Geographic Information Systems and Spatial Analysis

Fall 2012 Syllabus

Geographic Information Systems (GIS) are computer programs capable of displaying, storing, editing, and analyzing spatial information. GIS is becoming an increasingly important tool for natural resource management and scientific research. Students will gain a practical understanding of a wide range of GIS concepts including making maps and performing spatial data analyses using ArcGIS 10.

General Information

Instructor: Gregory Stewart, Ph.D.

Textbook: GIS Fundamentals, 4th Ed by Paul Bolstad (*textbook is required, although 3rd edition may suffice*)

Prerequisites: Students must be proficient with network file management on computers running Windows 7, but no previous experience with GIS is required.

Software: ArcGIS 10 running under Windows 7. It is recommended that students use campus computers for assignments, but educational copies of ArcGIS 10 will be available for those who want to install it on a home computer, however ArcGIS 10 only runs under Microsoft OS (http://resources.arcgis.com/content/arcgisdesktop/10.0/arcgis-desktop-system-requirements).

Meeting times: Class will meet every Monday night in SEM 2-B1105. Class is schedule from 6-10pm with most of the time spend in the CAL for a hands-on labs.

Attendance: Students must be prepared to attend every class and to participate with a high level of engagement. The course material builds on previous assignments and students who miss early labs will have difficulty completing later assignments.

Homework: Students will be assigned weekly labs and reading material. Labs are likely to require use of college computing facilities during non-class hours. Labs are due by 5pm the Sunday after they are assigned. Students who are unable to complete the assignment within the time

provided should contact the instructor, as late work is likely to result in a poor evaluation. The course will be largely paperless. Course materials will be posted electronically and students will turn to turn in assignments electronically. All work must be completed before the end of the term in order to obtain full credit.

Collaboration: Student collaboration is highly encouraged, though it is expected that each student will produce his or her own work. Please see Evergreen's Academic Policies for more information (http://www.evergreen.edu/advising/academicpolicies.htm)

GIS Project: MES students will be asked to complete a GIS analysis project, and to present the analysis and results to the class. The analyses are to be original and may be completed as part of an individual or group effort (up to 3 people per group). Students working in groups will be asked to write a short description of their contribution of the overall effort.

Evaluation: Course evaluations are based on student performance. Weekly lab assignments, written quizzes on reading material, and the final GIS project will serve as the primary basis for evaluation.

Schedule

Week 1 - Introduction to GIS - Making maps

Lecture: Introduction. What is GIS, why is it important, and how GIS is used?

Practicum: Folder connections and simple mapping exercises.

Reading: Chapter 2

Week 2 – Map coordinate systems

Lecture: Map projections and coordinate systems

Practicum: Subsetting shapefiles, coordinate system display, displaying GPS data

Reading: Chapter 3

Week 3 – Imagery and digitizing

Lecture: Datums, georeferencing, and creating spatial data

Practicum: Tilton exercise: Georeferencing, datum issues, digitizing

Reading: Browse chapters 4-7

Week 4 – Attribute tables and database concepts

Lecture: How to join tables and query data.

Practicum: Legislative exercise

Reading: Read chapter 8 & first half of chapter 9.

Quiz on material covered in chapters 1-8 (focus on Ch 3 & 8)

Week 5 – Basic spatial analysis

Lecture: Database concepts, queries.

Practicum: Location queries.

Reading: Finish chapter 9.

Week 6 – Raster analysis and model building

Lecture: Questions only a GIS can answer; GIS analytical functions, map algebra, classification, buffering, overlays.

Practicum: Spatial queries involving buffers and overlays.

Reading: Chapters 10 & 13

Week 7 – Spatial estimation and terrain analysis

Lecture: Using raster datasets for terrain analysis, working with DEMs, spatial interpolation.

Practicum: Spatial analysis and 3D tools.

Reading: Chapters 11 & 12.

Project description due

Week 8 – Geocoding and network analysis

Lecture: Turning addresses into locations and routing through a network.

Practicum: Geocoding.

Reading: Review chapter 9.

Week 9 – Spatial statistics / Creating map books

Lecture: Introduction

Practicum: Ordinary least squares, spatial autocorrelation, data driven pages

Reading: Chapter 13

Quiz on material in chapters 9-12

Week 10 – Putting it all together

Lecture: Project presentations.

Reading: Chapter 14 – Data standards and data quality

**** Final project due***