

GEOG/RGPL 316/516

Introduction to Geographic Information Systems (GEOG/RGPL majors)

Instructor: Dr. John Benhart, Jr.
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Office Hrs: M-W-F, 9:30-10:30 A.M.; T-R, 2:00-3:00 P.M.; Also by appointment
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Lab Facilities: The Spatial Environment Analysis Lab (SEAL) – Room 14 Leonard Hall
Texts: **A.** M. Price. 2011. *Mastering ArcGIS*. 5th Edition. McGraw-Hill: New York, NY. (required) **B.** *Introduction to GIS Class Notes* available at Copies Now (required).

Student Learning Objectives:

Understanding of:

- 1) What geographic information systems (GIS) are and how they work; the historical development of the technology, its present context, and future trends
- 2) How geospatial technologies are presently being used by geographers, planners and other scientists and decision-makers
- 3) The GIS processes of data acquisition, storage, management, analysis, and output production
- 4) Maps as models of the earth, and spatial data derived from maps; the concepts of mapping datums, two and three-dimensional coordinate systems, map projections, map scale, horizontal accuracy, and metadata
- 5) Aspects of data models used to represent phenomena in space (for example raster and vector), and appropriate applications for problem-solving
- 6) Types of GIS functionality, and contextual applications of GIS tools
- 7) How to solve geography and planning-related problems involving simple analysis, using GIS tools

Technical and Analytical Skills in:

- 1) The interface logic and effective use of industry-standard GIS software
- 2) Application of GIS tools and functionality within industry-standard GIS software to introductory to intermediate-level geography and planning-related problems
- 3) The extraction/derivation of desired information from spatial databases

Class Schedule

<u>Week of</u>	<u>Topic(s)</u>
Aug 30	Introduction to course. Discussion of texts, computer facilities, how things are going to done. <i>What is a Geographic Information System (GIS)?</i> Unique functions and problem-solving capabilities of GISs. Applications areas. Functional elements of a GIS. Read A. Introduction and B. Class Review of Notes
Sept 6	<i>Map Projections and Coordinate Systems</i> : Map Scale and Projections. Geographic coordinate systems. Characteristics of geographic information. Metadata. <i>GIS Data Structures - Vector Data Model</i> : Geometric Objects. Topology. Higher level objects. Read A. Ch. 3, 11, 15 B. Class Review of Notes
Sept 13	<i>GIS Data Structures - Vector Data Model, Raster Data Model</i> : Geometric Objects. Topology. Higher level objects. Types of Raster Data. Integration of Raster and Vector Data. Discussion of GIS functionality. Read A. Chs. 1, 2 B. Class Review of Notes

Sept 20	<i>Vector, Raster Data Input:</i> Existing spatial data (reading and understanding metadata), Data input methods: digitizing, scanning, Global Positioning System (GPS), image and remote sensing data. <i>Data Display and Cartography. Making Maps with GIS:</i> Map elements, types of maps, map design. <i>Introduction to ArcGIS and ArcView 10:</i> Adding data, working with layers, data frames, and map files Read A. Chs. 3, 4 B. Class Review of Notes
Sept 27	<i>Attribute Data Input and Management:</i> Database management, relational database management systems (RDBMS). <i>Data Exploration.</i> Attribute Data Query, Spatial Data Query. <i>Learning ArcView 10 continued:</i> Understanding RDBMS structure, relational join and relate operations, database (attribute) queries. Read A. Ch. 5, 6 B. Class Review of Notes
Oct 4	MIDTERM EXAM
Oct 6	<i>Attribute Data Input and Management:</i> Database management, relational database management systems (RDBMS). <i>Data Exploration.</i> Attribute Data Query, Spatial Data Query. <i>Learning ArcView 10 continued:</i> Understanding RDBMS structure, relational join and link operations, database (attribute) queries.
Oct 11	<i>Learning ArcView 10 continued:</i> Database Operations (Attribute data classification and computation) and Spatial Data Query (Feature Selection by Spatial Relationship). <i>Vector Data Analysis.</i> Read A. Ch. 7. B. Class Review of Notes
Oct 18	<i>Vector Data Analysis.</i> Describing attribute and spatial data statistically, Spatial analysis, GIS and Spatial Analysis. <i>Learning ArcView 10 continued:</i> Performing spatial analysis in ArcView. Geoprocessing Operations.
Oct 25	<i>Vector Data Analysis.</i> Describing attribute and spatial data statistically, and Spatial Analysis. Buffer, Overlay Operations. <i>Learning ArcView 10 continued:</i> Performing statistical and spatial analysis in ArcView. Read A. Ch. 8 B. Review Notes
Nov 1	<i>Vector Data Analysis.</i> Buffer, Overlay Operations. <i>Raster Data Analysis.</i> Advanced GIS functionality: Spatial aggregation, spatial merges, hyper links, report generation. B. Class Review of Notes
Nov 8	Advanced GIS functionality: Spatial aggregation, spatial merges, hyper links, editing tables, report generation. Advanced GIS functionality: ArcView Extensions... Spatial Analyst, Network Analyst, 3-D Analyst Read A. Ch. 14 B. Class Review of Notes
Nov 15	Some more advanced GIS functionality: ArcView Extensions...Spatial Analyst, Network Analyst, 3-D Analyst. Learning to think spatially...using GIS to analyze specific problems. Nov 23-27
Nov 21-27	Thanksgiving Break
Nov 29	Some more advanced GIS functionality: ArcView Extensions...Spatial Analyst, Network Analyst, 3-D Analyst. Learning to think spatially...using GIS to analyze specific problems
Dec 6	Relevant topics: geodatabases; Learning to think spatially...using GIS to analyze specific problems.
Dec 13	8 AM - 11 AM FINAL EXAM ACTIVITIES

Grading Procedure: Evaluation will be based on two exams of equal value (a midterm and a final) (40%); regular assignments and exercises (40%), and attendance, in-class exercises and participation (20%). A late penalty of 20% per day will be assessed on any assignment submitted after the deadline. Exercises will be graded as follows: 80 to 85% of the total points will be awarded based on following instructions and/or deriving the correct answer; the other 10 to 15% of the points will be given based on initiative, care, creativity, and professionalism of the final product turned in. This means I want attention to detail and cartographic correctness to be evident in the exercises you turn in for evaluation. **Late exercises will be penalized 20% of the total possible points for each day late** (by the way I don't expect to have to deal with this). There will be two exams (a midterm and a final). Class participation (which includes attendance, hands-on computer work, in-class exercises and participation) will be worth **30%** of your final grade.

Additional Policies and Requirements: 1) Students who have unexcused absences from class are responsible to catch up on class material on their own. 2) Students must be able to access the SEAL Lab and/or a personal computer with the appropriate version of ArcGIS 10.X to complete work for this course. 3) Students, by the end of the second week of the semester, should have a 500 mb minimum "flash" drive to store class data for assignments. 4) Students are responsible to check their e-mail accounts daily to see if the instructor has disseminated information regarding the class. 5) All students will complete and turn in their own work for assignments.