Geographic Systems and Analysis
Summer 2017 Syllabus

New York University
Wagner Graduate School of Public Service

Instructor
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Office hours by appointment

Schedule
May 25th – June 29th, 2017
Tu: 6pm-9pm & Th: 6pm-8pm
TISC - LC19

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 formal prerequisite for this class, but the course is very data intensive. Students are expected to know basic data management and manipulation.
**Class Format**
Most classes will include a lecture introducing a spatial analysis/GIS topic followed by a lab exercise (see class schedule). Materials for the lab exercises will be posted on the NYU Classes course site in advance of each class. Remaining class time will be used to work on graded assignments or optional text exercises. There is additional lab time on Tuesday evenings from 8pm to 9pm.

**Academic Integrity**
Consulting with classmates, peers, online GIS resources, and NYU Data Services is encouraged. All graded assignments, however, 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. Students are expected to abide by Wagner’s academic code.

**Graded Assignments & Attendance Policy**
Graded assignments are an opportunity to build a portfolio of professional quality GIS work. **Late work will NOT be accepted.** Further assignments instructions and grading rubrics will be posted on NYU Classes.

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!

Below is a summary of the assignments. Make sure to use the assignment instructions posted to NYU Classes.

1. **Map Portfolio – 30% of grade**  
*Due June 6th, 2017 @ 5:55pm*
Create a series of maps that tell a story about a particular neighborhood or place. The graded deliverable is a package of 4 maps and technical documentation. The Map Portfolio must:
   - Adhere to cartographic best practices, e.g. proper map projection and 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 – 30% of grade**  
*Due June 20, 2017 @ 5:55pm*
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 include at least 2 geoprocessing tools that create new attribute information.
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 Memo and Presentation ~30% of grade

*Presentation due June 29, 2017 @ 4pm; Memo due July 2, 2017 @ 11:59pm*

Develop a geographically focused research question or topic. The graded deliverable is a research memo, including technical appendix, and class presentation. The research memo must include a minimum of 3 maps and utilize at least 2 geoprocessing tools. The topic can be oriented around a place or around an issue.

4. Attendance ~10% of grade

Students are required to attend 10 of the 12 classes. There are no additional excused absences (e.g. being out of town, sick) so be sure to plan accordingly. Students must sign the attendance sheet each class to receive credit.

**Course Materials**

**Software**

Students wishing to install GIS software on their personal computers can receive a free educational license of ESRI ArcGIS 10.3 from NYU Data Services. Fill out this form to request a free copy: [http://guides.nyu.edu/appointment](http://guides.nyu.edu/appointment).

Note: ESRI software only runs on Windows operating systems. Many NYU lab computers are equipped with ArcGIS. If you cannot install ArcGIS on your personal computer, you must plan to use NYU lab computers to complete the assignments and labs outside of class time.

**Data Storage**

Recommended: Bring an external drive or USB flash drive to class (at least 64GB)

**Optional Texts:**

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

*Mapping It Out, Mark Monmonier*
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<th>Lecture Topic</th>
<th>Class Activity</th>
<th>Optional Getting to Know ArcGIS Assignments</th>
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<td>5/23/17</td>
<td><strong>Intro to GIS</strong>&lt;br&gt;-What is GIS?&lt;br&gt;-Spatial data</td>
<td>Explore ArcGIS I and II</td>
<td>Text chapters 1-4</td>
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<td>5/25/17</td>
<td><strong>Map Making I</strong>&lt;br&gt;-Cartography 101&lt;br&gt;-Map Projection</td>
<td>Reference Maps Map Projection</td>
<td>Text chapter 6</td>
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<td>5/30/17</td>
<td><strong>Map Making II</strong>&lt;br&gt;-Table Joins&lt;br&gt;-Definition queries&lt;br&gt;-Working with attribute tables</td>
<td>Thematic Maps Data Management</td>
<td>Text chapters 9, 10, 11, 15, 16(a and b)</td>
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<td>6/1/17</td>
<td><strong>Map Making III</strong>&lt;br&gt;-Symbolizing geographic data</td>
<td>Open Lab</td>
<td>Text chapters 7, 8</td>
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<td>6/6/17</td>
<td><strong>Geoprocessing I</strong>&lt;br&gt;-Spatial selection**&lt;br&gt;<strong>[MAP PORTFOLIO DUE BEFORE CLASS]</strong></td>
<td>Overlay Analysis</td>
<td>Text chapters 16c, 18 (a,b,c)</td>
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<td>6/8/17</td>
<td><strong>Geoprocessing II</strong>&lt;br&gt;-Measuring distance and other spatial relationships</td>
<td>Proximity Analysis</td>
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<td><strong>Geoprocessing III</strong>&lt;br&gt;-Multistep analysis&lt;br&gt;-Accuracy and precision</td>
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<td><strong>Geoprocessing III continued, Geocoding</strong></td>
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<td>Text chapter 14</td>
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<td><strong>Raster Data</strong>&lt;br&gt;-Map Algebra&lt;br&gt;-Interpolation</td>
<td>Interpolation, raster analysis</td>
<td>Text chapters 20, 7d</td>
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<td>6/27/17</td>
<td><strong>Spatial Stats + Course Wrap Up</strong>&lt;br&gt;-Geographic distribution&lt;br&gt;-Cluster analysis</td>
<td>Geographic distribution tools</td>
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<td>6/29/17</td>
<td><strong>Final Presentations</strong>&lt;br&gt;<strong>[FINAL PRESENTATION DUE 2HOURS BEFORE CLASS]</strong></td>
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<td>7/2/17</td>
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<td><strong>Final Research Memo Due</strong></td>
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