GTECH 380/721
Introduction to GeoVisualization

Hunter College, CUNY
Department of Geography and Environmental Science
Fall 2023
Mondays 5:30PM to 9:20PM

Instructor: Doug Williamson, PhD
Email: Douglas.Williamson@hunter.cuny.edu
Place of Instruction: Hunter College, Room HN1090
Office Hours: Mondays 4:30pm – 5:30pm

Text (REQUIRED):

- ✓ Krygier, John and Denis Wood, 2016, *Making Maps: A Visual Guide to Map Design for GIS (3rd 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

Technology:
The class will use ESRI ArcGIS Pro exclusively for lab assignments. This requires access to a *Windows based computer*. The software is available on certain campus computers and a copy will be provided to students. Minimum computer specifications can be found **here**.

Course Overview:
Geographic Visualization (GeoViz) is an important component of Geographic Information Science (GIS). GeoViz 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. GeoViz 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. GeoViz 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 Pro. 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.

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 aesthetically 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
- Geovisualization
- 3D Mapping and Visualization
- Spatio-temporal mapping
- Animated mapping

Expected Student Outcomes:

- Design and create a variety of geovisualizations
- Understand and apply fundamental cartographic design principles.
- Critique geovisualizations 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 layout.

Policies:

<u>Attendance</u>
- Attendance is crucial, as I will be covering information in class that is not in the text.
- Attendance will count towards your class participation.

<u>Academic Integrity</u>

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.

<u>Special Accommodations</u>

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

<u>Lab Policies</u>

Read and follow the lab rules. They are located here:
http://geography.hunter.cuny.edu/techsupport/rules.html

<u>Hunter College Policy on Sexual Misconduct</u>

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, on 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) of 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   40%
- Final Project   25%
- Final Exam   10%
- Participation   25%

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) Final Exam
The Final Exam will be a brief take-home essay.

4) Participation
Participation is vital to your success. Much of this will come through peer-review, or critiques; which will require you to provide constructive criticism to your classmates in regards to their assignments.

5) Grad Student Tips and Tricks Presentation (counts as an additional exercise)
Graduate students will be required to make a brief (5-10 minute) presentation explaining at least one (but no more than three) tips to using ArcGIS Pro in the context of Cartography and Geovisualization. Additional details will be provided for this assignment on Blackboard.

Numbers 1 - 4 apply to ALL students. Number 5 is for grad students only.

Hunter College: GTECH 380/721
Sample 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 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 geovisualization grading: The above example could be used in grading 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). If a rubric has less categories, the associated score would be lower.

Fall 2023	GTECH 380/721: Introduction to Geovisualization SUBJECT TO CHANGE!!!		Doug Williamson	
Week	Date	Topic	Reading(s)	Assignment
1	28-Aug	Introduction Map Functions and Cartographic Process	*Chapter 1-3*	
2	4-Sep	NO CLASS (College Closed for Labor Day)		
3	11-Sep	Earth Geometry Map Projections and Distortion Generalization Scale Effects on Map Data	*Chapters 5,6 & 8*	Warm Up Exercise: Due
4	18-Sep	Map Types, Symbolization & Visual Variables	*Chapter 7,9 & 10*	Learning Module #1 on Blackboard Due
5	*25-Sep*	NO CLASS (No Classes Scheduled)		
6	2-Oct	Map Design	*Chapter 11*	Exercise #1 (Parts I & II): Due
7	*9-Oct*	NO CLASS (College Closed)		
7	10-Oct (TUESDAY)	**Class will be Asynchronous (No Class Meeting) History of Cartography**		Complete Learning Module #2 on Blackboard
8	16-Oct	Fonts, Labeling and Typography	*Handouts*	Draft Exercise #2: Due
9	23-Oct	Use of Color	*Chapter 12*	Final Exercise #2: Due
10	30-Oct	Infographics: Mapping Enumerated Data & Tables, Graphs and Charts		
11	6-Nov	Relief/Terrain Mapping		Draft Exercise #3: Due
12	13-Nov	Design, Perception and Storytelling with Maps		Final Exercise #3: Due
13	20-Nov	Layer Blending and other Visual Effects		Draft Exercise #4: Due
14	27-Nov	Tips and Tricks (Grad Student Presentations)		Final Exercise #4: Due
15	4-Dec	Critique of Final Project Drafts		Draft Final Project Due
16	11-Dec	Final Project Presentation		Final Project Due
17	18-Dec	Take Home Final Exam		Final Exam Due