometry, attributes, geographic projections and coordinate systems.
- Enable the basic design, creation, and querying of spatial databases combining both spatial and attribute information.
- Develop the ability to import, create, display, edit, and present spatial information according to cartographic principles.
- Inform students about ethical considerations related to communication and interpretation of spatial data for organizational management

Methods of instruction

Lecture, demonstration, laboratory modules and exercises

Course Materials

The following books will need to be purchased prior to the start of the course. Additional materials on the class schedule will be shared by the instructor.

- 1) Bolstad, P. 2016. *GIS Fundamentals: A First Text on Geographic Information Systems*. FIFTH Edition. Eider Press.
- 2) External USB Flash Drive (16+GB)
- 3) *Optional*: Clemmer, G. 2013. *The GIS 20: Essential Skills*. SECOND edition. ESRI Press.

Lab modules

There are 10 modules covering a range of sustainability and natural resource management topics that will guide us through the general tools, displays projections, analysis features, etc. of ArcGIS. Each week you will be expected to cover one module. If you are not able to complete these during lab hours, then you will need to find time outside of class to complete this activity before the start of the following week's class time in order to stay caught up. Please remember that you will need to *purchase a USB drive and save your own data*. It is essential you stay on track so that we can move as a class through the labs in consecutive order. All labs must be submitted as a printed copy in class the following week.

Reading, lectures and exams

The intention of meeting in the computer lab is to allow you as much dedicated time possible to familiarize yourself with GIS by completing the modules within the allocated class meeting time and readings outside of it. As such lecturing will be kept to a minimum, however a brief introduction will be given for the week's topic, lab module, and related reading. Please remember to read the assigned text before beginning that week's lab module.

There will be a midterm exam covering material from the assigned readings. The exam will include multiple-choice, fill-in, problem solving, and short answer. You will complete a final project in lieu of a final exam.

Final Project

Everyone will complete a final project, graduate students will work independently, and undergraduates will work with a team of 3-4 people total. Your team will collect, analyze, and display geospatial data relevant to an environmental, sustainability, or natural resource management issue of your choice. Final project results will be presented to the class and you or your group will submit a project proposal halfway into the semester. A rubric of what is expected for the final project, presentation and proposal will be provided.

Grading

Completion of lab modules, regular attendance, passing the exam, and participation in a final project are required for this class. The course grade will be based on the following allocations: 50% lab modules (5% points each), 10% attendance, 20% exam and 20% final project.

Missed/Late Assignments and Make-ups

Late assignments will be docked 1% point for every class they are late. Students may request an extension on assignments due to illness or other reasonable circumstances.

Make-ups for missed exams will only be allowed under exceptional circumstances. Such circumstances are university approved excuses (see University regulations for further information). The format for make-up exams will be determined by the instructor.

Class Schedule

Class	Topic	Reading	Lab Module
Jan 17	Introduction to GIS	Bolstad, Ch. 1, p. 1-24	L1_Arc10
Jan 19			
Jan 24	Projecting geographic data	Bolstad, Ch. 3, p. 85-98, 116-137	L2 Projections
Jan 26			
Jan 31	Digitizing in ArcMap	Bolstad, Ch. 4, 147-169	L3_digit_arcgis10
Feb 2			
Feb 7	Image georeferencing	Bolstad, Ch. 4, p. 170-193	L4Georeferencing
Feb 9			
Feb 14	Digital data and tables	Bolstad, Ch. 7, p. 297-323	L6 Digital Data and Tables
Feb 16			
Feb 21	Lab catch up day		
Feb 23	Project work day		
Feb 28	Tables Operations	Bolstad, Ch. 8, p. 331-356	L7tables
Mar 2			
Mar 7	Spatial selection and joins	Bolstad, Ch. 9, p. 373-395	L8 Table Import&Join Spatial Select
Mar 9			
Mar 14	Buffering and overlay	Bolstad, Ch. 9, p. 396-419	L9 Buffering
Mar 16			
Mar 21	Midterm exam		
Mar 23	Lab catch up and project work day		
Mar 28	Spring Recess		
Mar 30			
Apr 4	Water Management	http://www.esri.com/industries/water-resources https://gis.water.ca.gov/app/boundaries/	Groundwater for Many
Apr 6			

April 6	Cal GIS Summit at UC Merced		
Apr 11	Fire Management	http://www.esri.com/industries/fire-emergency/wildland-fire	Point Patterns of Forest Fires
Apr 13		http://frap.fire.ca.gov/	
Apr 18	Wildlife Management	http://www.esri.com/industries/conservation	Planning for Sensitive Species
Apr 20		https://www.fws.gov/gis/	
Apr 25	Lab catch up and project work days		
Apr 27			
May 2			
May 4	Final project presentations		

Course Policies

1. *Classroom interaction.* I encourage personal views and critical inquiry based on the material and topics at hand. Equally, I expect that the viewpoints of others will be respected. Consider this course to be valuable practice to engage with your peers through professional communication and scholarly discourse.
2. *Special accommodations.* Students who need special accommodations are required to submit the form to me in person, preferably outside of class (e.g. office hours) within the first two weeks of the quarter. If you will be requesting academic accommodations, you must first contact the Disability Services (<http://disabilityservices.ucmerced.edu/>) to make arrangements.
3. *Academic integrity.* The University has established codes concerning proper academic conduct and the consequences resulting from improper behavior. Please be aware of these policies. The official UC Conduct Standards can be found at: <http://studentlife.ucmerced.edu/content/uc-conduct-standards>
4. *Life as a UC-Merced Student.* Your course facilitators are aware of the many pressures we all face. There are many campus services specifically suited to help you throughout your university career, please take advantage of your resources, including: University academic advising (<http://advising.ucmerced.edu/>), Health Services (<http://health.ucmerced.edu/>), and University Counseling and Psychological Services (<http://counseling.ucmerced.edu/>).