URP 521: INTERMEDIATE GEOGRAPHIC INORMATION SYSTEMS

Winter 2024
Course Time: Monday@ 6:00p)
Instructor: Lecturer Tony Bedogne (bedognea@umich.edu; abedogne@a2gov.org)

Several advanced GIS techniques are presented to help students deepen their analytical capabilities using spatial data. A major focus of the course will be geospatial workflow design practice, this will enable students to yield a sustainable enterprise and programmatic approach to spatial data decision making. Other topics to be covered include spatial analysis (e.g., raster modeling, interpolating point data, density analysis, and neighborhood statistics). Modules on the introductory visualization of spatial data through 3D modeling and network analysis (e.g., pipeline flows, waterways, facility service areas, and traffic routing). Outputs will be shared using both cartographic and dynamic web outputs.

The course also introduces students to several statistical and computational approaches to quantifying spatial patterns and identifying clusters and outliers in spatial data. The course focuses on applying GIS as a tool for studying urban problems. Students work with examples drawn from local communities. The course is a practicum and a discussion around the selection and design of spatial problem solving techniques through case studies. Students will also complete geoprocessing workflow automations; considering how the introduction of variables to batch processing can be used to influence outputs, these examples can be used to replicate, rank, contrast, and build upon prior inputs.

Learning Goals:

By the end of the term, students will be able to:

- Use Raster datasets to consider urban spatial problems.
- Collect, analyze, and interpret data from a variety of sources commonly used in the profession.
- Automate geoprocesses using model builder and python.
- Generate a digital terrain model is an input into hydrology modeling.
- Apply cost path, weighted overlay, and neighborhood statistical techniques to spatial problems.
- Visualize data distributions using graphs and histograms.
- Compare band statistics of aerial imagery; including change detection and pattern clusters.
- Interpret source code structure using python and R; an introduction to module access, variable definition, capturing an input from a user, and the deployment of geoprocessing using a programmatic approach.

Course Requirements:

Course assignments introduced and completed weekly; documenting in detail one assigned spatial analysis geoprocessing operation; and the design of a geoprocessing workflow automation delivered as a flowchart/verbal presentation as a final project. Lessons depicted with cartographic design; weekly pop quizzes, and one final examination.