GUS 4000/5073: Geovisualization Fall 2019

General Information

Meets: Tuesday 5:30 pm - 8:00 pm in Gladfelter Hall 336

Instructor: **Xiaojiang Li**
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Office Hours: Tuesday 4:00 pm - 5:00 pm, or by appointment

Information on this course, including general information, lecture slides, and other information is available on Canvas

Course Description

Maps can be powerful devices for communication, but also tools for exploration of relationships among social and physical processes manifesting in space. This course will address this dual purpose of maps as tools for visual communication and visual thinking. We will explore the world of cartography and geographic visualization (geovisualization) from many perspectives and through various methods. We will review theoretical concepts and traditional principles of cartography, such as map layout, typography, and color—subjects which are covered in greater depth in GUS 8065: Cartographic Design. We will learn how to use maps interactively for exploratory analysis and how to build and disseminate interactive maps for others to explore. Topics covered include fundamental concepts for geographic data representation, symbolization, map design, color theory, exploratory spatial data analysis, and tools and techniques in geovisualization. Technology is always changing, but the principles that lead to good map design remain the constant. This class will emphasize both design principles and practical skills.

This course requires time, creativity, and a drive to learn. I will be handing you prescribed labs detailing how to visualize data. Instead of teaching you a single data visualization platform that may not be used, or even around in a few years, I want to give you a flavor of various geovisualization tools and help you to learn how to find, test, and teach new software to yourselves and each other. I believe this will give you valuable experience into how actual research takes place in academia and industry, where tools and standards are constantly changing, and it is not enough to learn one software. Sometimes you will be learning a tool or technology that I am not an expert in, and we will be learning together.

After a 30-60 min lecture at the beginning of each session, the class will consist primarily of discussion and interactive, collaborative lab work and demonstrations, including student-led tutorials and map critiques.

Data visualization and design are ever evolving; it requires creativity and passion to constantly learn and to collaborate with other designers. I am so excited to share my passion and knowledge with you in this fascinating and ever-changing field - welcome to GeoViz!

Course Objective

Upon completion of this course, you will be able to

- Understand the theoretical concepts and methods of cartographic and geographic visualization

- Understand principles of symbolization and which visual variables to use for what purposes
- Understand principles of color theory and how they affect map symbolization and interpretation
- Choose a color scheme that is appropriate for the data characteristics
- Create effective visualizations of geographic data
- Create balanced and informative layouts
- Critique maps for improved design skills
- Use interactive visualization to explore spatial data sets, including linking and brushing
- Develop the ability to apply principles already learned to new projects or situations
- Learn how to gain new knowledge and skills in cartography and geovisualization on your own

During this course, I hope to help you cultivate those skills by grounding you in the principles of design and cartography and giving you the freedom and space to learn tools and techniques you want to learn.

Prerequisites

A previous course in GIS or cartography will be helpful, as will previous exposure to a programming language. A working knowledge basic file management is expected.

Attendance

Every class is important, and attendance is required, which means arriving at the beginning of class (5:30 pm) and not leaving until the end of class (8:00 pm). Attendance is crucial, as I will be covering information in class that is not in the text. Prolonged absence from class will affect your grade, inhibit your understanding of the lecture material, and prevent you from receiving help on the assignments. Attendance will be registered at the end of class through an open book quiz. The final grade for the semester will be lowered by 10% upon the third absence. If you cannot attend class, you must contact me before class.

Equipment and Class Room

The course will be taught in a computer lab (Gladfelter Hall 336) with the necessary software installed. However, if you have access to a laptop, you may find it easier to install the free software and do most of your work on your personal machine.

Some assignments will require lab work outside of the class times. Gladfelter Hall 336 is generally open M-F from 8:30 am - 7:00 pm, and is available to you when other classes are not using the lab. In addition, many other computer labs administered by the College of Liberal Arts (see http://www.temple.edu/cs/labs/index.htm for CLA labs) offer access to the software and data used for the course, including the large drop-in lab located in the lobby of Anderson Hall.

It is the student's responsibility to understand how data and projects are saved, and to manage and back up their own data and assignments. I suggest purchasing a USB port-based data storage device, with a 1 GB capacity or greater.

Structure of the Course

Typically, the first 30-60 minutes or so of each class will be devoted to lecture on the topic of that day. The lecture is intended, as much as possible, to be an interactive and inclusive environment. Please feel free at any time during lecture to ask a question or make a comment. Conversely, you are expected to respond to discussion questions asked in class. You should also be prepared to answer questions about readings or activities. Participation in the discussion is required and goes toward the participation portion of your final grade.

The remainder of each class following the lecture will be devoted to in-class activities. You will work individually or in small groups on assignments, such as the student-led visualization lectures and map critiques.

Graduate-student-led Lecture

After Middle term, each student will present a review of a relevant geovisualization from any source, such as mass media, blog, website, etc. Topics are flexible and range from Uncertainty Visualization to Flow Visualization and Collaborative Geovisualization (see list of special topics).

In class exercise and Homework

Students need to follow the tutorial in the lab and finish the in-class exercise. For each lab, students need finish a homework based on the in-class exercise.

Final Project

You will create two high quality visualization products: a static and a dynamic visualization using a platform or tool of your choice and the principles and techniques you have learned throughout the course. You will present your project on the last day of class, followed by a group discussion. Final presentations should clearly and concisely present the final project, including a brief introduction, research question, study area, data, methods, data sources, results, and conclusion. At the end of the term, you will produce a final report including the visualizations you created and an argument about factors influencing the election outcome.

Late Policy

Assignments that are turned in late will be penalized 10% for each calendar day beyond the due date and time. Assignments will not be accepted more than 7 days after they are due.

Text

The required book for the course is:

> ***Thematic Cartography and Geovisualization, 3rd Edition***
> by Slocum, et al. (Prentice Hall)

This text describes much of the material covered in the course, and more. Additional readings may be assigned and will be posted on Canvas.

Relevant Books (NOT required)

- Brewer, Cynthia. *Designing better Maps: A Guide for GIS users*. Esri Press, 2015.
- Tufte, Edward R. *Envisioning information*. Graphics press, 1990.
- Bertin, Jacques. *Semiology of graphics: diagrams, networks, maps*. 1983.
- Ware, Colin. *Information visualization: perception for design*. Elsevier, 2012.

Grading

Graduate Section		Undergraduate Section	
Student-led lecture	15%	Student-led lecture	20%
Homework	40%	Homework	40%
Final Project	40%	Final Project	30%
Participation	5%	Participation	10%

The following grading system will be used to determine final grades:

100% - 95.00% A	94.99% - 90.00% A-	
89.99% - 87.00% B+	86.99% - 84.00% B	83.99% - 80.00% B-
79.99% - 77.00% C+	76.99% - 74.00% C	73.99% - 70.00% C-
69.99% - 67.00% D+	66.99% - 60.00% D	59.99% - 0.00% F

Classroom Policies and Environment

Classroom Environment
All persons participating in the course should be respectful of other students and the instructor to facilitate a civil learning environment. All persons participating in the course have a right to expect respectful treatment in the classroom.
Cell phones: The use of cell phones is not permitted in class. Please be aware that I may ask you to put phones away if they become distracting.
Email: I encourage you to discuss matters in person as much as possible by asking questions in class or during office hours. Please note that if you email me, allow 24-48 hours for me to get back to you, unless it is a holiday or weekend. In that case, I might not get back to you until the next school day.

Disabilities
This course is open to all students who met the academic requirements for participation. Any student who has a need for accommodation based on the impact of a disability should contact me privately to discuss the specific situation as soon as possible. Contact Disability Resources and Services at 215-204-1280 in 100 Ritter Annex to coordinate reasonable accommodations for students with documented disabilities.

Academic Dishonesty
Students should maintain academic honesty at all times. Students should keep in mind that cheating, fabrication of academic material, and plagiarism are serious offenses, and will not be tolerated in any way, shape, or form. Students should do their own work, and GUS Departmental policy is consistent with the University's policy. Any ***proven incident of plagiarism or dishonesty in test taking will result in an immediate course failure*** as well as the student being referred to the Director of Academic Administration. Please refer to this statement for more information on Temple University's Academic Honesty policy: http://www.temple.edu/pharmacy_qara/plagiarism.htm.

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Statement on Academic Freedom
Freedom to teach and freedom to learn are inseparable facets of academic freedom. The University has adopted a policy on Student and Faculty Academic Rights and Responsibilities (Policy # 03.70.02) which can be accessed through the following link: http://policies.temple.edu/getdoc.asp?policy_no=03.70.02

Course Schedule

This schedule is subject to change as we proceed through the semester, so please check Canvas regularly for any updates.

Week	Date	Lecture Topic	Readings	Activities	Due Dates
1	08/26/19	Course Overview - What is Geovisualization?	Ch. 1		
2	09/02/19	**No Class – Labor Day**			
3	09/09/19	Cartographic Design Fundamentals and GIS in a Nutshell (I)	Ch. 6, 7, 8	Work on Tutorials	
4	09/16/19	Cartographic Design Fundamentals and GIS in a Nutshell (II)	Ch. 6, 7, 8	Work on Tutorials	
5	09/23/19	Map Semiotics, Symbolization	Ch. 5, 17	Work on Tutorials	
6	09/30/19	Data Classification, Choropleth Mapping, and Dasymetric Mapping	Ch. 4, 14, 15	Work on Tutorials	
7	10/07/19	Color Theory: **The end of the rainbow** **MIDTERM**	Ch. 10	Work on Tutorials	
8	10/14/19	Designing Beautiful Maps: Effective Map Design and Layout	Ch. 9, 11, 12, 13	Student-led Lecture Work on Tutorials	
9	10/21/19	Exploratory Spatial Data Analysis, Multivariate Spatial Data Analysis	Ch. 18, 22	Student-led Lecture Work on Tutorials	
10	10/28/19	Web Mapping	TBD	Work on Tutorials	
11	11/04/19	Uncertainty of Geovisualization	Ch. 23	Work on Tutorials	
12	11/11/19	**No Lecture** –Work on Final Project 11/13 GIS Day			
13	11/18/19	Flow Visualization & Spatio-Temporal Visualization	-	Student-led Lecture Work on Tutorials	

14	11/25/19	**Fall Break**	-		
15	12/02/19	Special Topics in Geovisualization: Virtual and Immersive Environments, Collaborative Geovisualization, Future of Geovisualization	-		
16	12/09/19	Last Day of Class: **Final Project Presentations during CAPSTONE event** Final Project Presentations (last day of class), **FINAL EXAM REVIEW**		Student	
17	12/16/19				Final Project Report due