

**GEOG-368
HEALTH GIS
Fall 2018**

Tues/Thurs 9:40-11:10 am, Carnegie 108

Instructor: Eric D. Carter

Office Hours: TBA

GIS Lab Instructor: Ashley Nepp

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Course Description and Objectives:

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. Lab section registration is required. Three hours of combined lecture/laboratory per week required.

Required Readings:

All of the required readings for this course will be available electronically, via Moodle. The course schedule (see below) does not specify the readings, but I will let you know which readings are required from week to week.

Recommended Books:

1. Anthamatten, P. and H. Hazen (2011). *An Introduction to the Geography of Health*. Routledge. ISBN-13: 978-0415498067
2. Cromley, E. and S. McLafferty (2012). *GIS and Public Health*, 2nd. ed. Guilford Press. ISBN: 978-1609187507.
3. Koch, T. (2005). *Cartographies of disease: maps, mapping, and medicine*. Redlands, CA: Esri Press.
4. Koch, T. (2011). *Disease maps: epidemics on the ground*. University of Chicago Press.
5. Krivoruchko, K. (2011). *Spatial statistical data analysis for GIS users*. Esri Press.
6. Kurland, K. S. & W. L. Gorr (2012). *GIS tutorial for health*, 4th ed. Redlands, CA: Esri Press.
7. Maantay, J. A., & McLafferty, S. (Eds.). (2011). *Geospatial analysis of environmental health*. Springer.
8. McGrew, J.C., Jr. & Monroe, C. B. (2009). *An introduction to statistical problem solving in geography*. Waveland Press.
9. Mitchell, A. (1999, 2005, 2012), *The ESRI Guide to GIS Analysis* (vols. 1, 2, and 3). ESRI Press.
10. Waller, L. A., & Gotway, C. A. (2004). *Applied spatial statistics for public health data*. John Wiley & Sons.

I will put copies of these books on reserve in the library, except the Mitchell book (copies will be available in the GIS lab).

Class Attendance and Participation Policy:

In this class, 10 percent of your grade derives from attendance and participation. Consistent attendance is necessary to fully comprehend the course material, and there will be plenty of opportunities to participate in this class. In general, "participation" means speaking up and making yourself noticed in positive and intelligent ways. Recognize that "participation" can include many kinds of contributions: asking questions in class, contributing to class discussions, coming to see the professor during office hours with questions or comments, etc. Reaction papers and other small assignments also count towards your participation grade. I also appreciate when students are engaged with relevant events and news beyond the course. I will create a forum on our course Moodle for you to post news items on mapping and spatial analysis in public health.

You should think of this course as seminar-like in terms of how much active, engaged participation I expect from you. If you attend class consistently (zero or very few absences), participate frequently, and make significant contributions to everyone's learning experience, you can expect to get a high grade for attendance and participation. If you show up to every class but never say anything, you will get fewer points. If you miss many classes, and then make little or no effort to participate, you should expect to get a very low attendance/participation score.

Class Format:

In the first half of the course (until around Fall Break), we will be focused on a common set of topics, readings, and exercises, in order to build our knowledge and skills in GIS analysis for public health. Generally speaking, during the first half of the course, on Tuesdays we will use a hybrid lecture-discussion format during class time, rather than having dedicated days for lecture and dedicated days for discussion, as you might find in some other classes. I sometimes use PowerPoint presentations but often I conduct our lecture-discussions making notes and outlining concepts on the board as we go along. Either way, my lectures are meant to be very interactive and not a one-way monologue, so feel free to ask questions, and expect that I will ask you questions, too. The readings are an accompaniment to the day's lecture-discussion. From day to day, I will try to give you specific instructions about how thoroughly I want you to read a particular article or chapter, and also try to preview how we will use it in class. Your default assumption should be to do all the reading before a given class. The more closely you do the readings, *before class starts*, the better you will understand the course material. On Thursdays, I will assign lab exercises and we will start working on them during class time, but you will often need to continue working on them outside of class. Ashley Nepp (GIS Instructor/Lab Supervisor) will sometimes be available during class time to help with your GIS lab exercises. You will devote most of the second half of the course to working on your independent projects, with our supervision and assistance.

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. Forgery, cheating and plagiarism are serious offenses and students found guilty of any form of academic dishonesty are subject to disciplinary action." For more details, see the college's guidelines on Academic Integrity at <http://www.macalester.edu/academicprograms/academicpolicies/academicintegrity/>.

Acts of academic dishonesty include, but are not limited to, plagiarism, fabrication of data, cheating, stealing or buying copies of exams or papers, unauthorized collaboration, and taking exams for someone else. Be aware that at Macalester penalties for academic dishonesty include verbal reprimand, written reprimand, lowering of grade on a specific exam or assignment, a failing grade on specific exam or assignment, lowering of course grade, a failing course grade, suspension from the college, and expulsion from the college. Depending on the circumstances of the infraction, you may be subject to any of these penalties. There will be collaborative work in this class, but I will indicate clearly when an assignment is meant to be done with a partner, in a group, or alone.

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 Melissa Fletcher, Director of Disability Services in the Office of Student Affairs (mfletche@macalester.edu) who coordinates disability services and determines accommodations. It is important to meet with her at the beginning of the semester to ensure that your accommodations are approved and in place to begin the semester successfully.

Late Policy:

Any paper or assignment turned in after the due date will be graded down one letter grade (or equivalent, i.e. 10%) for each day it is late (weekends not included). Exceptions may be made for extraordinary circumstances, but don't count on it. Unless otherwise indicated, all assignments must be submitted in *hard copy* (paper) form, *not via email!*

Use of Electronic Devices in Class:

Using computers is an integral part of this course. However, 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 your homework, and so on during these class activities. If necessary, turn off your computer screen to avoid distraction. Please avoid texting and other uses of your cell phone during class time.

Course Assignments

- 1) Attendance and Participation (see above)
- 2) Lab Exercises. These weekly lab assignments (7 total, in the first part of the semester) 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. Other lab activities will involve work with interactive online maps or paper maps. Generally speaking, the labs will be due the week *after* they are assigned; due dates will be indicated on each lab assignment. You will have time in class to work on labs, generally on *Thursdays*, but you will also need to work on them outside of class. For some labs you will work individually, and sometimes with partners. I will try to rotate partner assignments throughout the semester.
- 3) 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. The final project will have several stages with corresponding due

dates, starting around the fourth week of the semester. The format for presentation of project results, for most of you, will be an academic poster, but I am open to other formats (e.g. digital and interactive). I will give you more information about this assignment around Week 2 of the semester, but you should start thinking and conversing with me about potential research topics.

Grading

Attendance and Participation	10%
Lab Exercises (7 x 5%)	35%
Research Project (includes many different components)	55%
TOTAL	100%

COURSE SCHEDULE AT-A-GLANCE

	Monday	Tuesday	Wednesday	Thursday	Friday
1	3 (SEPT) LABOR DAY	4 Introduction Spatial Epidemiology	5	6 Begin Lab 1 (John Snow' London Cholera Map)	7
2	10	11 Lab 1 DUE Finding and Preparing Spatial Data	12	13 Begin Lab 2 (Data Sources for Public Health)	14
3	17	18 Lab 2 DUE Visualizing Health Disparities	19	20 Begin Lab 3 (Visualizing Health Disparities)	21
4	24	25 Lab 3 DUE Analyzing Clustering of Health Events	26	27 Guest: Mageen Caines, MHD Begin Lab 4 (Analyzing Cancer Clusters)	28
5	1 (OCTOBER)	2 Lab 4 DUE Environmental Justice Research with GIS	3	4 Begin Lab 5 (Using GIS for Environmental Justice Analysis)	5 Research Project Topic Statement DUE
6	8	9 Lab 5 DUE Infectious and Vector-Borne Disease	10	11 Begin Lab 6 (Lyme Disease Risk Mapping) International Round Table Events	12 International Round Table Events
7	15	16 Lab 6 DUE Measuring and Mapping Access to Health Services	17	18 Begin Lab 7 (Modeling Access to Health Care Using Network Analyst)	19 Research Project Proposal DUE
8	22	23 Prof. Carter out of town. Time to work on Lab 7	24 Lab 7 DUE	25 FALL BREAK	26 FALL BREAK

9	29	30 Recap Lab 7 Return Proposals Project Consultation in Class #1 (mandatory)	31	1 (NOV) Work on Projects Guest lecture/project consultant: Dave Van Riper, MN Pop Center	2
	10	5	6 Work on Projects Working Bibliography and Progress Report Due	7	8 Work on Projects
11	12	13 Work on Projects Project Consultation in Class #2 (mandatory)	14	15 Work on Projects	16
12	19	20 Work on Projects Preliminary Results Due	21	22 THANKSGIVING BREAK	23
13	26	27 Work on Projects Project Consultation in Class #3 (mandatory)	28	29 Work on Projects	30
14	3 (DEC)	4 Work on Projects Final Poster DUE (submission, tentative)	5	6 Oral Presentations in Class	7 Peer Review Assignment Due
15	10	11 Public Poster Session, 4:45-6pm (tentative)	12 Last Day of Classes	13 Study Day	14 Study Day
F I N A L S	17 Final Project Report DUE	18	19	20	21

