Principles of Geographic Information Science

Fordham University | BISC-7529

Instructor: Anna Thonis, PhD (she/her), Postdoctoral Researcher, NYU

Contact Information
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Dates: May 22 – May 26, 2025
Time: 9:00 am – 5:00 pm daily (however we may end earlier some days)
Location: Keating Hall – Room 318 (IN PERSON)

Course 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:

- Attendance and participation 5%
- Lab exercises 25%
- Project proposal 30%
- Independent project 40%

Assignments
Each section of laboratory exercise will be turned in digitally (via submission links on the course webpage). There will be one or two laboratory exercises each day. Additionally, each student is expected to develop a unique project proposal that will demonstrate their understanding of GIS. Through feedback between the instructor 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 23, 2025,** 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. The project proposal and final project will each be submitted via the submission links on the course webpage.

Late Work and Extensions Policy
Each lab assignment is due by 11:59 PM EST the day after it is assigned. For example, if a lab begins in class on May 24, it must be submitted by 11:59 PM on May 25. Late submissions will incur a 25% deduction from the total possible score for each calendar day past the deadline. For instance, if an assignment due by 11:59 PM on May 24 is submitted at 8:00 AM on May 26, the maximum score possible would be 75%.

If you anticipate needing extra time due to illness, personal emergencies, or other extenuating circumstances, please contact the instructor before the deadline to discuss possible accommodations.

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 (Keating 318), 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

Course policies

Attendance and Participation
Students are expected to attend all five days of the course. Absences will only be excused if permission is granted in advance by the instructor or if there is an extenuating circumstance (e.g., illness). Because the course is structured around interactive, follow-along activities and lab exercises, active participation is essential. All students are expected to fully engage in these components, and participation will be monitored and recorded.

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.

Group Work and Collaboration
Collaboration is an important part of learning, and students are encouraged to assist one another—especially when troubleshooting software-related issues during follow-along activities and lab exercises. Peer support and discussion can help build understanding and confidence with the tools we use. However, each student is expected to complete and submit their own individual work. Lab reports and assignments must reflect your own understanding and effort. While discussing approaches or comparing general ideas is acceptable, directly copying answers, splitting up the work, or submitting joint reports is not permitted. Each student must submit their own complete version of each assignment. If you're unsure whether a particular type of collaboration is appropriate, please ask the instructor for clarification.

Inclusivity and Accommodations
This course is committed to creating an inclusive, respectful, and supportive learning environment for all students. As the Instructor, I recognize and value the diverse backgrounds, identities, and experiences that each student brings to the classroom. You are encouraged to bring your full self to this course, and I ask that we all engage with each other thoughtfully and respectfully.

If you encounter barriers to learning or participation—whether related to disability, personal circumstances, or classroom dynamics—please email me or talk to me during class. I am committed to working with you to find reasonable and appropriate ways to support your success.

Students who require academic accommodations should contact Fordham's Office of Disability Services to obtain an official accommodation letter. Once you have this documentation, please share it with me as soon as possible so we can make any necessary adjustments.

If at any point you experience discrimination, bias, or harassment, you are encouraged to report it through appropriate university channels and/or reach out to me for support.

Tentative Schedule

Date	Topics	Labs

Thursday,
May 22, 2025
	• 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 23, 2025
	• 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 24, 2025	• Project discussions • GPS • Remote sensing	GPS, NDVI
Sunday, May 25, 2025	• Follow-along: Georeferencing a map • Follow-along: Raster calculator	Spatial analysis, Independent project development
Monday, May 26, 2025	• Species distribution modeling overview • Make-up work • Topic review • Independent project development	