

# Health GIS (GEOG-368) – Fall 2023

**TuTh 1:20-2:50 pm, Carnegie 109**

Instructor

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Office Hours and Location

Mon/Wed 1:10-4:00 pm in Carnegie 103

## Course Description

This course builds on skills learned in the introductory Geographic Information Systems (GIS) course, focusing explicitly on geospatial techniques used for analyzing problems in public health. Through lectures, discussions, hands-on labs, and collaborative group work, students will learn to use advanced GIS tools to visualize and analyze public health issues, including: health disparities; neighborhood effects on health; spatial clustering of disease events, such as cancers; environmental health and environmental justice; infectious and vector-borne disease; and accessibility of populations to health care services. The course builds skills in spatial thinking, statistical and epidemiological reasoning, logical inference, critical use of data, geovisualization, and research project design. Students will be required to complete a final independent project on a topic of their choice. Three hours of combined lecture/laboratory per week required.

*This course counts for the Geography major, Community and Global Health Concentration, and Social Science distribution requirement.*

## Learning Objectives

By the end of this course, you will be able to:

- Use key geospatial techniques for analyzing public health problems.
- Understand which geospatial techniques to use for different situations.
- Evaluate the statistical significance of your findings.
- Understand some of the key problems public health researchers face when using spatial data.
- Visualize and communicate results of your analysis through maps and other graphic design tools.
- Understand the basics of study design from the perspectives of geography and epidemiology.
- Contextualize findings in a broader scholarly literature.
- Develop and present a research project using spatial and statistical data and techniques.

To achieve these objectives the classes will consist of lectures, group discussions, writing assignments, lab exercises, map critique essay, and group research project.

## Required Readings

All readings for this course will be available electronically, via Moodle or a shared Google drive.

## Class Format

In this course there will be a mix of activities, including lectures, structured discussion of concepts and methods from lectures and readings; recap discussions of lab exercises; or open consultations while you work on your lab exercises. Class time will be spent in ways that maximize interaction and exchange among us (instructor, TA, students). Most of the second half of the semester will be spent working on your independent research projects. Your daily attendance is vital.

## Using GIS Software

For the Health GIS lab exercises and student projects, we will be using ArcGIS Online, ArcGIS Pro, and Geoda. You should be familiar with the Esri products. Geoda is an excellent software program for exploratory spatial data analysis, spatial statistics, and spatial epidemiology. In the case of Geoda, you will have to download the software, but it is free. I want to emphasize that it has never been the goal of this class -- or of our department's geospatial curriculum generally -- to teach the functions of specific

software packages. Instead we prioritize learning spatial-analytical concepts, critical thinking, problem solving, and design, while learning the functionality of specific software applications is a lower priority. Having said that, you will definitely improve your skills in all three of these software applications during the class.

### **Course Management Systems**

This course does have a Moodle page, but I will be using Moodle in a limited way (e.g., for submission of assignments). Instead, most resources in this class will be made available via Google apps (e.g. Google Docs), with a constantly updated [Course Outline](#) serving as the central node to connect to all the resources you'll need for the class, including readings, assignments, and other materials.

### **Course Policies**

#### *Attendance and Participation*

In this class, 10 percent of your grade derives from attendance and participation. Attendance plays an essential role in learning, so you are warmly invited and expected to attend all class meetings. Attendance will be important not only for your learning, but also for our ability to build a community together and maintain a sense of connection and commitment to one another. Your presence in class matters. If you will not be in class for any reason, it is your responsibility to inform me in advance, or as early as possible, via email. It is also your responsibility to make up work you missed in your absence. Participation is distinct from attendance and is also an essential part of this course. In-class discussions, on-line discussion forums, responses to brief ungraded writing assignments, quizzes, etc. will be factored into your participation grade. In general, “participation” means speaking up, sharing your thoughts, and making yourself noticed in positive, productive, and supportive ways. It also means listening carefully and respectfully to your fellow students. It is important to remember that we all have different styles of expression. If you have not been able to participate in a class discussion for any reason but want to demonstrate your active engagement, please send me an email after class with a comment or an idea you had that you would have liked to share, but were not able to during class. Students with any concerns, questions, or need for consideration for flexibility should connect with me as soon as possible to determine an appropriate plan.

#### *Come Prepared!*

Being part of this class means being prepared to participate fully in each day's activities. Those activities are spelled out clearly in the course outline and I'll be giving you frequent reminders about what we'll be doing in class on a given day. Please make sure to do the readings or consult other resources before class. The quality of in-class discussion and group work depends on your doing the assigned readings in advance. Do not be surprised if I call on you, unannounced, for your thoughts about an assigned reading. Only sometimes will class periods be taken up by lecture, and even then, you'll have a much better understanding of the material if you put in the work ahead of time.

#### *Academic Integrity*

As in every course, you will be expected to follow the college's policies on academic honesty: specifically, “Students are expected to maintain the highest standards of honesty in their college work; violations of academic integrity are serious offenses. Students found guilty of any form of academic dishonesty — including, for instance, forgery, cheating, and plagiarism — are subject to disciplinary action.” For more details, see the college's guidelines on Academic Integrity (link [here](#)).

#### *Special Accommodations*

If you have a physical or learning disability that will require special accommodations, please contact me to discuss arrangements. All conversations will be confidential. You will also need to meet with a representative from Disability Services, which determines accommodations. They can be contacted here: [disabilityservices@macalester.edu](mailto:disabilityservices@macalester.edu) .

### *Communication*

You are welcome to come see me during my scheduled office hours. If you can't meet during those times, please send me an email or call my office and we'll schedule an appointment. In general, I answer emails within 24 hours. But I always prefer to discuss important matters in person, not electronically or by phone. Also, make sure that you check your email frequently, because I do send email messages – either from my own email address or via Moodle – frequently to the class.

### *Use of Electronic Devices in Class*

Due to the nature of this course, you will be doing a lot of work on the computer, either your own laptop or GIS lab computers. When we are having a lecture, discussion, student project presentation, or similar activity, I expect everyone's eyes and attention to be focused on that activity. You definitely should not be browsing the web, checking email, doing homework for other classes, and so on during these class activities. The use of cell phones is strictly prohibited: no calling, texting or other uses of your cell phone during class time. Please respect decorum in the lab classroom by focusing on work for the class.

### *Recording Policy*

The Macalester College Classroom Recording (MCCR) policy sets forth community expectations regarding the recording (whether audio, video, or streaming) of class lectures, discussions, office hours, and other course-related activity. As an academic community, we value the free exchange of ideas and the privacy of community members. We are also committed to providing appropriate accommodations to students who require recorded lectures as an academic adjustment for documented disabilities. The MCCR policy balances the legitimate uses of classroom recording, the intellectual property of the faculty, and the privacy of individual students and faculty. The entire policy can be found [here](#). In short, the policy requires students to submit a completed Student Recording Agreement to the appropriate office (Disability Services for students with approved accommodations; Academic Programs and Advising for all others) prior to engaging in any type of recording. The faculty member who signed the Recording Agreement (or is notified by Disability Services that recording will occur as an accommodation) is responsible for notifying the class that recording will be occurring. The required Student Agreement Recording form is available [here](#).

### *Religious Observance*

Students may need to take part in religious observances that occur during the semester. If you have a religious observance/practice that conflicts with your participation in the course, please contact me before the end of the second week of the semester to discuss appropriate accommodations.

### *Health and Wellness*

You are encouraged to make your health and well-being a priority throughout this semester and during your career at Macalester. Taking care of yourself will help you engage more fully in your academic experience. Remember that beyond being a student, you are a human being carrying your own experiences, thoughts, emotions, and identities with you. It is important to acknowledge any stressors you may be facing, which can be mental, emotional, physical, cultural, financial, etc., and how they can have an impact on your academic experience. I encourage you to remember that you have a body with needs. In the classroom, eat when you are hungry, drink water, use the restroom, and step out if you are upset and need some air. Please do what is necessary so long as it does not impede your or others' ability to be mentally and emotionally present in the course. Outside of the classroom, sleeping, moving your body, and connecting with others can be strategies to help you be resilient at Macalester. If you are having difficulties maintaining your well-being, please don't hesitate to contact me and/or find support from Health & Wellness Center.

### *Inclusivity*

I am committed to providing a safe and equitable learning environment that welcomes and supports everybody. As learners and teachers, we all bring various experiences and life contexts to this course. These differences will emerge in class and be part of what we negotiate and benefit from as a developing community. I acknowledge that academic institutions have evolved within a historical context that

privileges certain students over others, and in this classroom, we will do our best to be aware of how these inequities may manifest. I hope you will feel comfortable coming to us to express any concerns or suggestions; this is an iterative process that requires the collaboration of all.

### *Late work*

You must turn in your work on time. I will indicate due dates for every assignment, and you must respect them. Every student has one “free token” to use for turning in an assignment up to 48 hours late, for the whole semester. Otherwise, I will have to penalize you 10 percent of your grade (or a full letter grade) for a given assignment for every day that it is late. Tokens can be used for lab exercises, the map critique essay, and for most research project milestones (except for some of the end-of-term deadlines – I will give you more details soon). For other, extenuating circumstances (e.g. illness, accident, bereavement, religious observance, etc.), I will consider granting extensions on a case-by-case basis.

### *Turning in Assignments*

I will be using electronic submission for most assignments. For a given assignment, I will create a “dropbox” on Moodle that has a specific time that work is due (and the dropbox then “closes”). Please do not submit assignments via email or as “shared” documents in Google Docs. Some research project-related assignments (like draft or final versions of StoryMaps) cannot be submitted via Moodle, and I will be clear about how this work will be “turned in.”

### **Course Assignments:**

- **Attendance and Participation:** see above.
- **Lab Exercises.** These weekly lab assignments (8 total) will serve as the main way for you to turn theory and concepts into practice. Typically, these labs will help you develop mastery of important tools and techniques for analysis of public health problems in GIS. Note that although there are many lab exercises, my goal is to make them brief and focused—each exercise will cover just a few new techniques.
- **Map Critique Essay.** The task is to find a published “health map” (or set of maps) and offer a constructive critique of how the mapmaker used spatial and other data to communicate a message through cartography and graphic design.
- **Research Project.** In your final project, you will use GIS-based, statistical, and epidemiological methods to answer a research question of significance in public health. You will employ GIS analytically and as a way of visualizing your results to present them to a broad audience. This project involves a multi-stage process, with several project milestones throughout the semester, culminating in an ArcGIS StoryMap to showcase your results, along with an oral presentation to the rest of the class.

### **Grading**

Attendance and Participation	10%
Lab Exercises (8 x 5% each)	40%
Map Critique Essay	10%
Research Project (includes many different components)	40%
TOTAL	100%

Note that there are no exams in this course.

**COURSE SCHEDULE AT-A-GLANCE (FALL 2023)**

	Monday	Tuesday	Wednesday	Thursday	Friday
1	4 (SEPT) <b>NO CLASS LABOR DAY</b>	5 Introductions and Course Business	6	7 Critical Reading of "Health Maps" exercise	8
2	11	12 Lecture/Discussion Disease Mapping	13	14 Lab Work Exercise 1: John Snow Cholera Map	15
3	18 <b>Exercise 1 due</b>	19 Lecture/Discussion Rate Mapping	20	21 Lab Work Exercise 2: Rate Mapping Assign/Discuss Research Project	22
4	25 <b>Exercise 2 due</b>	26 Lecture/Discussion Mapping Clusters	27	28 Lab Work Exercise 3: Mapping and Analyzing Clusters	29 Health Equity Symposium (Thurs. 7 pm)
5	2 (OCT) <b>Exercise 3 due</b>	3 Lecture/Discussion Georeferencing and Data Sources	4	5 Lab Work Exercise 4: Georeferencing and Data Sources	6 <b>Research Project: Topic Idea due</b>
6	9 <b>Exercise 4 due</b>	10 Lecture/Discussion Lead Risk Mapping	11	12 Lab Work Exercise 5: Lead Risk Mapping, part 1	13 <b>Map Critique paper due</b>
7	16 <b>Exercise 5 due</b>	17 Discussion Share map critiques	18	19 Guest lecture Anoushka Millear '15	20 <b>Research Project: Proposal due</b>
8	23	24 Lab Work Exercise 6: Lead Risk Mapping, part 2	25	26 <b>NO CLASS FALL BREAK</b>	27 <b>NO CLASS FALL BREAK</b>

9	30	31 Lecture/Discussion Envl Justice Risk/Exposure Analysis	1 (NOV) <b>Exercise 6 due</b>	2 Lab Work <b>Exercise 7: Mapping EJ in California</b>	3
	6 <b>Exercise 7 due</b>	7 Lecture/Discussion Health Care Accessibility	8	9 Lab Work <b>Exercise 8: Health Care Accessibility Analysis</b>	10 <b>Research Project Scoping Review due</b>
11	13 <b>Exercise 8 due</b>	14 Project Work: Storyboarding Exercise in class	15	16 <b>NO CLASS: Work on Projects Independently</b>	17 Prof. Carter endowed chair lecture (Thurs. 4:45 pm)
12	20 <b>Research Project Storyboard due</b>	21 Project Work	22 <b>NO CLASS THANKSGIVING BREAK</b>	23 <b>NO CLASS THANKSGIVING BREAK</b>	24 <b>NO CLASS THANKSGIVING BREAK</b>
13	27	28 Project Work	29	30 Project Work	1 (DEC) <b>Research Project Preliminary Results due</b>
14	4	5 Research Presentations	6	7 Research Presentations	8
15	11	12 Last Day of Project Work in Class	13 <b>Research Project Peer Review due</b>	14 STUDY DAY	15 STUDY DAY
F I N A L S	18 <b>FINAL PROJECT (STORYMAP) DUE</b>	19 <b>Research Project: Final Reflection Essay due</b>	20	21	22

**IMPORTANT NOTE:** Detailed, constantly updated course schedule available [here](#). Follow this document closely, because it will have reading assignments, links to lecture notes, lab exercise assignments, and so on.