11:573:437 | Spatial Data Visualization and Map Design

Rutgers, the State University of New Jersey
School of Environmental and Biological Sciences
Fall 2023 -- 3 Credits

Meeting Place: **Room 129, Blake Hall**
Meeting Time: **Fridays, 3:50 p.m. – 6:50 p.m.**
Instructor: **Dave Smith**
Office: Room 224, Blake Hall
Email: dave.c.smith@rutgers.edu
Office Hours: See Below
Course Website: CANVAS "MAP DESIGN (FALL 2023)"
Textbook: *Designing Better Maps: A Guide for GIS Users* by Cynthia A. Brewer (ISBN-13: 978-1589484405)
Prerequisites: Fundamentals of Environmental Geomatics Lab (11:573:233) or equivalent. ***Students should have basic knowledge and experience with ArcGIS before taking this course***.

Learning Objectives:

1. Understand and apply the basic principles of the visual representation of spatial data such as symbolization, classification, and generalization.
2. Develop and apply technical skills required for computerized mapmaking using ArcGIS and Adobe Illustrator.
3. Develop and apply skills for clear visual communication of spatial information through mapping, such as appropriate color selection, development of strong visual hierarchy, and designing map products within specified formatting constraints.
4. Develop and apply a strong aesthetic foundation for map design through practice, analysis, and critique.

Course Description:

This course introduces students to the fundamental concepts of cartography: the design and construction of maps. By the end of this course, students should be able to design effective and aesthetically sophisticated maps. They should also have the ability to interpret and critically evaluate the many maps that they encounter as they continue their academic and professional careers.

Course Structure:

Class sessions will consist of a brief peer critique of one student's map from the previous week, followed by a short lecture and a hands-on tutorial introducing relevant techniques. After this, students will be presented with a mapping exercise to work on outside of class. Students will also apply what they have learned throughout the semester to develop a final mapping project.

One-on-One Meetings:

In addition to regular class meetings, each week, students will schedule a 15-minute one-on-one meeting with the course instructor to discuss and receive feedback on their most recent assignment.

Projects and Assignments:

Mapping Exercises: each week, students will be presented with an exercise that addresses a different topic in map design or data visualization. These exercises will be completed outside of class time.

Critiques: Each week, one or two students will volunteer to have their most recent map critiqued by the class. All students will be expected to volunteer to have at least one map critiqued during the semester, and all students will be expected to participate in critiques of their classmates' work.

Map Analysis: Every two weeks, each student will be tasked with finding a map that they find to be particularly well designed and to write a short critique analyzing the cartographic decisions that contribute to the map's effectiveness.

Final Project: Each student will design a fully developed large-format map or map series that communicates some phenomenon or phenomena of interest to the student.

Grading:

Composition of Final Grade:	
Mapping Exercises	50%
Map Analyses	15%
Critique Participation	10%
Final Project	25%
Attendance:	See Below

Numerical Ranges for Letter Grades:			
A:	90-100%		
B:	80-86%	B+:	87-89%
C:	70-76%	C+:	77-79%
D:	60-69%		
F:	under 60%		

Late Submission Policy:

Students are responsible for submitting all work on time. The material presented in this course is cumulative, and feedback is essential to improving**. *Any work submitted late will receive a 10% grade deduction***. In addition, ***no specific feedback will be provided for work submitted more than one week late***.

Attendance Policy:

More than two unexcused absences will result in a 10% reduction in your final grade. Each additional unexcused absence will result in a further 10% reduction in your final grade.

Absences may be excused in cases of illness—***if you're sick, stay home***—family emergency, or organized professional development events (*e.g.,* conferences). In such cases, inform your instructor in writing within seven days of returning to campus.

Academic Integrity Policy:

Students will be held to the University's Policy on Academic Integrity, which can be found at: *http://academicintegrity.rutgers.edu/*

Plagiarism in any form is not accepted in this course. Cartography is a field where we often learn best from the work of others. There is a good chance that someone has already found a solution to a problem you are struggling with, or that you will find a map that inspires you think differently about how to approach one that you are designing. While it is acceptable—and even encouraged—to incorporate some of those ideas into your own work, the core of what you present in any map should always be your own work. In order to avoid issues of plagiarism, always consider the following:

- Imitating the overall style or layout of another cartographer's work is not acceptable. While this can be something of a gray area in terms of plagiarism, *it should still be avoided at all costs*.
- Graphical elements (logos, icons, diagrams, *etc.*) that were created by someone else should never be included in your own work—with very few specific exceptions.
- The use of photographs or other imagery that were created by someone else should be avoided in most cases. If used, *full citations* should be provided for those images.

If you have any questions about whether a design decision you've made or an image you've used constitutes plagiarism, feel free to talk to me about your concern.

Use of the Computer Lab:

While working in the lab, standard computer lab rules and common sense apply:

- No food or open drinks are allowed in the lab.
- Do not leave any logged in computers unattended.
- Clean up your desk before leaving.
- Be respectful of others working in the lab.
- Do not attempt to install any software on any computer in the lab.
- Report any malfunctioning computers to your instructor as soon as possible.

Course Schedule:

Week 1 (September 8): Introduction
Assignment: Adobe Illustrator Video Tutorial (Due September 15)

Week 2 (September 15): Graphics Software and Map Layout
Assignments: Preliminary Layout Mock-ups (Due September 22)
Map Analysis 1 (Due September 29)
Readings: Brewer, Chapter 1 *"Planning Maps"*
Brewer, Chapter 3 *"Explaining Maps"*

Week 4 (September 22): Labeling
Assignments: Glen Helen Map Labeling (Due September 29)
Reading: Brewer, Chapter 6 *"Labeling Maps"*

Week 3 (September 29): Typography
Assignment: Glen Helen Map Layout with Descriptive Text (Due October 6)
Map Analysis 2 (Due October 13)
Reading: Brewer, Chapter 5 *"Type Basics"*

Week 5 (October 3): Projections, Coordinates, and Scale
Assignment: Long-Billed Curlew Migration Maps (Due October 20)
Readings: Kimmerling, Chapter 2 *"Map Scale"*
Kimmerling, Chapter 3 *"Map Projections"*

Week 6 (October 13): Map Series (Online Lecture Only)
Assignment: Final Project Preliminary Ideas (Due October 20)
Map Analysis 3 (Due October 27)
Reading: N/A

Week 7 (October 20): Thematic Mapping of Categorical Data
Assignments: Hurricane Preparedness Map (Due October 27)
Reading: Brewer, Chapter 9 *"Customizing Symbols"*
Rost, *"How to pick more beautiful colors for your data visualizations*"
Video: Huffman, *"Mapping in Full Monochrome"*

Week 8 (October 27): Mapping Statistical Data I: The Choropleth Map
Assignment: Mapping Poverty in New Jersey (Due November 3)
Readings: Foster *"Statistical Mapping (Enumeration, Normalization, Classification)"*
Brewer, Chapter 8 *"Color on Maps"*
Optional Reading: Brewer and Pickle, *"Evaluation of Methods for Classifying Epidemiological Data on Choropleth Maps in Series"*

Week 9 (November 3): Mapping Statistical Data II: Other Methods
Assignments: Design Iteration (Due November 10)
Map Analysis 4 (Due November 17)
Reading: TBA
Optional Reading: Quinnan, et al. "*Examining Implicit Discretization in Spectral Schemes*"

Week 10 (November 10): Mapping Terrain Data
--FINAL PROJECT PROPOSAL DUE--
Assignment: Whiskeytown-Shasta-Trinity Recreation Area Terrain Representation (Due November 17)
Reading: Imhoff, Chapter 5 *"The Problem and Its Characteristics"*
Optional Reading: Bell, *"Drawing Hillshade: A tutorial (with time lapse videos)"*

Week 10 (November 11): Reference Maps
Assignments: Whiskeytown-Shasta-Trinity Recreation Area Trail Map (Due December 1)
Map Analysis 5 (Due December 1)
Reading: Brewer, Chapter 2 *"Basemap Basics"* and TBA

Week 12 (November 21): NO CLASS

Week 13 (December 1): In-Class Project Work
Optional Reading: Nelson, *"20 Unrequested Map Tips"*

Week 14 (December 8): Final Project Draft Pin-Up
--FINAL PROJECT DRAFT DUE--
Optional Video: Leroux and Daniel, *"Imprimatur: Printing Maps in Today's Digital World"*

Finals Week (TBD): Final Project Critique
Optional Reading: Edney, Chapter 2 *"Seeing, and Seeing Past, the Ideal"*