

GTECH 380/721
Introduction to GeoVisualization
Hunter College, CUNY
Department of Geography

Fall 2017
Tuesdays 5:35PM to 9:25PM

Instructor: Doug Williamson, PhD

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Text (REQUIRED):

- ✓ Krygier, John and Denis Wood, 2011, *Making Maps: A Visual Guide to Map Design for GIS (2nd edition)*, The Guilford Press
- ✓ 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.

- ✓ Brewer, Cynthia. 2005 *Designing Better Maps*, ESRI Press, Redlands Ca.
- ✓ Brewer, Cynthia. 2007 *Designed Maps*, ESRI Press, Redlands Ca.
- ✓ Peterson, Gretchen N., 2009 “GIS Cartography: A Guide to Effective Map Design”, CRC Press, Taylor Francis.
- ✓ Kraak, Menno-Jan and Ormeling, Ferjan, *Cartography: Visualization of Geospatial Data*, Prentice Hall

Relevant Books (NOT required):

- ✓ Dent, Borden D. 2008. *Cartography: Thematic Map Design*. 6th ed. McGraw Hill: Boston.
- ✓ Slocum, Terry A. 2008. *Thematic Cartography and Visualization*. 3rd ed. Upper Saddle River, NJ: Prentice Hall

Course Overview:

Geographic Visualization (GeoVis) is an important component of Geographic Information Science (GIS). GeoVis is driven by the need to develop new and interesting ways to display an ever-increasing amount of geographic data. Geographic visualization draws from developments in GIScience, scientific visualization, information visualization, as well as from the cognitive sciences. GeoVis is also related to developments in computer hardware and software, and to human-computer interaction research which allows for the design and construction of interactive Geo/cartographic visualization tools. GeoVis tools are utilized to facilitate thinking, problem solving, and decision making in a variety of pressing environmental and societal issues.

Therefore, GTECH 380/721 is designed as an introduction to geovisualization concepts as well as modern cartographic theory and conventions, while providing 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 visualization 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 Symbolology
- Map Typography
- Map Projections, Coordinate Systems, and Scale
- Thematic Map Types
- Color-Use Guidelines
- Mapping Three Dimensional Data
- Geovisualization
- Spatio-temporal mapping
- Interactive mapping
- Interface design and usability
- Web mapping
- Animated mapping

Expected Student Outcomes:

- Design and create a variety of geovisualizations
- Understand and apply fundamental cartographic design principles.
- Critique maps for improved design skills.
- Use spatial and non-spatial attribute data to perform exploratory spatial data analysis, data visualization, and data presentation
- 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>

Hunter College Policy on Sexual Misconduct

In compliance with the CUNY Policy on Sexual Misconduct, Hunter College affirms the prohibition of any sexual misconduct, which includes sexual violence, sexual harassment, and gender-based harassment retaliation against students, employees, or visitors, as well as certain intimate relationship. Students who have experienced any form of sexual violence on or off campus (including CUNY-sponsored trips and events) are entitled to the rights outlined in the Bill of Rights for Hunter College.

- a. Sexual Violence: Students are strongly encouraged to immediately report the incident by calling 911, contacting NYPD Special Victims Division Hotline (646-610-7272) or their local police precinct, or contacting the College's Public Safety Office (212-772-4444)
- b. All Other Forms of Sexual Misconduct: Students are also encouraged to contact the College's Title IX Campus Coordinator, Dean John Rose (jtrose@hunter.cuny.edu or 212-650-3262) or Colleen Barry (colleen.barr7@hunter.cuny.edu or 212-772-4534) and seek complimentary services through the Counseling and Wellness Services Office, Hunter East 1123.

CUNY Policy on Sexual Misconduct Link:

<http://www.cuny.edu/about/administration/offices/la/Policy-on-Sexual-Misconduct-12-1-14-with-links.pdf>

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
- Animated Maps

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

10/25 and should consist of at least 6 entries in the journal. The second time will be 11/29 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.

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Sample Map Grading Criteria

Category	VERY GOOD (5 points)	GOOD (4 points)	NEEDS IMPROVEMENT (3 points)	POOR (2 points)
Labels-Accuracy and Neatness	All of the appropriate features are labeled and located correctly and can be read easily (legible, not too many fonts).	The majority of the appropriate features are labeled and located correctly and can be read easily (legible, not too many fonts).	Some of the appropriate features are labeled and located correctly and can be read easily (legible, not too many fonts)	Very few of the appropriate features are labeled and located correctly and can be read easily (legible, not too many fonts).
Scale	All features on map are at the appropriate scale (no jagged or blocky features) and the scale used is clearly indicated on the map.	Most features on map are at the appropriate scale (no jagged or blocky features) and the scale used is clearly indicated on the map.	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.	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.
Color	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.	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.	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.	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.
Metadata/Title/Legend	Map has exceptional documentation, including useful and appropriate title, legend, data sources, map credits, and other explanatory text	Map has some documentation, including useful and appropriate title, legend, data sources, map credits, and other explanatory text	Map has minimal documentation, including useful and appropriate title, legend, data sources, map credits, and other explanatory text	Map has no documentation.
Cartographic Design	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	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	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	Does not exhibit understanding of basic map design
Overall Visual Impact	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).	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).	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).	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).

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)

Fall 2017		GTECH 380/721: Introduction to Geovisualization		Doug Williamson
		SUBJECT TO CHANGE!!!		
Week	Date	Topic	Reading(s)	Assignment
1	29-Aug	Introduction Map Functions and Cartographic Process	<i>Chapter 1-3</i>	
2	5-Sep	Earth Geometry Map Projections and Distortion Generalization Scale Effects on Map Data	<i>Chapters 5,6 & 8</i>	
3	12-Sep	Map Types, Symbolization & Visual Variables	<i>Chapters 9</i>	Exercise #1 Due
	19-Sep	NO CLASS (Classes Follow a Thursday Schedule)		
4	26-Sep	Map Design	<i>Chapter 7</i>	
5	3-Oct	Fonts, Labeling and Typography	<i>Chapter 10</i>	Exercise #2: Due
6	10-Oct	Use of Color	<i>Chapter 11</i>	Draft Exercise #3: Due
7	17-Oct	Cartograms & Flow maps	<i>Handouts</i>	Final Exercise #3: Due
8	24-Oct	<i>Guest Lecturer: CARTO</i>		Grad Student Map Critique Due
9	31-Oct	Infographics: Mapping Enumerated Data & Tables, Graphs and Charts	<i>Handouts</i>	Draft Exercise #4: Due
10	7-Nov	Relief/Terrain Mapping	<i>Chapter 12</i>	Final Exercise #4: Due
11	14-Nov	Animated and Interactive Cartography (CartoDB)	<i>Handouts</i>	Draft Exercise #5: Due
	21-Nov	NO CLASS (Classes Follow a Friday Schedule)		
12	28-Nov	Dashboards		Final Exercise #5: Due
13	5- Dec	Critique of Final Project Drafts	<i>Handouts</i>	Draft Final Project Due
14	12-Dec	Final Project Presentation		Final Project Due
15	19-Dec	Final Exam		