



# ENVS 3700: GIS: Mapping Places & Analyzing Spaces Spring 2023

## COURSE DETAILS

### LOCATION AND TIME

Mondays, 3:30 – 6:30 pm

Rm. PCPSE 201 (Perelman Center for Political  
Science & Economics)

### INSTRUCTOR

Dr Siobhan Whadcoat ([whadcoat@sas.upenn.edu](mailto:whadcoat@sas.upenn.edu))

Rm. 360C, Hayden Hall

Office hours: Mon 12:30 – 2:30 pm, Thurs by  
appointment ([calendly.com/whadcoat/envs-3700](https://calendly.com/whadcoat/envs-3700))

### COURSE DESCRIPTION

This course is intended as a hands-on introduction to the concepts and capabilities of geographic information systems (GIS). Students will develop the skills necessary for carrying out basic GIS projects and for advanced GIS coursework. We will focus on a broad range of functional and practical applications, ranging from environmental science and planning to land use history, social demography, and disaster management. The class aims to help students develop an understanding of what is spatial, when GIS is appropriate for answering questions or presenting data, and an awareness of the complexities involved in map making. By the end of the course, students will be able to:

1. Find, organize, map, and analyze data using both vector (drawing-based) and raster (image-based) GIS tools.
2. Appreciate basic cartographic principles relating to map presentation.
3. Understand the basic principles of GIS, including representation, georeferencing, projection, scale, and uncertainty.
4. Obtain and work with secondary data, including U.S. Census data and data from environmental agencies, in a GIS environment.

## COLLEGE/LPS CURRICULUM REQUIREMENTS

This course fulfills the spatial analysis requirement for ENVS and EASC Majors. Previous experience in the use of GIS is not required.

## COURSE MATERIALS & TECHNOLOGY

There is no assigned textbook for this class. Complimentary and suggested readings from a variety of sources will be made available on Canvas.

This course will utilize ESRI's ArcGIS software, which can be accessed in Penn computer labs on campus and via the Penn virtual lab (vLab). In addition, students will be introduced to the capabilities of QGIS and Google Earth, which are both freely available to download. Data for use during class will be made available on Canvas.

## COURSE COMMUNICATION

Outside of class, the majority of communication will occur via Canvas and email. In addition to our weekly class, office hours will be held on Mondays, 12:30 – 2:30 pm in HAYD 360C, and on Thursdays, by appointment via Zoom. If you have any questions or problems, it is important to see me as soon as possible. I am also available by email, but it is often much easier to deal with issues in person, so I do encourage you to come to office hours or make an appointment.

Additionally, there is a general Q&A Discussion Board on Canvas that is designed for you to post questions relating to course content or logistics. Any questions about grades must be sent to me (Dr Whadcoat) in email format. Please see the Grading Policies at the end of the Syllabus for specific details regarding potential grading queries. If needed, I may ask to discuss the grade in person.

## COURSE FORMAT

The weekly three-hour class session will be approximately divided into three sessions, with a short break in between each:

- 3:30 – 4:15 pm: Lecture + Q&A
- 4:15 – 6:15 pm: Computer lab tutorial
- 6:15 – 6:30 pm: Discussion + Q&A

Each week will focus on a different topic (see course schedule below). The lectures will introduce the topic, providing the theory and technical information to support the computer lab. The computer lab tutorials will guide you through an exercise(s) to develop the related GIS skills, with a focus on different applications of GIS data each week. Each class will conclude with a short discussion of the results from the lab and time for questions. A summary of the workload and the requirements for the different course components are outlined under "Attendance & Participation".

# ATTENDANCE AND PARTICIPATION

## ATTENDANCE

Attendance at all classes is expected and the work completed in the computer lab tutorial will be factored into the class participation portion of your final grade. Due to the technical nature of this class, making up a missed class is difficult. If you do need to miss class due to illness, an emergency, or religious observance, then please contact me ahead of time. Additionally, please read the Policy section below for details on how to formally report any medical or emergency absences.

## COURSE WORKLOAD

Table 1: Approximate course workload.

Course Component	Hours	Total hours
Weekly class sessions	3 hrs per week (x14 weeks)	42 hrs
Weekly problem sets	1 hr per week (x13 weeks)	13 hrs
Assignments	5 hrs per assignment (x5)	25 hrs
Final Project		25 hrs
<b>Total</b>		<b>105 hrs (~7 hrs/wk)</b>

## PROBLEM SETS & IN-CLASS PARTICIPATION

Each week, work completed in the computer lab tutorial is designed to develop your skills in using GIS software and a deeper understanding of the course material introduced through lectures. This work is graded for completion only and will count for your participation grade in the course.

In addition to your participation in class, weekly problems will be set. These are short (max. 1 hr) tasks based on the skills developed in the computer lab tutorials. **Problem sets must be submitted (on Canvas) before class the following week and are graded for completion.** Please note that problem sets must be submitted prior to the beginning of class and that late submissions will not be accepted, unless an extension has been granted. In the event that unforeseen circumstances arise and you are not able to complete the work by the deadline, please reach out to me (Dr Whadcoat) ahead of the deadline to discuss an extension.

To account for extenuating circumstances that may require you to miss a class, you may miss one class and one associated problem set without any impact on your grade. However, it is important that you do your best to catch up on the missed material in order to be able to complete the assignments and final project.

## ASSIGNMENTS

Five homework assignments will be completed throughout the semester (see course schedule). The assignments will build on weekly problem sets to address particular GIS concepts and functions taught during the semester

and provide you with the opportunity to demonstrate the skills gained in class. Each assignment will have a specific focus on one or two key skills. Most assignments will require approximately 5 hrs work to be completed; note that this is an average time, and some assignments will not require this while others may require a little more. Please bear in mind that while I encourage you to work with one another and share ideas, both in and out of class, the assignment submissions must be your own work.

**Assignments must be submitted (on Canvas) before class the week after they are set** (see course schedule and Canvas for specific dates) and a graded according to a rubric, also available on Canvas. You are encouraged to respect the deadlines set and plan accordingly to make sure that you meet the deadlines for assignments. However, to ensure that you are able to submit work that reflects your best effort and not a last minute pre-class rush, no penalty will be applied to work submitted a few hours beyond the deadline (i.e., a little later on Monday evening). For work submitted the next day, or later, a grade penalty will apply (10% per day) unless an extension has been provided. In the event that unforeseen circumstances arise and you are not able to complete the work by the deadline, please reach out to me (Dr Whadcoat) ahead of the deadline to discuss an extension.

## FINAL PROJECT

In place of a final exam, you will complete an independent final project that will ask you to demonstrate a combination of analytical and technical skills. The project will require you to develop a plausible question that can be answered using GIS. You will collect relevant data, create maps to address your question, and write a final paper (~10 pages, including maps) describing your analysis methods and results. More details about the final project will be given later in the semester.

## GRADING

Final grades are based on a combination of the components outlined above. The breakdown is as follows:

In-class participation:	10 %
Problem sets:	20 %
Assignments:	45 %
Final Project:	25 %

Total scores will be converted to final letter grades using the following general scale:

A+	97-100	B+	87-89	C+	77-79	D+	67-69	F	0 - 59
A	94-96	B	84-86	C	74-76	D	64-66		
A-	90-93	B-	80-83	C-	70-73	D-	60-63		

# COURSE SCHEDULE

Table 2: Course schedule, with approximate times of the assignments provided.

Week	Week beginning	Topic	Assignments
1	Jan 9 <i>*Class meets on Weds (Jan 11) this week*</i>	Introduction to Digital Maps and ArcGIS	
2	Jan 16	<i>No class (MLK day)</i>	
3	Jan 23	Symbols, Classifications, & Themes	Assign. 1 (due 01/30)
4	Jan 30	Coordinate Systems, Projections, & Georeferencing	
5	Feb 6	Acquiring Data & Understanding Data Sources	Assign. 2 (due 02/13)
6	Feb 13	Attribute Tables: Joining Data & Calculating Values	
7	Feb 20	Managing & Editing Data in ArcMap	Assign. 3 (due 02/27)
8	Feb 27	Geoprocessing Tools & Raster Datasets	
9	Mar 6	<i>No class (Spring Break)</i>	
10	Mar 13	Introduction to Spatial Analyst	
11	Mar 20	Raster Classification, Map Algebra, & Composite Grids	Assign. 4 (due 03/27)
12	Mar 27	Applications for Environmental Data	
13	Apr 3	Calculating Density	
14	Apr 10	Zonal Statistics: Near, Far, & In Between	Assign. 5 (due 04/17)
15	Apr 17	Elevation Data & Raster Mosaics	
16	Apr 24	Conclusion	
17	May 1	<i>No class. Final Project due: May 5<sup>th</sup></i>	

# POLICIES

## DIVERSITY, EQUITY, AND INCLUSION

The Earth and Environmental Science Department embraces human diversity and intends equity and inclusion in our community and our classrooms. We expect instructors, staff, and students to respect our diversity. We encourage you to contact our Climate, Diversity, Equity and Inclusion (CDEI) Committee at [ees-cdeic@groups.sas.upenn.edu](mailto:ees-cdeic@groups.sas.upenn.edu) if you need support or have suggestions for how our efforts in EES can improve.

## ACADEMIC INTEGRITY

Students are expected to be familiar with and comply with Penn's Code of Academic Integrity, which is available in the Pennbook, or online. This course has a zero-tolerance policy for cheating or plagiarism, and all violations will result in substantial penalties. If you have any doubts or questions about what constitutes academic misconduct, please do not hesitate to contact me.

## CLASS ETIQUETTE

In-person class sessions, including lectures, labs, and office hours, should be spaces where everyone feels welcome and safe. In order to facilitate a welcoming and inclusive environment, it is expected that every student in this course will:

- Exercise consideration and respect in their speech and actions.
- Attempt collaboration and consideration, including listening to differing perspectives and respectfully raising any concerns, avoiding direct conflict.
- Refrain from demeaning, discriminatory, or harassing behavior and speech.

Please consider the following expectations when communicating in the online environment, such as on Canvas.

Please do:

- Ask questions and engage in conversations as often as possible.
- Be patient and respectful of others and their ideas they post online.
- Be prepared to wait for a response - you may not receive an immediate response.
- Contact the instructor to report inappropriate or offensive communications.

Please avoid:

- Using inappropriate language—this includes, but is not limited to, the use of hurtful and offensive terms.
- Posting inappropriate materials—this includes, but is not limited to, sharing nude, offensive, and graphic images.
- Posting in ALL CAPS, as this is perceived as shouting.
- Sending or respond to heated messages.
- Sending an email to the entire class, unless it requires a response from all classmates.

## ELECTRONICS IN CLASS

To ensure that electronic devices are helpful and not a hindrance to our learning please note the following: In addition to the use of the desktop computers for the lab exercises, you may use the desktop computer (or your laptop or tablet) for taking notes during lecture; however, that privilege will be lost if you are found to be using them for non-course-related reasons (e.g., news, social media, shopping). All other electronic devices should be silenced and hidden (you may use your cell phone as a calculator when appropriate). If there is an emergency situation and your phone must be on/visible, please make the instructor aware of this at the beginning of class.

## DISABILITY DISCLOSURE

University of Pennsylvania provides reasonable accommodations to students with disabilities who have self-identified and been approved by the Office of Student Disabilities Services (SDS). If you have not yet contacted SDS and would like to request accommodations or have questions, you can make an appointment by calling SDS at 215-573-9235 or by visiting their website: <https://www.vpul.upenn.edu/lrc/>. The office is located in the Weingarten Learning Resources Center at Stouffer Commons, 3702 Spruce Street, Suite 300. All services are confidential. If you have any accommodations that I (Dr Whadcoat) need to be aware of then please communicate this with me as soon as possible. I will make every effort to ensure that your needs are accommodated so that you can fully participate in this class.

## GRADING

During the course of grading assignments and the final project, it is possible that a mistake could be made. There are three categories of mistakes, and you should approach them, and can expect responses, as follows:

1. Errors that introduce confusion or ambiguity in formulating questions: These impose equal disadvantage on all students, and as such, any adjustment will be made solely at the discretion of Dr Whadcoat.
2. Errors of addition/subtraction in compiling individual student scores: These are easily corrected and will be done so with due diligence. If you find such an error in an assignment, please bring it to Dr Whadcoat's attention.
3. Errors of judgment in assigning full or partial credit to specific answers: All students are given the benefit of any legitimate doubt in determining the "correctness" of an answer to any question. I am far more likely to award more credit than an answer is worth than I am to award less credit. If you think you have suffered from one or more errors of this category, describe those errors fully, in writing, and submit it with the relevant assignment or exam to Dr Whadcoat. Your work will be reviewed to see if you should have been awarded more credit for those questions. Please understand that once you submit your work for regrading, the grade can go either up or down.

## ABSENCES

Students who need to miss class due to illness or other extenuating circumstances should use the Course Absence Notice (CAN) in [Path@Penn](mailto:Path@Penn) to notify their instructors that they are unable to attend class. Additionally, students should contact the instructor directly to obtain resources to make-up missed work.

## EXTENSIONS

Extensions for assignments are granted for unforeseen, extenuating circumstances including, but not limited to, severe illness or a death in the family. Requests for extensions should be made via email to Dr Whadcoat ahead of the due date for assignments. Extensions are not given to problem sets. Please note that an extension cannot be given on the final project; if you are unable to complete the project due to extenuating circumstances then you may apply to take an Incomplete in the class according to university policy. There is no guarantee that an Incomplete will be awarded and all decisions will be made by the instructor on a case-by-case basis.