"*Knowing where things are, and why, is essential to rational decision making*"

Jack Dangermond, President, Environmental Systems Research Institute (ESRI)

"A map is not the territory it represents, but, if correct, it has a similar structure to the territory, which accounts for its usefulness"

Alfred Korzybski, philosopher and scientist

Principles of GIS
NRE 531

Instructors	Daniel Brown Professor	Silvia Cordero-Sancho PhD Student	Courtney Wilson MS Student	Naomi Hamermesh MS Student
Contact	3505 Dana 763-5803 danbrown@	Sections 5 and 6 corderos@	Sections 2 and 3 crwils@	Section 4 nhamerme@
Office Hours	Monday 3pm to 5pm or by appointment	Wed 9-12	Thurs 2:30-4 Fri 11-12:30	Mon 1-3
Class Meets	Lecture: Tuesdays and Thursdays 1 to 2:30 pm in 1040 Dana Bldg. Lab: Tue. 3-5 pm (002); Tues. 6-8pm (003); Wed. 1-3 pm (sec 004); Wed. 3-5 pm (sec 005); Wed. 6-8 pm (sec 006); in 3325 Dana (computer lab)			
Ctools	At *http://ctools.umich.edu* the homepage will contain pdf copies of lecture graphics as well as lab assignments.			
Objectives	Making the most of geographic information, whether it be for investigating a scientific hypothesis or managing spatially distributed resources, requires the ability to think about spatial relationships, an understanding of the technical capabilities of computer based information systems, and GIS software skills. The goals of this class are, therefore, to provide a firm understanding of the conceptual and technical issues that affect the use of geographic information for research and a variety of planning and management applications. The focus is on how to think about and implement geographic data management and analysis, requiring both a discussion of basic concepts (i.e., lecture) and practice with implementing them with GIS software (i.e., lab). The lab is taught using ArcGIS 10 (ESRI, Inc.). Labs and lectures are intimately linked and "live" software demonstrations are included in the lecture.			
Prerequisites	This course is a lot of work. Lab assignments usually require work outside of class and lab times. The course is designed so that students without GIS background can succeed, but previous experience will no doubt be helpful. Although not required for successful completion of this course, courses in all of the following areas can be helpful background for work in GIS: remote sensing and image interpretation, statistics, cartography, surveying, and computer programming.			
Required Readings	1. **Textbook** – Bolstad, P. 2008. *GIS Fundamentals: A First Text on Geographic Information Systems, Third Edition*. White Bear Lake, MN: Eider Press. Available at Ulrich's, Union Bookstore, Michigan Book & Supply, or www.atlasbooks.com 2. **Miscellaneous Readings** - from various sources will be available on the CTools site.			

Course Policies

Attendance	Attendance and participation in the lecture sessions is essential to your understanding of and performance in both lecture and lab. From my experience, the single best predictor of performance in the class is consistent attendance. We will take attendance in the lab. It is important to be prompt in getting to the both lab and lecture, so as not to miss key instructions or disrupt the session for the other students.
Lab	You will probably not be able to complete the assigned tasks during your lab period. The software is available in both the instructional lab (3325) and the 2nd floor public lab in Dana; both have open hours. Also, you can pick up from the instructor a student copy of the software for loading on your own machine. Finally, you can access all software loaded onto the computers in the lab anytime from any machine (with a network connection) by logging into http://virtualsites.umich.edu. All labs will be due before the next lab period. We recommend that you keep a lab notebook (digital or hardcopy) into which you can put all lab assignments and your notes. Later labs and lab exams rely on performing tasks that are described in detail in earlier labs.
Exams and Grading	Your grade will be based on two lecture exams, two lab exams, and 11 lab assignments. The lab exams are take-home, but require lab work and will cover skills learned in the lab section of the course. The lecture exams are non-comprehensive and focus on your understanding of the concepts presented in the course. Your lab instructor will grade your lab write-ups and exams. *There will be no extra credit.*
Disabilities	We will make every effort to accommodate the needs of students with hearing, visual, or other physical impairments and/or learning disabilities. Be sure to let us know your needs.

Grade Calculation

	Dates	Final Grade %	Overall %	Grade
Lab Write-ups	weekly	40	97 or above	A+
Lab Midterm	Feb 17-24	10	92-96	A
Lec Midterm	Mar 8	20	90-91	A-
Lab Final	Apr 10-17	10	88-89	B+
Lec Final	Apr 26	20	82-87	B
			80-81	B-
			78-79	C+
			72-77	C
			68-71	C-
			62-67	D

NRE 531: Schedule of Events (subject to change)

Date	Topic(s)	Lab	Readings
Jan 5	Course Goals, GIS History & Components		Ch. 1
Jan 10 Jan 12	Maps as Models of the World Geographical and Attribute Measurement	Intro to Lab & ArcGIS	Ch. 2, p. 32-3; Ch. 4, 125-32 Ch. 2, p. 25-31; p. 57-9
Jan 17 Jan 19	Map Design (Silvia) *Brown in TUCSON* Vector Data Structures	Creating Map Displays	Carto.Communication (Geographer's Craft); Ch. 4, p. 159-65 Ch. 9, p. 332-9 Ch. 2, p. 33-42; p. 54-7
Jan 24 Jan 26	Raster and Other Data Structures Projections and Coordinate Systems	Data Structures	Ch. 2, p. 42-54; p. 59-61 Ch. 3
Jan 31 Feb 2	Attribute Data Structures Data Collection: Remote Sensing (Silvia) *Brown in DC*	Projections & Coordinate Systems	Ch. 8 p. 291-304 Ch 6
Feb 7 Feb 9	Data Creation from Secondary Sources Data Collection: Existing Data and Volunteered Information	Data Creation & Attributing	Ch. 4, p. 133-58 Ch. 7
Feb 14 Feb 16	Data Collection: GPS **No Class** *Brown in NC*	Mapping Your Own Data	Ch. 5
Feb 21 Feb 23	Metadata and Accuracy Data Query and Description / SQL	**LAB MIDTERM**	Ch. 4, p. 166-8; Ch. 14 Ch. 9 p. 321-31;340-41; Ch. 10 p. 379-90
Feb 27- Mar 2	*B R E A K*		
Mar 6 Mar 8	Review **LECTURE MIDTERM** *Brown in Berlin*	Application: Basic Query and Analysis	

Mar 13 Mar 15	Map Overlay Distance and Buffer	Application: Land Use Change	Ch. 9, p. 350-61; Ch. 10 390-394 Mohai & Saha 2007 Ch. 9, p. 342-9; Ch. 10, p. 404-8
Mar 20 Mar 22	Overlay for Decision Support Neighborhood Operations	Application: Raster Suitability Mapping	Ch. 13, p. 481-7; Cargin & Dwyer 1995 Ch. 10; p. 395-404
Mar 27 Mar 29	Terrain Analysis Network Analysis	Application: Terrain/Viewshed Analysis	Ch. 11; Russell et al. 1997 Ch. 9, p. 362-68; Wood 2003
Apr 3 Apr 5	Spatial Interpolation Cartographic & Spatio-Temporal Modeling	Application: Choice of Labs (1 of 3)	Ch. 12, p. 437-60 Ch. 13, p. 477-80, 487-507
Apr 10 Apr 12	TBD GIS and Society	**LAB FINAL**	 McCall & Minang 2005
Apr 17	Review		
Apr 26	**LECTURE FINAL** (1:30-3:30 pm)		

Required Readings Available on CTools

Cargin, J and Dwyer, J. 1995. Pennsylvania's Low-Level Radioactive Waste Disposal Facility Siting Project: Process Summary. 1995 ESRI User Conference.

Mohai, P. and Saha, R. 2007. Racial inequality in the distribution of hazardous waste: A national-level reassessment. *Social Problems*, 54(3): 343-370.

McCall, M.K.,and Minang, P.A. 2005. Assessing participatory GIS for community-based natural resource management: Claiming community forests in Cameroon. *The Geographical Journal*; 171(4): 340-356.

Russell, G.D., Hawkins C.P., and O'Neill, M.P. 1997. The role of GIS in selecting sites for riparian restoration based on hydrology and land use. *Restoration Ecology*, 5 (4): 56-68 Suppl. S.

Wood, G. 2003. Modelling the ecological footprint of green travel plans using GIS and network analysis: from metaphor to management tool? *Environment and Planning B,* 30(4): 523 – 540.