Cleveland State University  
Geographic Information Systems (GIS) Principles  
UST 485/585 Fall 2015  4 Credit Hours  Mon. 4-5:50 PM

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Office Hours- 3:00 to 4:00 PM Mon or by appointment

Class Website-- go to CSU Blackboard Learn to access class lectures & assignments

Note: The prerequisite for UST 585 is UST 601 or permission of instructor.

Objectives:
The course focuses on the principles of Geographic Information Systems (GIS) as a tool to provide geospatial information analysis and displaying results using industry standard map design and output. Students learn techniques in importing attribute and spatial data; recognize critical components of cartography to design appropriate map output; build attribute and spatial queries in problem solving in spatially related project analysis. Laboratory exercises incorporate the use of GIS software to aid in the analysis of workplace problem situations.

Texts (Required):


Class Evaluation:
1. Tests (2) based on lecture and assigned reading...........................................(U-30%  G-25%)

2. Homework assignments using ArcGIS software ...........................................(U-30%  G-25%)

3. GIS Project.............................................................................................................(30%)

4. Graduate students only- GIS function presentation...........................................(G-10%)

5. Attendance...........................................................................................................(10%)

Note: Attendance is graded as follows: attend 25 to 28 times- 10 points; 22 through 24- 8 points; 18 through 21- 6 points; 14 through 17- 4 points; Less than 14- 0 points.

Grading Scale:  
A  92.51 to 100  C+  77.51 to 79.50  
A- 89.51 to 92.50  C  69.51 to 77.50  
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
ArcGIS Assignments:
Assignments will be based on the GIS Tutorial 1: Basic Workbook, with additional assignments from The GIS 20 Essential Skills, and the Essentials of Geographic Information Systems text. All homework assignments are due the following week prior to the next assignment (10% penalty if late-not accepted after 1 week late).

Topics to be Covered: See course on blackboard for specific dates of assignments.

1. Introduction to maps and the relationship to GIS- terminology and definitions
   Open existing layers and change their display characteristics; View data in various formats (table and map); Use Menu features and the Table of Contents features.

2. Map anatomy
   Map types, map projections, and map abstraction
   Base maps- TIGER, Cadastral, and Planimetric data; create & change map projections

3. Map design and layouts
   Cartographic principles- concepts of good map design (Smart Cart and Color Brewer)

4. Geodatabases
   Definitions and uses

Test 1

5. Data, Information, and where to find them, data input
   Download attribute data from Census Bureau- American Factfinder, Ohio Department of Health, & NEOCANDO websites. Open Excel, dBase and ASCII files into AcGIS

6. Geospatial data management
   Acquisition, management, and quality. Download spatial data (shapefiles) from various sources such as Census Bureau- Data.gov and Cuyahoga County government websites.

7. Thematic maps- data display
   Creating various types of thematic maps

8. Geocoding
   Geocoding by interpolation method (address) and centroid of polygon

9. Attribute queries-
   Using Structured Query Language (SQL) for relational joins of tables and other queries

Test 2

10. Spatial queries and buffers
    Spatial analysis using Structured Query Language (SQL) to determine spatial relationships between data layers. Create a buffer and use SQL to find spatial relationship.
11. **Editing**  
Creating and changing shapes of spatial features

12. **Data Models: Raster and Vector**  
Characteristics and comparisons, analysis

**GIS Project:**

Students will determine their own project based on their interests. The student must submit their proposed project to the instructor for approval by the date of test 2.

The project must include the following functions:
- Spatial & attribute data download from a minimum of 3 websites.
- Open and/or import spatial & attribute data and open spatial data in to ArcGIS.
- Create a graph in Excel using a portion of downloaded data
- Draw a study area using the Editor.
- Geocode an attribute database table or create points using x,y coordinates to create a shapefile.
- Create a minimum of 2 attribute SQLs. One SQL must be a relational join.
- Create a new field. Use update column or calculate values for an attribute field.
- Create 2 (minimum) thematic maps.
- Overlay 2 data layers to show at least 1 of following geoprocessing tools: clip, merge, intersect, dissolve, or union with apportioned data associated.
- Create a minimum of 2 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.
- Export map from ArcGIS to create jpg or emf files.

A report will be created in Word with map images (jpg) inserted. Each map should include a description (map reading, map analysis, and map interpretation). There should be a written introduction that explains the objective of the project. A conclusion with results and recommendations should be made. There should also be a requirements appendix that lists the map or table, etc in which each requirement is found in the report.

All students will also create a power point of the project. **ONLY Graduate students** will present their project to the class. The presentation should be from 6 to 10 minutes long. The student does not need to present all functions that were completed, just the critical components to reach the final outcome.

**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. Accommodations need to be requested in advance and will not be granted retroactively.” Students should notify the instructor as soon as possible if they have been granted an accommodation through the Office of Disability Services.