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GEOG 248: Cartography and Spatial Data Visualization

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Summary

Welcome to **GEOG 248: Cartography and Spatial Data Visualization**! You are probably here because you want to make good-looking maps. This course provides a toolkit for doing that. It also introduces key concepts in thinking critically about maps as social objects and considering the work that maps—especially good-looking ones—do in the world. As geographers and cartographers, you have a lot of obligations to the data you map and to the audiences who encounter your work. It's incumbent on you to represent the data as faithfully as possible; it's an expression of care to your audience that you make those representations legible through cartographic best practice.

Maps are a really powerful type of media. They distill complex geographical processes, statistical relationships, and narrative moments into a single scene (or series of scenes). In doing so, maps make arguments. They argue through visual conventions that convey ideas, concepts, and spatial relationships. After this class, you'll be able to employ those conventions, understand and speak the graphic language of maps, and make maps that look good. Because good-looking maps tend to be more convincing, this class will help you make more compelling arguments. But that power comes with great responsibility; after all, a better looking map/argument doesn't necessarily mean a better map/argument.

Learning objectives

This course is designed to teach you:

1. How maps operate as representational scientific documents *and* as agents of geographical and social change
2. Cartographic literacy and map comprehension
3. Cartographic best principles for representing spatial data
4. The application of those principles in industry-standard software
5. Responsible, intentional, accessible, and ethical cartographic design

Instructor

My name is Ian and I'm excited to make maps with you this semester. Before UR, I taught at Tufts University and worked as Associate Curator for the [Boston Public Library's map center](#). My research is concerned with how digital real estate technologies impact housing in the United States. I also play ultimate frisbee, enjoy climbing and biking, write creative nonfiction, and recently joined a sea shanty choir.

Office hours

Come to office hours! They are a great way to connect, troubleshoot tech issues, ask questions about labs and lectures, and receive feedback on your work. You can book a specific time to visit office hours [through YouCanBookMe](#), or you can just pop in unannounced on a first-come, first-served basis. I'm also happy to chat over email or Zoom. Please just allow 24 hours for email replies. Unless otherwise noted, my office hours will follow this schedule:

Table 1: Ian's office hours

	Monday	Tuesday	Wednesday	Thursday	Friday
Time	-	-	-	11-12pm	10-11am
Location	-	-	-	313 INTC	300 INTC

If none of these times work, reach out to me and we can find another time to meet.

Community expectations

By virtue of meeting nearly every week for the next few months, we constitute a community—and like any community, we have a few obligations to one another. My tolerance for intol-

erance is zero, and I expect everyone to share that principle. I will always strive to create a classroom environment that is welcoming, respectful, and celebratory of our differences in race, class, color, language, sexuality, gender expression, citizenship, ability, and religion. Being empathetic about one another's experiences forms the basis of our shared goal of learning about geography and cartography. After all, our personal experiences of space and place are always intertwined with the maps we make and the conversations that we have in class. Let's cultivate a supportive geospatial community within GEOG 248.

My commitments

As your instructor, I'm mainly responsible for making sure you achieve the **learning objectives** described above. To that end, I will do my best to:

- Respond to inquiries within a business day (e.g., 24 hours M-F)
- Return grades in about a week from submission of the assignment
- Post lecture slides the day we meet for class
- Clearly communicate my expectations for your work on an assignment-by-assignment basis

Also, I do not use plagiarism detection software like SafeAssign, which I explain in my **AI policy**.

Readings

There is no required textbook for this class.

Instead, throughout the semester, you'll encounter two kinds of readings: *standard readings* (e.g., journal articles, book chapters, and blog posts), and *map readings*. These will appear as part of . Any assigned readings will be made available through our course site, although in some cases, you'll need to use UR's library subscriptions to access articles or papers. Readings will sometimes be blended into your other course assignments.

Accessing the software

We'll make maps using ArcGIS Pro. You should all already be hip to this software. It is only available on Windows operating systems. There are three ways to access it:

- Use computers in the SAL (easiest)
- Download it on your personal computer (Windows only)
- Access via RDP (kind of complicated, but allows you to work from your own computer without installing ArcGIS Pro)

Follow these instructions for more details on accessing ArcGIS Pro.

After a certain point in the semester, you'll stop composing maps in ArcGIS Pro and start exporting your data for layout and composition in Adobe Illustrator. This is a common workflow among practicing, professional cartographers. Illustrator is **only available in the SAL**.

Course structure

This course is divided into three sections. The first part of the semester focuses on **concepts**. Many of them should be familiar but we will consider each one more explicitly from the angle of cartographic design. After fall break, we turn to **features**, focusing on how to map specific parts of the earth (like rivers, mountains, and so on). In the final few weeks, we explore **topics**, including narrative and qualitative mapping.

Grading

This course adheres to the standard University rules around **credit and GPA** and **grading policies**.

GEOG 248 follows a 300-point scale, normalized to the ranges below, with decimal points rounded up to the nearest tenth (e.g., a final grade of 89.94 = B+, while a final grade of 89.95 = A-):

Table 2: GEOG 248 grading scale

Letter grade	Ranges
A	A+ = 100-97; A = 96-94; A- = 93-90
B	B+ = 89-87; B = 86-84; B- = 83-80
C	C+ = 79-77; C = 76-74; C- = 73-70
D	D+ = 69-67; D = 66-64; D- = 63-60
F	< 60

Attendance

You have to show up to succeed in this class. I don't track or grade your attendance, but if attendance becomes an issue, we'll need to talk (in extreme cases, I follow the **University's attendance policy**).

Assignments

The coursework includes a variety of mapping activities. These assignments build knowledge and skills that students will use in their final project: a collaborative, class-wide digital exhibition.

The bulk of your everyday work will consist of skill-building activities, labs, and cartography challenges:

- 10 mapping activities
- 3 labs
- 5 cartography challenges

Those skills are assessed and/or culminate in three larger assignments:

- 1 curatorial reflection
- 1 final map project
- 1 collaborative digital exhibition

In general, I'll publish assignments on Tuesday before we meet for class, and those assignments will be due the following Tuesday at 11:59pm.

Table 3: Breakdown of assignments, at a glance

Assignment category	Number of assignments	Total points	Total % of grade
Mapping activities	10	30	10
Labs	3	45	15
Challenges	5	75	25
Curatorial reflection	1	45	15
Final map project	1	60	20
Digital exhibition	1	45	15

Mapping activities

Mapping activities are bite-sized instructional assignments that should not take more than 30-60 minutes to complete. They give you some cartographic skill reps, but they also proxy your in-class participation (you'll typically be able to knock them out within the class period they are assigned).

Labs

Throughout the semester, students will be assigned three labs which explore theories, concepts, and methods in greater depth. Labs weave together methods and concepts in a software application, usually ArcGIS Pro or Adobe Illustrator, and they typically include step-by-step instructions for answering questions and/or producing a map.

Cartography challenges

Cartography challenges allow students to respond creatively to a mapping prompt. Five will be assigned throughout the term. Especially for students who are interested in careers at the intersection of design, geography, and cartography, your responses to these challenges could make nice portfolio pieces later on.

Curatorial reflection

In the first half of the semester, you will identify two maps that have something substantive in common and write a short (~500 words) reflection about their cartographic efficacy. I'm flexible on how you define "something substantive in common," and I'm also generally flexible on how you define "map," although I do ask that the maps you choose are *still* (e.g., not digitally interactive). Reflections will address the following:

1. How the maps are related to one another; e.g., they are both about housing, they both use the same methods, they both depict the same place, they are both located on UR's campus
2. Contrasts between the two maps
3. How each map employs (or ignores) cartographic best practices
4. What argument, either implicitly or explicitly, the maps are making
5. How each map's design supports (or fails to support) its arguments through design choices

Additionally, you must incorporate **at least 5** specific class concepts into your reflection (e.g., visual hierarchy, typography, color theory). When the curatorial reflection is assigned, I'll include a fuller list of topics/concepts that you can use as a starting point when thinking about the maps you select for this reflection. The purpose of this essay-style assignment is to stand in for a midterm examination.

Final map project

A final map project is the cornerstone assignment of GEOG 248. Focusing on a topic within their area of research/scholarly interest, students will use geospatial data to tell a place-based story through a thoughtfully-designed map. In addition to adhering to general prin-

ciples of cartographic design, final map projects must reflect some kind of quantitative or qualitative analysis. Very short (~250 word) write-ups will accompany the submission of the final maps.

Students will use the geographical keywords below to guide their selection of a topic. These keywords will factor into the organization of the digital exhibition:

Table 4: Some geographical keywords			
Environments	Concepts	Processes	Representations
Landscape	Place/belonging	Bordering	Figure-ground
Earth system	Region	Heterogeneity	Projections
Watershed	Gradient	Connectivity	Colors
Sustainability	Scale	Narrative	Maps as art
Urban systems	Power	Justice	Lettering

Note that you must submit a final map project to receive a passing grade.

Digital exhibition

In the final weeks of the semester, using a totally free, museum-grade software called **Quire**, students will work together to develop a digital exhibition based on final map projects. Starting around Week 11, students will self-sort into the following roles, determining which part of the digital exhibition they will contribute their talents:

- Metadata librarians (~2): Manage and compose bibliographic and image metadata for the exhibition. Skills = attention to detail, text editing, file management
- Graphic designers (~2): Identify a graphic identity for the digital exhibition, especially colors and fonts. Skills = eye for design, strong sense of visual hierarchy
- Curatorial reviewers (~2): Develop the exhibition's thematic strands by sorting projects into clusters and drafting a short introductory statement
- Site architects (~2): Under Ian's close supervision, architect the codebase for the digital exhibition

In lieu of a final exam, we'll meet during our exam block to for a digital exhibition launch. **The exam block for this course is Wednesday, December 16 from 9am-12pm.** Unless otherwise stated, we'll meet in the normal classroom.

Timely submission of work

I expect all work to be submitted on time and I am confident that we can all proactively manage our time to meet those shared deadlines together. In GEOG 248, material is cumulative

and concepts stack—the second week builds on stuff from the first week, the third week on the second week, and so on. Due dates keep everyone on pace, and the timely submission of work allows me to provide you with timely feedback (and grades!).

This is especially important for the final project, which is associated with multiple assignments over the course of the semester, including the digital exhibition, which will require students to collaborate with one another on time-sensitive benchmarks.

Of course, I also understand that things don't always go according to plan. I provide these policies as release valves for any stumbling blocks you may encounter this term:

1. **Late passes.** Everyone will start the semester with three late passes. You can use these to submit a lab or activity up to 48 hours late—no penalty, no questions asked. I'll keep track of these, so just email me when you want to use a late pass (or if you want to know how many late passes you have left). Late passes cannot be combined for the same assignment. Also: for each late pass you retain at the end of the semester, I'll add 1 point (out of 300 points) to your final grade. Doesn't sound like a lot, but 3 free points is a 1% bump to your final grade.
2. **Late work.** You can still submit late work without late passes, but I apply a 10% penalty for each business day the assignment was submitted late. Assignments submitted more than four business days late won't be accepted at all. For extenuating circumstances, please write to me as soon as possible to arrange an alternative submission schedule, which I offer at my discretion.
3. **Extra credit.** There will be opportunities for extra credit throughout the semester.

Note that the final project and digital exhibition must be submitted on time and are exempt from late passes/late submission.

Use of probabilistic automation

Short version

I don't use software like **SafeAssign**. I ask that you don't use language models like ChatGPT, Claude, etc. to do the following:

- Summarize or annotate readings
- Conceptualize final projects
- Produce maps
- Answer lab questions

Long version

First off, I don't have an AI policy because I think "AI" is a kind of superficial moniker. Instead, I use terms like **probabilistic automation**, which more specifically describe the kinds

of text and image extrusion that you can do with tools like ChatGPT or Claude. So, I don't have an AI policy, but I do have a probabilistic automation (PA) policy.

The companies who make software for probabilistic automation promise that their tools will speed up workflows, make processes faster, save time, and reduce friction. As with any technology—animal traps, pencils, motor vehicles, the internet—that can be true, and it can be not true. I am always happy to have longer conversations about how, whether, where, and to whom the AI industry's promises of acceleration get kept, but I'd contend that matters of speed and convenience are at best immaterial, and at worst antithetical, to your learning the foundations of geospatial analysis.

I've designed GEOG 248 with some specific **learning objectives** in mind. Using probabilistic automation to interpret readings, find your data, conceptualize your final project, and answer lab questions would, in all likelihood, actively impede those learning objectives. For instance, a **recent paper** found that AI-assisted essay writers “consistently underperformed at neural, linguistic, and behavioral levels” compared to “Brain-only” essay writers. In my opinion, that shouldn't be surprising, like, at all: it's through the writing process that one works out ideas, draws connections, and develops a distinct voice. Writing isn't a consequence of thinking—it is thinking. And it's slow. So is learning. So don't be afraid to slow down.

Unfortunately, slowing down can be hard. I know that. And I know that you get mixed messages about how to use the kinds of software that the AI industry makes. For instance, contra what I just wrote, **the University's primer on this topic** suggests that “essay drafting” is a promising use case for Generative AI. While I happen to disagree with that particular use case, I want to be clear that I'm not universally anti these tools. I'm not saying that “AI” isn't useful, nor am I saying that the extended universe of probabilistic automation and image recognition tools constitute some kind of intrinsic moral/ethical threat.

What I'm trying to get at is a contradiction between “AI” and learning: companies design these tools to speed things along, but learning takes time. It takes brow furrowing, hair pulling, possibly even head banging. Probabilistic automation makes it easier to skip over those uncomfortable parts of learning, but in doing so, at least in this class, you risk sidestepping many of the load-bearing first principles of geography, GIS, and geospatial analysis. I care way more about you trying to do the work on your own—even and especially if you didn't finish it or if you aren't happy with what you've made—than I care about grading a perfectly polished finished product. And in fact, doing that work the long, slow way will help form the **metacognitive neural pathways that actually aid your learning**.

If you ever find yourself running out of time, stressing, panicking, etc., talk to me. I'm here to help, and I'll do everything I can to support your success and your learning in this class.

With all of that said: please do your own work. Please follow the standards of academic integrity in the social sciences, which means reading the readings, writing the writing, doing the labs, and **citing your work**. I ask that you don't use probabilistic language models

like ChatGPT, Claude, etc. to do the following:

- Summarize or annotate readings
- Conceptualize/execute final projects
- Produce maps
- Answer lab questions

You can expect the same of me: I don't use software like **SafeAssign** because I think they're premised on faulty assumptions about what constitutes plagiarism and I don't like the ambient surveillance. I don't use PA tools to make coursework or to shape the course design.

You may use LLMs as you would a search engine (e.g., to search for datasets), and for some parts of the final project and digital exhibition work. If you'd like to incorporate an LLM process into your final project workflow, let's talk about it first. There are plenty of contexts in which these tools are useful, but I want us to think together about how you are using them so that they generate, rather than foreclose, conversation between us.

For further consideration

- "**Context Windows**," Kevin Baker (2026)
- "**Data Boom Geographies: Virginia's Colocation and Buildout**," Mary Finley-Brook (2026)
- "**Time Trades**," Jeffery Lewis (2011)

Disability accommodations

The University of Richmond's office of Disability Services strives to ensure that students with disabilities and/or temporary conditions (i.e., concussions & injuries) are provided opportunity for full participation and equal access. Students who are experiencing a barrier to access due to a disability and/or temporary condition are encouraged to apply for accommodations by visiting <https://disability.richmond.edu>. Disability Services can be reached at disability@richmond.edu or 804-662-5001.

Once accommodations have been approved, students must (1) Submit their Disability Accommodation Notice (DAN) to each of their professors via the Disability Services Student Portal available at this link: sl.richmond.edu/be. and (2) Request a meeting with each professor to create an accommodation implementation plan. It is important to complete these steps as soon as possible because accommodations are never retroactive, and professors are permitted a reasonable amount of time for implementation. Disability Services is available to assist, as needed. Faculty are legally required to honor identified accommodations. Implementation is not optional.

Style guidelines and citation

All cartographic work should adhere, when appropriate, to key principles of map design as discussed in class.

Use **Chicago** as the style guide for written work and citation. Boatwright has an **excellent geography citation guide** that you can reference.

Schedule

A more detailed schedule can be found **on the course website**.

Week	Topic	Day	Date
Week 01	Welcome	T	8/25/26
	Process	R	8/27/26
Week 02	Basemap	T	9/1/26
	Scale	R	9/3/26
Week 03	Symbol	T	9/8/26
	Distortion	R	9/10/26
Week 04	Color	T	9/15/26
	Type	R	9/17/26
Week 05	Data	T	9/22/26
	Viz	R	9/24/26
Week 06	Constraints (feat. Riley Champine)	T	9/29/26
	Debates	R	10/1/26
Week 07	Adobe	T	10/6/26
	Curatorial reflection due (No class)	R	10/8/26
Week 08	No class (Fall break)	T	10/13/26
	Final map project kickoff	R	10/15/26
Week 09	Shading hills	T	10/20/26
	Lab work	R	10/22/26
Week 10	Winding rivers	T	10/27/26
	Lab work	R	10/29/26
Week 11	Bending lines	T	11/3/26
	Lab work	R	11/5/26
Week 12	Narrative	T	11/10/26
	Lab work	R	11/12/26
Week 13	Exhibition work	T	11/17/26
	Exhibition work	R	11/19/26
Week 14	Thanksgiving Break	T	11/24/26

Week	Topic	Day	Date
	Thanksgiving Break	R	11/26/26
Week 15	Exhibition work (Final map project due)	T	12/1/26
	Exhibition work	R	12/3/26
Week 16	What's next?	T	12/8/26
	No class; Study period	R	12/10/26
Exam week	Digital exhibition launch	W	12/11/26