

**Cleveland State University**  
**Undergraduate Geographic Information Systems (GIS) Capstone Course**  
**UST 486 4 Credit Hours Fall 2009**

Instructor- **Jim Wyles**  
Office- **UR18**  
Email [j.wyles@csuohio.edu](mailto:j.wyles@csuohio.edu)

Work Phone- **216-687-2221**  
Office Hours- **5 pm to 6 pm Mon**  
or by appointment

**Objectives:**

The goal of the GIS capstone course is to integrate the GIS knowledge and skills learned from the first portion of this course as well as accumulated from the prerequisite courses and apply to each student's individual GIS project. The student will use the GIS functionality found within ESRI ArcGIS software as a tool to complete their project. Homework exercises will be completed using ArcGIS software.

**Skill Areas:**

The GIS Capstone course will meet the Cleveland State University criteria for the skill areas of Oral Communication, Quantitative Literacy, and Critical Thinking.

*Oral Communication:*

The student will orally present an outline of the GIS project that the student has selected and researched. The presentation will include an objective statement, requirements, data layers to be downloaded, GIS functions to be used, and flow diagram to reach project results and conclusions. Students will follow the instructor guideline document (See Oral Presentation of GIS Capstone Project- Outline Grade Sheet document) for their oral presentation. An example project outline is provided by the instructor. (See Project Outline Example document.)

The completed project results will be orally presented at the end of the semester. Students will follow the oral presentation criteria as shown in the Oral Presentation of GIS Capstone Project Results document.

The student will also orally present an assigned GIS topic or function using the ArcGIS software. Students will follow the oral presentation criteria as shown in the GIS Topic/ Function- Oral Presentation Grade Sheet document.

*Quantitative Literacy:*

The student will use ArcGIS software to output GIS maps and query results to interpret and draw conclusions from the GIS functions that are executed. The analysis will be performed on the weekly GIS exercise assignments and also the student project.

The student will show the results of the GIS functions on maps, graphs or data tables. The resultant mapping will be achieved using the GIS thematic (choropleth) maps or filtered data map symbol subsets from the original data universe. Results and conclusions will be presented using maps, tables, or graphs with student results and conclusions.

GIS queries or filtering of data will be achieved through the use of Structured Query Language (SQL) that is provided within the GIS software. Results will be displayed in maps, graphs, or data tables. Students will evaluate the maps for map reading, map analysis, and map interpretation.

*Critical Thinking:*

The student will use critical thinking to complete their GIS project objective. Using ArcGIS software functions, the student will determine answers to project questions. Students will use their ability to analyze data, filter data, and evaluate the data to determine a project outcome.

**Prerequisites:**

The prerequisites for this class are the successful completion of UST 401 (Computer Applications for Urban Research), UST 403 (Cartography & Graphics), and UST 434 (Introduction to GIS). A prerequisite will only be waved if the student has completed a similar course at another university or where a student has tested out of a prerequisite course.

**Readings:**

Text: **GIS Tutorial** (Workbook for ArcGIS 9.x) by Wilpen Gorr & Kriten Kurland, ISBN 978-1-58948-127-5 The book is required for the course as it contains free ArcGIS software for 6 months and has all homework exercise assignments and files.

**Assignments and Grading:**

- 1. *Homework—exercises using ArcGIS software*.....(45%)
- 2. *GIS lecture topic/ function student presentation* ..... (05%)
- 3. *GIS Project-outline*.....(05%)
- 4. *GIS Project Results- oral presentation*.....(15%)
- 5. *GIS Project Results- written report* .....(30%)

Grading Scale: A	92.51 to 100	C+	77.51 to 79.50
	A- 89.51 to 92.50	C	69.51 to 79.50
	B+ 87.51 to 89.50	D	60 to 69.50
	B 82.51 to 87.50	F	< 60
	B- 79.51 to 82.50		

**Homework- ArcGIS Exercises:**

All homework exercises are from the **GIS Tutorial** workbook

- GIS Tutorial 1: Map documents and data properties
- GIS Tutorial 2: Map design- create choropleth maps, pin maps, & hyperlinks
- GIS Tutorial 3: GIS outputs- Map layout & export file formats
- GIS Tutorial 4: Geodatabases

- GIS Tutorial 5: Import spatial and attribute data
- GIS Tutorial 6: “Heads-up” digitizing to create new data features and edit existing layers
- GIS Tutorial 7: Geocoding
- GIS Tutorial 8: Spatial data processing- data queries, clip, dissolve, & append
- GIS Tutorial 9: Spatial analysis- buffer objects & apportion data

**All Homework assignments are due at the beginning of the next class meeting.  
10% deducted for late submission of homework.**

### **GIS lecture topic- Oral presentation by student**

Each student will be assigned a GIS topic by the instructor. The topic will correspond to the exercise for that week’s lesson. The student will explain and demonstrate how to complete the function or application using ArcGIS. Minimum lecture time of 5 minutes and maximum of 10 minutes. Students will follow the oral presentation criteria as shown in the GIS Topic/ Function grade sheet.

### **GIS Project:**

Each student will explore and determine the topic for their GIS project. Project goals and procedures will be developed by each student. The project will be worked on INDIVIDUALLY. An outline of the project must be submitted to instructor by **October 13, 2008**. The project GIS functionality must be completed in ArcGIS. Oral Project Presentations will be **December 1, 2008**. The written project report will be due on **December 8, 2008**.

Project Outline (due **October 13, 2008**):

State objective(s) of project.

Data layers required with description of spatial and attribute components.

Create a diagram that shows analysis methodology

List GIS functions needed to complete the analysis to reach objectives. The minimum required functions are listed in project requirements- See GIS functions below.

Project Requirements/ Functions:

Project must be completed in ArcGIS and place data in a project folder.

Must acquire data layers from a minimum of 3 sources (NODIS, websites, etc.).

GIS Functions:

Draw a study area using the Editor.

Geocode an attribute database table or create points using x,y coordinates.

Minimum of 3 Attribute SQLs (must include a relational join).

Update a column or calculate values for an attribute field.

Create a thematic map.

Overlay 2 data layers to show at least 1 of following: clip, merge, or dissolve with apportioned data associated.

Minimum of 3 spatial SQLs (select by location).

Create a buffer, then perform a spatial SQL to determine if other data layer objects are within, partly within, intersect, or outside the buffer (only 1 required).

Create presentation quality maps- layouts, save all map documents or workspaces.

Export map from ArcGIS to create jpg, emf or pdf files.

Create a Power Point slide presentation- import .jpg or .emf files; or create an Adobe Acrobat presentation- from pdf files; or create a Word document with imported map images

Oral Presentation (due **December 1, 2008**):

Show Power Point, Word, or Adobe Acrobat presentation.

Slides can be maps, tables, graphs, photographs, and/ or text.

Presentation must 10 to 15 minutes long.

Questions from classmates & instructor to follow each presentation.

Submit Power Point files, jpg, emf &/or pdf files, project folder files to instructor (Burn CD).

Grading guidelines are shown in the Oral Presentation of GIS Capstone Project- Outline and Grade Sheet document.

Written Project Report (due to instructor by **December 8, 2007**):

Must include introduction: state objectives, similar studies or subject matter, data integral for analysis & cite sources, GIS functions/procedures, results, recommendations & conclusion.

Metadata should be included in an appendix (can be abbreviated as in Intro to GIS project).

Report should be 7 to 10 pages of TEXT (not including maps, graphs, metadata) – double spaced font size 12, and 1 inch margins.

Presentation quality maps are of the utmost importance in the final report. Each map should fill as much space as possible of a 8.5” x 11” paper.

Each map will be preceded or followed by text that describes the map. (i.e. map reading, map analysis, and map interpretation.)

Maps must be dispersed throughout the report in a logical manner. Do NOT have all maps back to back- make your report more interesting by distributing your maps through the report.

Be sure to give a detailed description of each GIS function used- objective or why function is used, layers used, and results of the processed files.

**Students with Special Needs:**

Educational access is the provision of classroom accommodations, auxiliary aids and services to ensure equal opportunities for all students regardless of their disability. Any student who feels he or she may need an accommodation based on the impact of a disability should contact the Office of Disability Services at (216)687-2015. The Office is located in UC304. Accommodations need to be requested in advance and will not be granted retroactively.