

**Introduction to Geographic Information Systems (GIS)
UST 434 Spring 2005**

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or by appointment

Objectives:

This course will approach GIS as a tool to provide students with basic technical, analytical, and management skills that can be used in other courses or in the work setting. Focus will be on the principles and concepts of GIS and tools of spatial information analysis that result in recommending fast and efficient solutions to everyday problems.

Optional Readings:

Text: **Geographic Information Systems: An Introduction** by Julie Delaney
Other articles from GIS publications may be assigned throughout the semester.

Assignments and Grading:

1. *Written Tests (3) based on lecture and reading*.....(30%)
2. *Practical Application Tests (3) using MapInfo software*(30%)
3. *GIS Project*.....(30%)
4. *Homework using MapInfo software*.....(10%)

Grading Scale: A	92.51 to 100	C+	77.51 to 79.50
A-	89.51 to 92.50	C	72.51 to 79.50
B+	87.51 to 89.50	C-	69.51 to 72.50
B	82.51 to 87.50	D	60 to 69.50
B-	79.51 to 82.50	F	< 60

MapInfo Laboratory Exercises:

- Introduction to computer mapping in MapInfo for Windows: Views, Menus, Button Pads, Table Characteristics
- Overlaying, TIGER, Cadastral, and Planimetric data
- Scanning, registering orthophotos
- Importing and exporting data from various mediums: DXF, ASCII, & dBase
- Making data meaningful: thematic and dot density mapping
- Geocoding: Linking attribute data to map locations

- Filtering and analyzing data using SQL (structured query language)
- Creating layout windows and producing paper maps through output devices
- Create / edit spatial objects such as polygons, lines, or points
- Spatial Queries; Buffering around spatial objects

Topics to be Covered: *Lecture topic in bold; Assigned reading in ()*

1. Introduction to GIS- terminology and definitions (Read Ch. 1)

Demo/ Lab- Working in the Windows environment and MapInfo file types and characteristics.
 Open existing layers and change their display characteristics; View data in various formats; Use Menu features and "short cut" Button Pads

Data Input

2. Base Maps- Types, Map projections (Ch. 2 & 5)

Demo/ Lab- Overlay TIGER, Cadastral, and Planimetric data; change map projections

3. Digitizing, Scanning, & Registering Orthophotos; (Ch. 3)

Demo/ Lab- Scan a picture, register an orthophoto to a cadastral map

Demo/ Lab- Import DXF, open dBase and ASCII files, create a new MapInfo data table

Written Test 1 and MapInfo Practical Test 1

Data Display

4. Types of Accuracy, Thematic maps; Geocoding (Ch. 4 & handout)

Demo/ Lab- Creating various types of thematic maps

Demo/ Lab- Geocoding by address and centroid of polygon

Data Management

5. Attribute databases, Structured Query Language (SQL) (Ch. 8)

Demo/ Lab- Using SQL for relational joins of tables

6. Raster versus Vector formats; Topology (Ch. 6, 9 & 10)

Demo/ Lab- Producing a finished paper map using a map layout

Demo/ Lab- Create, draw, and edit spatial (map) objects.

Using snap to nodes and move duplicate nodes.

Written Test 2 and MapInfo Practical Test 2

7. GIS Project explanation

Data Manipulation / Analysis

8. GIS Functions and Applications (Ch. 9, 11 & 13)

Demo/ Lab- Selecting spatial objects from a map or browser;

Spatial SQL- simple and complex; Buffering map objects

9. **Metadata** (Ch. 7)

Demo/ Lab- Open Lab: Project

10. **Hardware/ Software Issues: Interagency GIS Cooperation** (Lecture material)

Demo/ Lab- Open Lab: Project

Written Test 3 and MapInfo Practical Test 3

GIS Project:

Students will represent a neighborhood housing corporation (NOLASCO) in the City of Cleveland. Students will conduct a site analysis study to locate the best sites for low cost single family housing in the near west side area of Cleveland. Recommendations will be based on various layers of information such as parcel characteristics, transportation, topography, toxic sites, building footprints, tax, zoning and demographics.

- Data layers will be created or imported and placed in GIS spatial databases.
- Manipulation, analysis, and evaluation of these layers will be determined (using the Auditor's parcel map and/or the TIGER/Line files as the most appropriate base map).
- Attribute databases will be used imported, opened, or created per layer using dBase, ASCII, or ACCESS files.
- Areas best suited for development will be determined based on filtering criteria such as Auditor's parcel characteristics, land banked property, zoning, topography, population effected by proposed changes. This will be achieved through the use of GIS functions such as Structured Query Language, buffering, and spatial SQLs.
- Create maps (location, condition filtered, and thematic) indicating the most desirable area for development based on combined analysis of the integrated layers and student's ingenuity.
- Create output report browsers of the databases that support development recommendations.
- An electronic written report of GIS project results & conclusions will be presented to the instructor.

Students with Special Needs:

Anyone requiring special assistance to take exams or complete assignments must identify themselves to the instructor by the end of the second week of classes. These include accommodations for physical handicaps and learning disabilities.