GEOGRAPHY GEOSPATIAL COURSE OFFERINGS

*A few **HELPFUL TIPS** for advising students interested in **geospatial courses**.*

PREPARED BY THE GEOGRAPHY DEPARTMENT (Updated SP 2024)

> *Note: Course descriptions and requirements can be found in the college catalog. The following information is intended to assist advisors who are providing guidance to students interested in geospatial courses.*

GENERAL ADVICE:

- All geospatial courses require instructor approval **AND** have waiting lists.
- Many of the waiting lists open after the Add/Drop period during the prior semester. These waiting lists can be found on the front page of the Geography Department homepage under "Links for Current Students" www.macalester.edu/geography/.
- First-day attendance is required for **ALL** geospatial courses.

COURSE DESCRIPTION:

INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEMS (GEOG 225)
> PREREQUISITE: Sign-up on waitlist at www.macalester.edu/geography/ under "Links for Current Students"
> GEN ED: Q2
> OTHER: We strongly advise against first year students taking this course.
> OFFERED: Every Semester
> INSTRUCTORS: Holly Barcus & Ashley Nepp

This is an introductory course designed for geography majors and intended to be a comprehensive cartography and GIS course. As such, there are 3 hours of lecture and a 1.5 hour lab period each week. Students should expect to spend a minimum of 4-6 hours outside of class time working on their labs and other homework. This course does not require any previous knowledge of GIS or cartography and is suitable for any major. It is, however, a time-intensive course (based on student feedback) and requires a small-group final project. This is the foundation course for all other GIS courses and, if a student intends to take an upper-level GIS course, they must take INTRO at Macalester. Probably not a good course to take pass/fail; it has a heavy workload and group project.
NOTE: *We strongly advise against first year students taking this course.*

REMOTE SENSING OF THE ENVIRONMENT (GEOG 362)
> PREREQUISITE(S): Some geospatial knowledge is desirable
> GEN ED: Q3
> OTHER: Cross-list in Environmental Studies
> OFFERED: Every Semester except when Advanced is offered; next offered SP 2025
> INSTRUCTOR: Xavier Haro-Carrión

Remote Sensing of the Environment is designed to introduce the student to the theory and application of digital imagery data in geographical research. It emphasizes fundamental remote sensing concepts and utilizes remote sensed data for analyzing human-environmental issues such as deforestation, reforestation, urban expansion, or any other change in land surface across space or time.

ADVANCED COURSE DESCRIPTIONS:

Note: All advanced geospatial courses have pre-req of GEOG 225 (except GEOG 372)

GIS & COMMUNITY PARTNERSHIPS (GEOG 364)

    PREREQUISITE(S): GEOG 225, First day attendance required, Permission of instructor
    GEN ED: Q1
    OTHER: Cross-list in Environmental Studies
    OFFERED: Not offered in 2024-2025
    INSTRUCTOR: Holly Barcus

This course is designed as a community partnership in which the majority of the work and time in class is dedicated to working with the partner chosen for the respective semester (YMCA, for example, was the partner during FA 2017) to determine their mapping and analysis needs. The class is organized around large and small group tasks and culminates in a final report and presentation to the partner at the end of the semester. This course is appropriate for students interested in civic engagement and community partnerships. It is a collaborative research-based course intended to introduce students to community-based projects as they apply to GIS and advance GIS skills, including data collection, analysis and formal report writing. Not currently offered.

URBAN GIS (GEOG 365)

    PREREQUISITE(S): GEOG 225, First day attendance required, Permission of instructor
    GEN ED: Q2
    OTHER: Counts toward Urban Studies concentration
    OFFERED: Fall 2024
    INSTRUCTOR: Laura Smith

This course allows students to participate in a "real world" application of their GIS knowledge and skills in a collaborative research project setting. Project focus is on urban GIS and questions developed by and for neighborhoods and other community research organizations. Content of the course includes development of the research project, acquisition and utilization of data used in urban analysis, data manipulation and analytical techniques unique to urban GIS, and geographical data visualization. This course is appropriate for students interested in civic engagement and community partnerships. Laboratory work is required.

HEALTH GIS (GEOG 368)

    PREREQUISITE(S): GEOG 225, First day attendance required, Permission of instructor
    GEN ED: Q1
    OTHER: Counts toward CGH concentration; GEOG 256 (Medical Geography) and MATH-125 (Epidemiology) recommended but not required.
    OFFERED: Not offered in 2024-2025
    INSTRUCTOR: Eric Carter

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 lecture/laboratory per week required.

ADVANCED CARTOGRAPHY AND GEOVISUALIZATION (GEOG 370)

This course is designed for students who are interested in communicating data graphically and telling stories with data. This is a hands-on course with a lab component. There are 2 main projects/products for the course - a static visualization and a dynamic viz. Students most often use Adobe Illustrator to create their static visualization, but may choose any design software or application they want. No previous experience with design software is required. The dynamic visualizations usually use an online platform such as Tableau Public, Carto or ArcGIS Story Maps, but it's open to being anything the student is comfortable with; I've had a few students experiment with various programming languages or packages, like Leaflet (JS) and R. This course has a mixture of individual projects and group assignments. This is a great course for students who have wanted to try out a new platform or technique, but haven't had the space yet to do so; they can explore these ideas in a low-risk and supportive environment. The assignments for this course are fairly unstructured and quite adaptable to student interests; as such, students should have ideas about skills or technologies they want to learn or develop before they begin this course. The lecture component of the course is focused on learning different types of graphic forms, basic design principles, and the design process, all to support the students' individual project work. Laboratory work is required.

ADVANCED REMOTE SENSING (GEOG 372)

This course is designed to follow on from basic concepts of remote sensing studied in GEOG 362 and directed to students who want to work deeply on a remote sensing research project of their own choice. Introduction to some advanced classification approaches (e.g. Random Forests, Time Series Analysis) will be initially offered. However, as the course progresses the focus will switch entirely to students' projects. Students are expected to build a body of literature related to a topic of their choice, lead discussions of these papers, analyze data in Google Earth Engine, peer-review their peers' work, and other steps related to the production of a scientific paper. Laboratory work required.

CULTURAL ATLAS PRODUCTION (GEOG 394)

This course will be centered on the goal of creating and publishing a cultural atlas. A cultural atlas maps ideas and questions not normally addressed in western maps such as, "What makes a place special? What does a place feel like? Sound like? Smell like? Taste like? What do traditional maps overlook about this place? What has happened in this place? Who is this place special to? What is my personal experience with this place?" The class will work as a team to create a print atlas from start to finish; choosing map topics, designing the layout of the atlas, gathering data, conducting field work, interviews and/or site visits, and finally working through the publishing process. Each student will be individually responsible for at least a 2-page layout related to the theme of the atlas

that will be featured in the atlas, as well as other group responsibilities for editing and production. The spring 2020 atlas will be geographically-focused on Minneapolis, but students are welcome to explore any thematic topic that falls within that geography. The lecture topics and labs for this course will be focused on learning different types of graphic forms, basic design principles, storytelling devices, and the design process, all to support the creation of their 2-page layouts and the overall atlas. Laboratory work and field work is required.

ADVANCED GIS: CAPTURING PERSONAL EXPOSURES ACROSS SPACE AND TIME (GEOG 394)
 PREREQUISITE(S): GEOG 225, First day attendance required, Permission of instructor
 GEN ED:
 OTHER:
 OFFERED: SP 2025
 INSTRUCTOR: Kelsey McDonald

In this course you will develop skills in spatial-temporal data collection, exploratory data analysis, and geovisualization, with particular attention paid to data collection. We will spend the first few weeks of the semester acquiring background knowledge and developing technical skills through readings, discussions, and lab exercises, often using examples from medical geography or spatial epidemiology. Then we will quickly move on to individual projects. The project will allow you to choose an environmental exposure to measure (e.g. air quality, sound levels, etc.) across space and time using sensors. You will collect, clean, analyze, and visualize the spatial-temporal environmental data you collect using your chosen sensor. This course will also provide you with the opportunity to advance several skills of your choosing, for example: spatial analysis and visualization in QGIS (free GIS software - for Mac and PC); data analysis in R/RStudio (free statistical analysis software); big (spatial) data analysis; or advanced cartographic skills. Laboratory work required. Prerequisite(s): GEOG 225.