

Principles of Geographic Information Science

(BISC-7529)

Instructor: Anna Thonis (she/her)
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Dates: May 25 – May 29, 2023

Time: 9:00 am – 5:00 pm daily (however we may end earlier some days)

Location: Keating Hall – Room 318 (IN PERSON)

Overview

Geographic information systems (GIS) are powerful tools for analyzing fundamental geographic questions. GIS involves generating, managing, linking, manipulating, and implementing data in many different formats. The most common way involves visualizing information in the form of two-, and sometimes three-, dimensional maps. This course will cover major topics in GIS with applications relevant to the broad fields of biology and the natural sciences, yet theories can easily be applied to economic development, urban planning, epidemiology, and many aspects of the anthropogenic world. The goal of this course is to teach students a level of GIS proficiency such that they will be self-sufficient in their further learning and use of GIS.

This course is an intense, five-day short course combining short lectures that will cover basic ideas and concepts, paired with longer, hands-on computer laboratory exercises that will provide experience learning the free, open-source GIS software QGIS.

Evaluation

Students will be evaluated on the following:

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| • Attendance and participation | 5% |
| • Lab exercises | 20% |
| • Project proposal | 25% |
| • Independent project | 50% |

Assignments

Each section of laboratory exercise will be turned in digitally (via email). There will be one or two laboratory exercises each day. Each student is expected to develop a unique project proposal that will demonstrate their comprehensive understanding of GIS. Through feedback between instructors and fellow graduate students, these proposals will be developed into a GIS analysis that will combine spatial, tabular, and other sources of information.

Final projects will be due via email by **June 26, 2023**, and include (but are not limited to): The research question, expected outcomes, types of analyses to be used to answer the research question, and the types of data required to do so, accurate and complete methods description, results, and how these results relate to your overall question. We will discuss the project in more detail during the course.

Software

This course will use the open-source software QGIS to complete the GIS lab exercises. Although QGIS is presently installed on all of the computers in the room assigned for this course, you will likely need to spend time outside of class completing your final project. For this reason, you may want to install QGIS on your personal laptop. If you choose to install QGIS on your personal laptop, you are also welcome to use your personal laptop to complete all in-class lab activities.

Download QGIS: <https://qgis.org/en/site/forusers/download.html>

Academic Integrity

All students are expected to abide by the standards of academic integrity. All work submitted is expected to be an individual effort, unless explicitly instructed to work in groups. Plagiarism, cheating, and dishonest research will not be tolerated and result in a zero grade for all parties involved.

Tentative Schedule

Date	Topics	Labs
Thursday May 25, 2023	• Introduction to GIS ○ What is GIS? ○ Vector data ○ Raster data • Locality information ○ Datums ○ Coordinate systems ○ Projections • Using QGIS ○ Overview ○ GIS data files ○ Basic operations ○ The QGIS interface ○ Follow along using QGIS ○ Maps • Working with projections	GBIF and Mapping
Friday May 26, 2023	• Deep dive into vector data ○ Tables ▪ Field types ▪ Editing fields ▪ Adding fields ▪ Follow-along joining tables • Deep dive into raster data • Project ideas (bring for next class)	Projections, Vector editing, Raster editing
Saturday, May 27, 2023	• Project discussions • GPS • Remote sensing	GPS, NDVI
Sunday, May 28, 2023	• Follow-along: Georeferencing a map • Follow-along: Raster calculator	Spatial analysis, Independent project development
Monday, May 29, 2023	• Make-up work • Topic review • Independent project development	