ENVS 3700: GIS: Mapping Places and Analyzing Spaces

Fall 2023 Course Prospectus

INSTRUCTOR

Dr Siobhan Whadcoat [whadcoat@sas.upenn.edu], Rm. 360C, Hayden Hall

COURSE MEETING TIMES

Thursdays, 3:30 – 6:30 pm in UDAL (201 Perelman Center, PCPSE)

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

There is no assigned textbook for this class. Complimentary and suggested readings from a variety of sources will be made available on Canvas, in addition to the online ArcGIS Pro documentation.

This course will utilize ESRI's ArcGIS Pro software, which can be accessed in Penn computer labs on campus and via the Penn virtual lab (vLab). Data for use during class will be made available on Canvas.

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.

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.

COURSE COMPONENTS & WORKLOAD

Weekly Problem Sets
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 are due at the beginning of class the following week and graded for completion.

Homework Assignments
There are five homework assignments throughout the semester (see course schedule). The assignments will 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.

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.

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
Total		**105 hrs (~6.5 hrs/wk)**

GRADING

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

In-class participation:	10 %
Problem sets:	15 %
Homework assignments:	50 %
Final Project:	25 %

COURSE SCHEDULE

Table 2: Course schedule, with approximate times of the assignments provided. Please note that this is subject to minor changes.

Week	Week beginning	Topic	Assignments
1	Aug 28	Introduction to Digital Maps and ArcGIS	
2	Sep 4	Symbols, Classifications, & Themes	Assign. 1
3	Sep 11	Coordinate Systems, Projections, & Georeferencing	
4	Sep 18	Acquiring Data & Understanding Data Sources	Assign. 2
5	Sep 25	Attribute Tables: Joining Data & Calculating Values	
6	Oct 2	Managing & Editing Data in ArcMap	Assign. 3
7	Oct 9	*No class (Fall Break)*	
8	Oct 16	Geoprocessing Tools & Raster Datasets	
9	Oct 23	Introduction to Spatial Analyst	
10	Oct 30	Raster Classification, Map Algebra, & Composite Grids	Assign. 4
11	Nov 6	Applications for Environmental Data	
12	Nov 13	Calculating Density	
13	Nov 20 **class meets on Tues, Nov 21**	Zonal Statistics: Near, Far, & In Between	Assign. 5
14	Nov 27	Elevation Data & Raster Mosaics	
15	Dec 4	Conclusion/Final Projects	
16	Dec 11	*No class (classes finish on Mon, Dec 11)*	
17		*Final Project due: Dec 14th*	