Geographic Systems and Analysis
Summer 2016 Syllabus

New York University
Robert F. Wagner Graduate School of Public Service

Instructor
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Office hours by appointment

Schedule
May 24th, 2016 to June 30th, 2016
Tuesday 6-9pm and Wednesday 6-8pm
194 Mercer, Room 304

Course Description
Understanding geographic relationships between people, land use, and resources is fundamental to planning. Urban planners routinely use spatial analysis to inform decision-making. This course will introduce students to Geographic Information Systems (GIS), a tool to analyze and visualize spatial data. The course will emphasize the core functions of GIS: map making, data management, and spatial analysis. Students will learn cartographic best practices, how to find and create spatial data, spatial analysis methodology, and how to approach problem solving from a geographic perspective. Throughout the course, students will build a portfolio of professional quality maps and data visualizations.

Objectives
Students will gain the following skills and abilities:

• An understanding of what GIS is and how GIS is used in planning and other fields
• Fluency in the ESRI ArcGIS interface (the most commonly used GIS software package)
• An understanding of where to find existing GIS data and how to create custom GIS data
• Ability to make professional quality maps
• Expertise in working with and visualizing geographic data
• Ability to solve a “spatial question” using GIS

Course Structure

Prerequisite
There is no prerequisite for this class, but students should be prepared to work extensively with data in various formats, including GIS shapefiles, excel spreadsheets, .zip files, text files, and more. Basic competency in Microsoft Excel is helpful.

Class Format
Most classes will include a lecture introducing a spatial analysis/GIS topic followed by a hands-on lab exercise (see class schedule). Materials for the lab exercises will be posted on the NYU Classes course site in advance of each class. Any remaining class time will be used to work on graded assignments. Tuesday classes include extended lab time.

Academic Integrity
Consulting with classmates, peers, online GIS resources, and NYU Data Services is encouraged.
However, all graded assignments must be individually produced. It is perfectly acceptable for a classmate to help troubleshoot a difficult task but not acceptable to turn in an assignment using output generated by a classmate (such as a shapefile). Students are expected to abide by Wagner’s academic code.

**Graded Assignments**

Graded assignments are an opportunity to build a portfolio of professional quality GIS work. **Late work will NOT be accepted.** More detail about the assignments and grading will be discussed in class.

Each assignment is a stand-alone product and specific analyses cannot be resubmitted for multiple assignments. Focusing on a single topic/theme and using the same core datasets for all the assignments is encouraged!

*Note: Though lab and text exercises are not graded, the skills covered are necessary to complete the graded assignments. Students are responsible for mastering the assigned material.*

**1. Map Portfolio – 25% of grade**  
*Due June 9th, 2016 @ 6pm*  
Create a series of maps that tell a story about a particular neighborhood or place. The graded deliverable is a package of 4 maps.

The Map Portfolio must:
- Adhere to cartographic best practices, e.g. proper map projection
- Include a legend, scale, north arrow, insets, and/or other map elements as appropriate
- Maps must be titled and annotated so they can be read as a standalone product
- At least 3 of the maps must be thematic AND make use of table joins

**2. Spatial Analysis Memo – 25% of grade**  
*Due June 21, 2016 @ 6pm*  
Design and execute an analysis in ArcGIS that addresses a ‘spatial question’. The graded deliverable is a 2-3 page memo detailing the research question, data, analysis methodology, and results. The spatial analysis design should be multistep (include at least 2 geoprocessing tools).

The memo will include:
- A statement of the research question
- Description of the methodology written for a non-technical audience
- Results (tables and maps, as appropriate)
- An appendix with a flow chart of the tools used to perform the analysis

**3. Research Presentation – 50% of grade**  
*Proposal due June 14, 2016; Report and presentation due June 30, 2016 @ 6pm*  
Develop a geographically focused research question or topic and submit a proposal by June 14th. The graded deliverable is a research presentation, technical methodology document, and in-class presentation. The research presentation must include a minimum of 5 maps and utilize at least 3 geoprocessing tools. The research presentation can be oriented around a place or around an issue.
Course Materials

Software
Students wishing to install GIS software on their personal computers can receive a free educational license of ESRI ArcGIS 10.2 from NYU Data Services. Note: ESRI software only runs on Windows operating systems. Many NYU lab computers are equipped with ArcGIS.

Data Storage
Recommended: Bring an external drive or USB flash drive to class (at least 16GB)

Text
*Getting to Know ArcGIS for Desktop*, 3rd edition, by Michael Law and Amy Collins

Optional:
*Mapping It Out*, by Mark Monmonier (great cartography resource)
## Tentative Class Schedule

*(Subject to change)*

<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture Topic</th>
<th>Lab Topic</th>
<th>Text Assignment</th>
<th>Graded Assignment</th>
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</table>
| **Tu** 5/24 | Intro to GIS  
- What is GIS?  
- Spatial data | Explore ArcGIS | Chapters 1-4     |                           |
| **Th** 5/26 | Map Making I  
- Cartography 101  
- Map Projection  
- Feature Selection | Reference Maps  | Chapter 6,9,10  |                           |
| **Tu** 5/31 | Map Making II  
- Table Joins  
- Definition queries  
- Working with attribute tables | Thematic Maps   | Chapter 7, 8, 11, 15, 16a,b |                           |
| **Th** 6/2 | Map Making III  
- Symbolizing geographic data | Thematic Maps   |                 |                           |
| **Tu** 6/7 | Geoprocessing I  
- Single-layer operations (clip, merge)  
- Multi-layer operations (overlay analysis) | Spatial Joins   | Chapter 16c, 18a,b,c | Map Portfolio Due @ 6pm   |
| **Th** 6/9 | Geoprocessing II  
- Measuring distance and other spatial relationships | Proximity Analysis | Chapter 17, 19a,b,c |                           |
| **Tu** 6/14 | Geoprocessing III  
- Multistep analysis  
- Accuracy and precision | Group activity   | Chapters 12 & 13, 18d | Research Presentation Proposal Due |
| **Th** 6/16 | Geocoding | Geocoding | Chapter 14 | Spatial Analysis Memo Due @ 6pm |
| **Tu** 6/21 | Raster Data  
- Map Algebra  
- Interpolation | Interpolation, raster analysis | Chapter 20 |                           |
| **Th** 6/23 | Spatial Stats  
- Geographic distribution  
- Cluster analysis | Geographic distribution tools | |                           |
| **Tu** 6/28 | Course Wrap Up + Presentations | Work on final | |                           |
| **Th** 6/30 | Final Presentations | Research | | Presentation Due |