

## GEOGRAPH 493A/693A

# Cartography and Geovisualization

### Course Information

**Term:** Fall 2024  
**Credits:** 3.0  
**Days & Times:** TuTh 10:00AM – 11:15AM  
**Location:** Amherst Holdsworth 302 or  
MIC School of Design Rm 6  
or Zoom: [https://umass-  
amherst.zoom.us/j/99004338101](https://umass-amherst.zoom.us/j/99004338101)

### Instructor

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**Virtual Office:** Zoom: [https://umass-  
amherst.zoom.us/my/hzhang](https://umass-amherst.zoom.us/my/hzhang)  
**Office:** TuTh 11:30AM – 12:00PM  
**Hours:** or by appointment at  
<https://cal.com/hzhang>

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### Course Website

**Canvas:** <https://umamherst.instructure.com/courses/23960>

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### Course Description

Students in Cartography and Geovisualization will understand and implement principles of good design in cartography along with understanding the human vision and how it influences perception and cognition. The course will also cover the scope of contemporary thematic cartography and web mapping. Students will gain hands-on experience in designing and improving web-based maps.

### Course Objectives

Course readings, lectures, discussions, in-class activities, and assignments are designed to help you to:

- apply the fundamentals of cartography for designing better maps
- practice GIS tools to improve the visual quality of cartographic products
- practice various map types through independent design and exploration

### Required Textbook

Slocum, T. A., McMaster, R. B., Kessler, F. C., & Howard, H. H. (2023). *Thematic cartography and geovisualization (4<sup>th</sup> ed.)*. CRC Press.

### Additional Readings

If you are new to GIS and would like to have a fundamental book, check these two:

Clarke, K. C. (1997). *Getting started with geographic information systems (5<sup>th</sup> ed.)*. Pearson Prentice Hall.

Chang, K. T. (2015). *Introduction to geographic information systems (8<sup>th</sup> ed.)*. McGraw-Hill.

Dr. Cynthia Brewer's book is a great source for map designers:

Brewer, C. (2024). *Designing Better Maps: A Guide for GIS Users (3<sup>rd</sup> ed.)*. ESRI Press.

How Maps are Seen is a great book to understand human vision, cognition, and relation to cartography:

MacEachren, A. M. (2004). *How maps work: representation, visualization, and design*. Guilford Press.

QGIS opens up exciting new possibilities and you can find lots of recipes in the following book:

Graser, A., & Peterson, G. N. (2018). *QGIS map design (2<sup>nd</sup> ed.)*. Locate Press.

Finally, Edward R. Tufte's *The Visual Display of Quantitative Information* is a must-have classic reference if your heart stays with map design from this course forward.

Tufte, E. R. (1997). *The visual display of quantitative information (2<sup>nd</sup> ed.)*. Graphics press.

### Tentative Course Schedule

Week	Topic(s)	Assignments
1	Introductions	
2	Thematic cartography and information graphics	
3	Cognitive issues in cartography	Lab 1
4	Coordinate systems and projections	
5	Spatial data and scale	Lab 2
6	Choropleth and bivariate maps and classification	Lab 3
7	Map types and data types	
8	Principles of map design and SDSS 2024	Visual essay
9	Dasymetric and isarithmic mapping	
10	Flow maps and map animation	Design portfolio
11	Visual analytics and data uncertainty	
12	Web-based cartography	Lab 4
13	Thanksgiving recess	
14	Applications in geovisualization	
15	Project presentation	

## Course Assessments

Your grade in this course will be based on performance on lab assignments, a visual essay concerning map design, a portfolio showcasing your cartographic and geovisualization skills, and discussion and symposium participation.

1. **Lab Assignments** **40%**  
The lab assignments will require you to engage in a variety of map making activities. Each assignment is designed to challenge your software skills and enhance your understanding of the course content.
2. **Visual Essay** **20%**  
Throughout the semester, we will conduct several cartographic critiques. For this visual essay assignment, you will collect a selection of maps, discuss what you liked or disliked about their designs, and suggest potential improvements.
3. **Symposium Participation** **2%**  
[The 5<sup>th</sup> Spatial Data Science Symposium](#) (SDSS 2024, Oct. 23-24) explore how incorporating spatial-temporal thinking into data science enhances research across various disciplines. Attending and reflecting on the symposium will help you explore trending topics in cartography and GIS that are not necessarily covered in this course.
4. **Discussion** **8%**  
The discussion board on Canvas will cover concepts and topics related to cartography and geovisualization. It is designed to help you review material, stay on track, and inspire one another.
5. **Design Portfolio** **30%**  
In the latter part of the course, you will create a themed map design portfolio. You may either publish your maps online and provide a URL for distribution or submit it as a PDF if it's a collection of static visualizations. You will also have the opportunity to present your portfolio to the class in a brief presentation.
  - a. Presentation 10%
  - b. Portfolio 20%

## Grading Scale

Letter Grade	Grade Point	Percentage	Grad Only
A	4.0	93-100	93-100
A-	3.7	90-92	90-92
B+	3.3	87-89	87-89
B	3.0	83-86	83-86
B-	2.7	80-82	80-82

**Please note that a grade of D- is not valid.**

*\*Graduate students may not receive a grade of C-, D+, or D*

C+	2.3	77-79	77-79
C	2.0	73-76	73-76
C-*	1.7	70-72	-
D+*	1.3	67-69	-
D*	1.0	63-66	-
F	0.0	0-62	0-72

### **Class Attendance**

Students are required to attend all regularly scheduled classes at the university for which they are registered. If you are unable to attend a class, you must inform the instructor in advance or, if that is not possible, immediately after the absence. This notification is mandatory to be considered for make-up work.

### **Late Policy**

Assignments are due by the posted date on Canvas, and adherence to deadlines is mandatory. A late penalty of 10% per 24-hour period will be applied, up to 96 hours after the due date. After this 96-hour period, missed work may be submitted for partial credit, with a maximum of 60%, until the end of classes (**Dec. 10, 2024 at 11:59 PM**). Failure to submit an assignment will result in a grade of 0.

*How to avoid late penalties:* If you anticipate being unable to complete an assignment by the deadline, you must notify me via email at least one week in advance to arrange an alternative plan. Should an unforeseen circumstance arise, you are required to request an extension no later than 24 hours before the assignment is due.

### **Email Policy**

Students are required to use their university-associated email accounts when contacting the instructor or teaching assistants. Emails from personal accounts (such as @yahoo or @gmail) that lack proper forwarding information will *not* be acknowledged. You will receive regular emails from the course listserv regarding scheduling and important events, and it is your responsibility to monitor your university email account regularly. Additionally, be aware that federal privacy law (FERPA) prohibits the discussion of grades via email.

### **Tips for Successful Learning**

Plan ahead by marking assessment due dates on your personal calendar and setting aside dedicated time to work on them. For a 3-credit graduate course, you should allocate 6-9 hours per week outside of class for reading and assessments. Begin working on assignments early to allow time for breaks, giving your brain a chance to process the material—a technique known as

"distributed learning," which is proven to be more effective than cramming. Take short physical breaks every half hour to stay focused.

When tackling problems, refer back to the textbook for similar concepts, especially if the assignment includes exercises from the book.

Finally, address any technical issues promptly. While the instructor may assist with some problems, you may need to contact IT or seek external computer repair services for others.

### **Academic Honesty Policy**

Since the integrity of the academic enterprise of any institution of higher education requires honesty in scholarship and research, academic honesty is required of all students at the University of Massachusetts Amherst. Academic dishonesty is prohibited in all programs of the University. Academic dishonesty includes but is not limited to: cheating, fabrication, plagiarism, and facilitating dishonesty. Appropriate sanctions may be imposed on any student who has committed an act of academic dishonesty. Instructors should take reasonable steps to address academic misconduct. Any person who has reason to believe that a student has committed academic dishonesty should bring such information to the attention of the appropriate course instructor as soon as possible. Instances of academic dishonesty not related to a specific course should be brought to the attention of the appropriate department Head or Chair. Since students are expected to be familiar with this policy and the commonly accepted standards of academic integrity, ignorance of such standards is not normally sufficient evidence of lack of intent ([http://www.umass.edu/dean\\_students/codeofconduct/acadhonesty/](http://www.umass.edu/dean_students/codeofconduct/acadhonesty/)).

### **Accommodations Statement**

The University of Massachusetts Amherst is committed to providing an equal educational opportunity for all students. If you have a documented physical, psychological, or learning disability on file with Disability Services (DS), you may be eligible for reasonable academic accommodations to help you succeed in this course. If you have a documented disability that requires an accommodation, please notify me within the first two weeks of the semester so that we may make appropriate arrangements. For further information, please visit Disability Services (<https://www.umass.edu/disability/>).

### **Title IX Statement**

In accordance with Title IX of the Education Amendments of 1972 that prohibits gender-based discrimination in educational settings that receive federal funds, the University of Massachusetts Amherst is committed to providing a safe learning environment for all students, free from all forms of discrimination, including sexual assault, sexual harassment, domestic violence, dating violence, stalking, and retaliation. This includes interactions in person or online through digital platforms and social media. Title IX also protects against discrimination

on the basis of pregnancy, childbirth, false pregnancy, miscarriage, abortion, or related conditions, including recovery. There are resources here on campus to support you. A summary of the available Title IX resources (confidential and non-confidential) can be found at the following link: <https://www.umass.edu/titleix/resources>. You do not need to make a formal report to access them. If you need immediate support, you are not alone. Free and confidential support is available 24 hours a day / 7 days a week / 365 days a year at the SASA Hotline 413-545-0800.