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GEOG 260: Foundations of Geospatial Analysis

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Summary

Welcome to GEOG 260: Foundations of Geospatial Analysis! This course introduces geographic information systems (GIS)—a variety of technologies for creating, modifying, analyzing, and visualizing geospatial data—as a subset of geographical theory and methods. Lectures introduce the big-picture ideas, such as spatial data structures, coordinate systems, and geostatistical reasoning. Coursework puts those ideas into motion, training skills like georeferencing, proximity analysis, and cartographic design. Final projects allow students to independently conceptualize, analyze, and visualize a topic of their own choosing.

GIS is broadly relevant to different academic fields, but it's also used every day for government, military, business, non-profit, and social movement applications across the world. Urban planners use it to assess building conditions in their city, while climate scientists use it to estimate methane emissions. Environmental scientists use it to track water quality, and historical geographers use it to reconstruct long-gone landscapes. How *you* choose to use GIS will fundamentally depend on your research questions, conceptual frameworks, and personal curiosities, because GIS isn't just a machine for objective mapmaking: it's an expression of the deeply human desire to engage with the world we collectively inhabit.

And while GIS doesn't provide a panacea for solving *all* the world's wicked problems, it gives you some really good places to start.

Learning objectives

This course is designed to teach you:

1. Foundational concepts in geospatial analysis and geographic reasoning
2. General principles of geographic thought as they apply to GIS (and vice versa)
3. The application of (1) those principles and (2) those concepts in a traditional GIS environment
4. How maps, digital mapping, and cartography operate as non-neutral, power-laden processes

GEOG 260 also satisfies the Web of Inquiry integrated focus area for Quantitative Data Literacy. Throughout the course, students will:

1. Represent information and formulate questions in forms amenable to quantitative analysis, recognizing multiple approaches to communicating quantitative information.
2. Apply relevant quantitative approaches to solve problems and analyze data.
3. Evaluate assumptions, limitations, biases in, and/or ethical implications of particular analytical frameworks and/or study designs.
4. Formulate results, draw appropriate conclusions, and communicate findings using relevant quantitative evidence.

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 intolerance 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 GIS. 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 260.

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.

Required readings

There is no required textbook for this class. Any assigned readings will be made available through our course site, and in some cases, you'll need to use UR's library subscriptions to access articles or papers. Readings will often be blended into your lab assignments.

Accessing the software

We'll primarily be using a GIS software called ArcGIS Pro. 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.

Course structure

This course is divided roughly into three sections. Weeks 1-6 focus on core concepts related to geography, cartography, and geospatial data. The midterm in week 7 assesses those foundational skills. Starting in week 8, we turn our attention to analytic methods, including overlay analysis, suitability assessment, georeferencing, basic spatial statistics, and open-source GIS tools.

Grading

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

GEOG 260 follows a 250-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 260 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

Letter grade	Ranges
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 consists of 15 assignments, which pretty much averages to one thing being due each week:

- 9 labs
- 3 "GISketches"
- 1 midterm
- 1 group curation
- 1 final project

In general, I'll publish assignments on Wednesday before we meet for class, and those assignments will be due the following Wednesday at 11:59pm. The labs and sketches average 10 and 16.6 points, respectively, but their actual point values will vary from assignment to assignment.

Table 3: Breakdown of assignments, at a glance

Assignment category	Number of assignments	Total points	Total % of grade
Labs	9	90	36
Sketches	3	50	20
Midterm	1	30	12
Group Curation	1	30	12
Final Project	1	50	20

Labs

Throughout the semester, students will be assigned nine labs which explore theories, concepts, and approaches in greater depth. With the exception of Week 1, labs will be assigned on Wednesdays during class and due the following Wednesday at 11:59pm. Labs weave together methods and concepts in a software application, usually ArcGIS Pro, and they typically include step-by-step instructions for answering questions and producing a map. Some labs (like Lab 01) are much shorter, and others (like Lab 07) are much longer.

GISketches

GISketches concentrate on self-directed, creative application of concepts explored in lectures and labs. Two sketches require creative cartographic responses to a prompt, and one sketch is totally focused on your final project.

Midterm

On Monday, October 5, we will have a midterm exam. Please reach out to me as soon as possible if you need to coordinate accommodations.

Group curation

Starting in Week 4, we'll kick off some of our class meetings with a short curatorial introduction to a geospatial project, process, or product. In small groups, students will briefly and collaboratively present a "curation" of their choice, explaining (among other things) how their chosen project was created, what kinds of spatial data were required in order to make it, and what kind of argument or intervention the project is making. Additionally, group curations will identify areas of growth for the project, carefully interrogating its data and design elements.

Final project

Beginning officially in Week 7—although you can, and should, start to think about it earlier—you will begin working on a final project. Using concepts and methods learned in class, you will create a large-format infographic that presents original geospatial research into a topic of your choosing.

In lieu of a final exam, we'll meet during our exam block to for a low-stakes class exhibition. The exam blocks are as follows:

- If your class meets **1:30-2:45pm on Mondays and Wednesdays**, your exhibition will take place 9am-12pm on Friday, December 11

- If your class meets **12-1:15pm on Mondays and Wednesdays**, your exhibition will take place 9am-12pm on Monday, December 14

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 260, 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.

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 four 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 250 points) to your final grade. Doesn't sound like a lot, but 4 free points is a 1.6% 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 must be submitted on time and is 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 probablistic automation promise that 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. Here's a fantastic essay about the relationship between large language models and scientific work. Note also that these technologies accelerate environmental degradation. 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 260 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, and 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 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.

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!	M	8/24/26
	Geography and GIS	W	8/26/26
Week 02	Geospatial data	M	8/31/26
	Mostly open lab	W	9/2/26
Week 03	Projections and coordinate systems	M	9/7/26
	Classification	W	9/9/26
Week 04	Cartography and design	M	9/14/26
	Generalization and symbolization	W	9/16/26
Week 05	Census data	M	9/21/26
	Mostly open lab	W	9/23/26
Week 06	Vector analysis	M	9/28/26
	Exam review	W	9/30/26
Week 07	Midterm exam	M	10/5/26
	No class (Ian at conference)	W	10/7/26
Week 08	No class (Fall break)	M	10/12/26
	Final project kickoff	W	10/14/26
Week 09	Georeferencing	M	10/19/26
	Deep research (with Kyle Jenkins)	W	10/21/26
Week 10	Raster analysis	M	10/26/26
	Mostly open lab	W	10/28/26
Week 11	Spatial statistics	M	11/2/26

Week	Topic	Day	Date
	Mostly open lab	W	11/4/26
Week 12	Geovisualization	M	11/9/26
	Mostly open lab	W	11/11/26
Week 13	QGIS	M	11/16/26
	Mostly open lab	W	10/18/26
Week 14	No class (Thanksgiving break)	M	11/23/26
	No class (Thanksgiving break)	W	11/25/26
Week 15	Crowdsourcing	M	11/30/26
	Mostly open lab	W	12/2/26
Week 16	What's next?	M	12/7/26
	No class (Study period)	W	12/9/26
Exam week	Exhibition A: Section 02	F	12/11/26
	Exhibition B: Section 01	M	12/14/26