ENVI3010 GIS in Earth and Environmental Sciences

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Class meetings: W 4:00-6:50pm
Office hours: I will be available to answer questions *during scheduled office hours*:
Thursday 9:30-10:30am, Friday 1:30-2:30pm, or my appointment
Course website: jamesheiss.com/ENVI3010S19

Course Objective
The objective of this course is to provide a theoretical and practical introduction to Geographic Information Systems (GIS). The course entails basic concepts and applications of GIS through examination of topics including geospatial data, data management, spatial reference systems, geodesy, map projections, interpolation, analytic toolboxes, and cartographic design. The ESRI's ArcGIS will be used extensively during class and for laboratory assignments. The course emphasizes practical application and laboratory exercises and is heavily hands-on.

Email
Any email that you send to me *must* have ENVI3010S19 at the beginning of the subject line. Any email that you receive from me will have ENVI3010S19 in the subject line. I will not see your email if ENVI3010S19 is not in the subject.

Textbook and Flash Drive
Price, Maribeth, 2014, Mastering ArcGIS, 8th Edition.
You will need a personal flash drive >8gb. All data files for in-class assignments, labs, and tutorials will be stored on this flash drive. *No data files, assignments, or lab reports can be stored on lab PCs.*

Learning Outcomes
After successful completion of this course you will be able to:
1) Explain and demonstrate proficiency of major concepts/skills of GIS, spatial data, attribute data, data structures, coordinate systems, data projection, spatial analysis, vector and raster datasets, metadata, and several analytical GIS tools
2) Navigate within the ArcGIS software environment and perform introductory-level analytical skills such as joining data, creating buffers, digitizing, georeferencing, and conducting geospatial queries, performing raster and terrain analysis
3) Distinguish between spatial and attribute data
4) Differentiate vector and raster data and how the data type affects storage, display, and analysis
5) Collect, process, and analyze geospatial data
6) Discuss the strengths and weaknesses of GIS for spatial analysis

Course Requirements
Class Participation
Students are expected to be in class for lectures and in-class exercises. The best way to lean GIS software is to work with it and to work with others on GIS objectives, both of which are done in class.

In-class exercises:
GIS is complex and learning by doing is the most effective learning strategy. These assignments are intended to demonstrate or reinforce concepts or skills that can be applied in laboratory assignments. In-

class exercises are due at the end of the class period. Any student not present in class that misses an in-class exercise will receive a grade of zero for that assignment.

Lab Assignments:
Lab assignments will involve working in ArcGIS and will be completed outside of class. The deliverable includes maps, tables, and text presented as a report. Labs are due on the assigned date. Lab reports will be submitted as webpage portfolio and will be assessed using the Lab Assessment Rubric.

Teaching Exercise Portfolio
Chapter exercises will be completed related to specific GIS skillsets. The exercises involve working through the textbook step-by-step guides and answering select questions at the end of the guide. The exercises will be submitted as webpage portfolios.

Exam:
One exam is scheduled that will cover topics and skills learned in class and will include a hands-on component. Attendance is mandatory. Any discussion about missing the exam must occur prior to the exam.

Final Project
Over the course of the semester, students will complete and report on a final innovative GIS project of their choosing. This will involve 1) developing an objective and a set of research questions that can be answered using GIS, 2) seeking and identifying the geospatial data to answer that question, 3) selecting the appropriate GIS methods, 4) analyzing and interpretation of results, and 5) presenting the project to the class and other faculty members at the end of the semester.

Expectations

- All maps must include a title, legend, scale, north arrow, and projection information. Optional items include a neatline and supporting graphics and tables.

Grading

In-class exercises	20%
Labs	40%
Exam	30%
Final project	10%
Total:	100%

*Grades are rounded to the nearest tenth.

Percentage	Letter Grade
>92	A
90 – 92	A-
88 – 89	B+
83 – 87	B
80 – 82	B-
78 - 79	C+
73 – 77	C
70 - 72	C-
68 – 69	D+
60 – 67	D
<60	F

Tentative schedule

Week	Date	Topic	Reading	Assignment due	Lab due / Exam
1	23-Jan	Introduction, syllabus, class schedule, GIS examples, geospatial datasets, ESRI's ArcGIS			
2	30-Jan	Data management, metadata, ArcCatalog, coordinate systems, map projections, geodesy	Ch 1	Ch 1 Tutoral	
3	6-Feb	Categorizing data: thematic maps, graduated colors, graduated symbols, proportional symbols, dot density	Ch 2-3	Ch 2-3 Tutoral	
4	13-Feb	Scale, layers, paths, data frame, map elements, cartographic design	Ch 4	Ch 4 Tutoral	
5	20-Feb	Attribute tables	Ch 5	Ch 5 Tutoral	
6	27-Feb	Map algebra, spatial queries	Ch 6 and 8	Ch 6 and 8 Tutoral	
7	6-Mar	Raster datasets			Exam
8	13-Mar	Spring break	Spring break	Spring break	Spring break
9	20-Mar	Sampling, intro to Sand Table Project	Ch 11	Ch 11 Tutorial	
10	27-Mar	Interpolation			Lab 1
11	3-Apr	Terrain analysis			Lab 2
12	10-Apr	Cartography			Lab 3
13	17-Apr	Hillslope and flood analysis			Lab 4
14	24-Apr	Georeferencing			
15	1-May	Final Project presentations			
16	6-11 May	Finals Week	Finals Week	Finals Week	Final project presentations