GTECH 380/722
Analytical and Computer Cartography
Hunter College, CUNY
Department of Geography

Fall 2015
Mondays 5:35PM to 9:15PM

Instructor: Doug Williamson, PhD
Email: Douglas.Williamson@hunter.cuny.edu

Text (REQUIRED):

✓ Additional Readings to be provided in class and electronically.

Supplemental Readings (NOT required):
Selected readings from the following texts may be used, but it is not necessary to purchase these.


Relevant Books (NOT required):


Course Overview:
GTECH 380/722 is designed as an introduction to modern cartographic theory and conventions, but also provides significant introductory hands-on experience in map design using computer software, specifically ESRI's ArcGIS. The majority of topics covered in the course are divided into a lecture and laboratory section. Students are presented with fundamental design theories and principles associated with particular types of maps or related graphic materials in lectures, and then challenged to implement these principles in self guided hands-on exercises utilizing the software.
The course is intended to cover the basic principles of cartography as well as modern techniques which influence map design, presentation, and interpretation processes. Students will develop a series of hard copy maps, charts, and graphics as well as design materials for presentation through digital media. With the exception of the instructor’s lectures, the class will consist primarily of class discussion. All students are encouraged to participate and add to class discussions using knowledge from their own experiences, class readings, and/or additional readings.

A note about technology… while a familiarity with computer technology is important and we will be spending a considerable amount of time using specific software, this is not the focus of the class. As we all know, technology by definition is always changing. However, the principles that lead to good map design remain the constant. This class will emphasize design principles that transcend technology.

Course Objectives:
This course is designed to introduce you to maps and digital mapmaking. You will learn the fundamentals of compiling, designing, and using maps and mapped data. You will also learn the concepts and theory related to cartographic design and digital methods of production. The goal of this class is to teach you how to recognize, appreciate, and incorporate cartographic principles to make effective and esthetically pleasing maps.

Selected Lecture Topics:

- A Brief History of Cartography
- Cartographic Design Fundamentals
- Map Symbology
- Map Typography
- Map Projections, Coordinate Systems, and Scale
- Thematic Map Types
- Color-Use Guidelines
- Mapping Three Dimensional Data
- Digital Graphics
- Geovisualization

Expected Student Outcomes:

- Understand and apply fundamental cartographic design principles.
- Understand principles of color theory and how they affect map symbolization and interpretation.
- Choose appropriate symbols for point, line, and polygon features.
- Understand the effect of scale on generalization and how to improve readability of map features.
- Create balanced and informative layouts.
- Critique maps for improved design skills.
• Understand how various types of numeric and qualitative information is symbolized
• Use spatial and non-spatial attribute data to perform exploratory spatial data analysis, data visualization, and data presentation
• Identify and describe a map purpose and audience.
• Use and integrate presentation media skillfully (e.g. print, electronic).
• Design and produce effective small-scale and large-scale thematic maps.
• Use typography as a design variable skillfully.
• Understand cartographic conventions
• Create custom symbols using GIS software.
• Design feature and type symbolization schemes.
• Select an appropriate projection for a given map purpose.
• Use GIS software to create a 3D terrain representation.
• Produce multiple classifications of the same data set and analytically consider the advantages and disadvantages of each classification.
• Create and use a custom color ramp using GIS software.
• Choose a color scheme that is appropriate for the data characteristics.
• Select an appropriate symbolization strategy for a given data set.
• Devise an appropriate classification scheme for comparing patterns at multiple points in time.
• Select an appropriate visualization strategy for representing and comparing two or more variables.
• Effectively integrate information graphics within a map layout.

Policies:

Attendance
• Attendance is crucial, as I will be covering information in class that is not in the text.
• Attendance will count towards your class participation.

Academic Integrity
Hunter College regards acts of academic dishonesty (e.g., plagiarism, cheating on examinations, obtaining unfair advantage, and falsification of records and official documents) as serious offenses against the values of intellectual honesty. The College is committed to enforcing the CUNY Policy on Academic Integrity and will pursue cases of academic dishonesty according to the Hunter College Academic Integrity Procedures.

Special Accommodations
If you need special accommodations, I encourage you to see me during my office hours or by appointment.

Lab Policies
Read and follow the lab rules. They are located here:
http://geography.hunter.cuny.edu/techsupport/rules.html
Grading:
Evaluation of your performance in this course will be based on both lecture and laboratory components. Assignments will be graded on how well they meet the objectives of the specific assignments and the amount of attention paid to the details of map making. In short, YOUR grade is YOUR choice. If you contribute often to class discussions and put in ‘a little extra effort’ on each assignment you will get an A. If you fail to come to class, miss assignments or turn in substandard work, your grade will suffer. A note on the final project... For this, you will be graded by your peers based on what they have learned throughout the semester as to what Quality in Cartography looks like compared to your final project.

- Exercises 50%
- Final Project 20%
- Map Journal 10%
- Final Exam 10%
- Participation 10%

Final grades will be determined based on the CUNY grading policy that can be found in the online undergraduate (or graduate) catalog available at: http://catalog.hunter.cuny.edu/

1) Exercises:
You will be performing several ‘hands-on’ exercises developed to teach you fundamental cartographic concepts and techniques.

2) Final Project
Create a presentation quality map from a variety of data sources using techniques learned in class

3) Map Journal
Every student is responsible for creating a map journal. This consists of finding maps from any reasonable source (internet, journal, magazine, newspaper, etc.) that illustrates each of the following map types:
Choropleth Maps
Dot Density
Graduated Symbol
Flow Map
Cartograms
Terrain
Isoline/Isopleth

Two examples should be included for each type… a good application and a bad application of the concept. For instance, Minard’s Napoleon’s March is an excellent example of a successful flow map. Place an image of the map (scanned if necessary) in an MS Word document followed by a paragraph or two describing what the map is and how it relates to the topic. Journals will be reviewed twice via BlackBoard. The first time will be 10/30 and should consist of at least 6 entries in the journal. The second time will be 12/04 and should consist of the completed map journal (all 14 entries).
4) **Map Critique** (counts as an additional exercise)
Locate one low quality map and write a formal critique for it, explaining why it fails and what steps could be taken to improve it. Additional details will be provided for this assignment on Blackboard.

**Numbers 1-3 apply to ALL students. Number 4 is for grad students only.**
### Hunter College: GTECH 380/722
#### Sample Map Grading Criteria

<table>
<thead>
<tr>
<th>Category</th>
<th>VERY GOOD (5 points)</th>
<th>GOOD (4 points)</th>
<th>NEEDS IMPROVEMENT (3 points)</th>
<th>POOR (2 points)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Labels-Accuracy and Neatness</strong></td>
<td>All of the appropriate features are labeled and located correctly and can be read easily (legible, not too many fonts).</td>
<td>The majority of the appropriate features are labeled and located correctly and can be read easily (legible, not too many fonts).</td>
<td>Some of the appropriate features are labeled and located correctly and can be read easily (legible, not too many fonts).</td>
<td>Very few of the appropriate features are labeled and located correctly and can be read easily (legible, not too many fonts).</td>
</tr>
<tr>
<td><strong>Scale</strong></td>
<td>All features on map are at the appropriate scale (no jagged or blocky features) and the scale used is clearly indicated on the map.</td>
<td>Most features on map are at the appropriate scale (no jagged or blocky features) and the scale used is clearly indicated on the map.</td>
<td>Many features on map are NOT at the appropriate scale (jagged or blocky features) even though the scale used is clearly indicated on the map.</td>
<td>Many features on map are NOT at the appropriate scale (jagged or blocky features) and/or the scale used is NOT indicated on the map.</td>
</tr>
<tr>
<td><strong>Color</strong></td>
<td>Color use is always appropriate for features (e.g., blue for water) on map, adds emphasis in appropriate places/ways, helps the reader in interpreting the map, and is sufficiently distinct without clashing or cluttering.</td>
<td>Color use is usually appropriate for features (e.g., blue for water) on map, adds emphasis in appropriate places/ways, helps the reader in interpreting the map, and are sufficiently distinct without clashing or cluttering.</td>
<td>Color use is sometimes appropriate for features (e.g., blue for water) on map, adds emphasis in appropriate places/ways, helps the reader in interpreting the map, and is sufficiently distinct without clashing or cluttering.</td>
<td>Color use is never appropriate for features (e.g., blue for water) on map, adds emphasis in appropriate places/ways, helps the reader in interpreting the map, and is sufficiently distinct without clashing or cluttering.</td>
</tr>
<tr>
<td><strong>Metadata/Title/Legend</strong></td>
<td>Map has exceptional documentation, including useful and appropriate title, legend, data sources, map credits, and other explanatory text</td>
<td>Map has some documentation, including useful and appropriate title, legend, data sources, map credits, and other explanatory text</td>
<td>Map has minimal documentation, including useful and appropriate title, legend, data sources, map credits, and other explanatory text</td>
<td>Map has no documentation.</td>
</tr>
<tr>
<td><strong>Cartographic Design</strong></td>
<td>Exhibits highly refined map design (balance, alignment, visual hierarchy, contrast, use of white space) of symbology, labels and other cartographic elements (appropriately sized), including color, text, and composition</td>
<td>Exhibits refined map design (balance, alignment, visual hierarchy, contrast, use of white space) of symbology, labels and other cartographic elements (appropriately sized), including color, text, and composition</td>
<td>Exhibits basic map design (balance, alignment, visual hierarchy, contrast, use of white space) of symbology, labels and other cartographic elements (appropriately sized), including color, text, and composition</td>
<td>Does not exhibit understanding of basic map design</td>
</tr>
<tr>
<td><strong>Overall Visual Impact</strong></td>
<td>The overall purpose of the map and how it is to be read is easily understood and the map is polished and professional in appearance (ready for publication).</td>
<td>The overall purpose of the map and how it is to be read is understood and the map is fairly polished and professional in appearance (ready for publication).</td>
<td>The overall purpose of the map and how it is to be read is NOT understood or the map is NOT polished and professional in appearance (NOT ready for publication).</td>
<td>The overall purpose of the map and how it is to be read is NOT understood AND the map is NOT polished and professional in appearance (NOT ready for publication).</td>
</tr>
</tbody>
</table>

**A note on map grading:** Maps will be based on a scale from 1 to 30. The above sheet will be used in grading map exercises. The maximum value for each category is 5. Therefore, in order to get a perfect score (30), all of the six (6) categories would need a score of five (5).
<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Reading(s)</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>31-Aug</td>
<td>Introduction Map Functions and Cartographic Process</td>
<td>Chapter 1-3</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>7-Sep</td>
<td>NO CLASS (Labor Day)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>10-Sep</td>
<td>Map Types (CartoDB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>14-Sep</td>
<td>Earth Geometry Map Projections and Distortion Generalization Scale Effects on Map Data</td>
<td>Chapters 5,6 &amp; 8</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>21-Sep</td>
<td>Map Design</td>
<td>Chapter 7</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>28-Sep</td>
<td>Symbolization &amp; Visual Variables</td>
<td>Chapters 9</td>
<td>Draft Exercise 1: Due</td>
</tr>
<tr>
<td>6</td>
<td>5-Oct</td>
<td>Typography</td>
<td>Chapter 10</td>
<td>Final Exercise 1: Due</td>
</tr>
<tr>
<td>7</td>
<td>12-Oct</td>
<td>NO CLASS (Columbus Day)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>19-Oct</td>
<td>Color 1</td>
<td>Chapter 11</td>
<td>Draft Exercise 2: Due</td>
</tr>
<tr>
<td>9</td>
<td>26-Oct</td>
<td>Color 2</td>
<td>Handouts</td>
<td>Final Exercise 2: Due</td>
</tr>
<tr>
<td>10</td>
<td>2-Nov</td>
<td>Guest Lecturer: Matt Knutzen NYPL Map Division</td>
<td></td>
<td>Grad Student Map Critique Due</td>
</tr>
<tr>
<td>11</td>
<td>9-Nov</td>
<td>Mapping Enumerated Data &amp; Tables, Graphs and Charts</td>
<td>Handouts</td>
<td>Draft Exercise 3: Due</td>
</tr>
<tr>
<td>12</td>
<td>16-Nov</td>
<td>Mapping Higher Dimensions</td>
<td>Chapter 12</td>
<td>Final Exercise 3: Due</td>
</tr>
<tr>
<td>13</td>
<td>23-Nov</td>
<td>Animated and Interactive Cartography</td>
<td>Handouts</td>
<td>Draft Exercise 4: Due</td>
</tr>
<tr>
<td>14</td>
<td>30-Nov</td>
<td>TBD</td>
<td></td>
<td>Final Exercise 4: Due</td>
</tr>
<tr>
<td>15</td>
<td>7-Dec</td>
<td>Critique of Final Project Drafts</td>
<td>Handouts</td>
<td>Draft Final Project Due</td>
</tr>
<tr>
<td>16</td>
<td>14-Dec</td>
<td>Final Project Display</td>
<td></td>
<td>Final Project Due</td>
</tr>
<tr>
<td>17</td>
<td>21-Dec</td>
<td>Final Exam</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>