

SIE 510: Overview

GIS Applications with Python

[Kate Beard](#)

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Course Objectives

This course investigates theoretical and practical aspects of GIS applications and application development using the Python programming language. The course reviews GIS models and operations, various application areas, and dependencies between models and applications, conceptual data modeling, database development, and analysis. The course requires completion of several lab exercises, presentations, and development and completion of an application project.

A. Class Sessions

- *On-campus Students:* Tues and Thursday, 9:30 – 10:45 Tues & Thurs, Room 326 Boardman Hall
- *Live Broadcast:* Available through Zoom. Online students may view and participate in the live sessions but are not required to do so.
- *Archived Lectures:* Links to the recorded lectures are available at the end of each day through the *Lectures and Assignments* link for this course.

B. Class Assignments

- **Lab Exercises:** Students are responsible for completing several lab exercises. The objective of the labs is to develop skills with Python programming and GIS project development. We will be using jupyter notebooks, ArcGIS and QGIS software.
- **Application Presentation:** Each student will be required to present a short report on an application of their choosing.
- **Projects:** The application project involves working with a client(s), conducting a requirements analysis to determine the client's needs, specification of requirements, and development of an application prototype to serve the client's needs. Projects require a final presentation to the class and clients and submission of a final project report at the end of the semester.

C. Course Grading

- GIS Application Presentation 10%
- Labs 40%
- Final Project 50%

D. Class Resources

- **Supporting Text** [Principles of GIS](#) by Otto Huisman and Rolf A. de By
- **Python resources:** [A python tutorial](#)

E. Important Notices

- [Important Disability Notice](#)
- [Contingency Plans in the Event of a Flue Epidemic](#)

F. Instructor Office Hours

- For one-on-one discussions with the instructor, email to kate.beard@maine.edu.
- **On-campus Students:** Send an email to set up an appointment.
- **Distance Students:** Email me to schedule a Zoom conference.

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Sample Schedule of Lectures and Assignments

Wk	Day	Date	Topic	Reading Assignments	Lab Assignments	Lab Data
1	T	Jan 21	Course introduction	Principles of GIS – Chapter 1		
	TH	Jan 23	Conceptual Modeling		Lab 1 Conceptual Model Development	
2	T	Jan 28	Jupyter Notebooks & Python Basics I			
	TH	Jan 30	More Jupyter Notebooks & Python Basics		Lab 2 Python programming	
3	T	Feb 4	Logical Models- Databases			
	TH	Feb 6	Normalization		Lab 3 Normalization	
4	T	Feb 11	Designing effective maps			
	TH	Feb 13	Python – geoprocessing tools		Lab 4 Geoprocessing with Python	

5	T	Feb 18	Python – text processing			
	TH	Feb 20	Python – cursors		Lab 5 Text Parsing	
6	T	Feb 25	Projections			
	TH	Feb 27	Working with Terrain Data		Lab 6 Reading and Writing Spatial Features	
7	T	Mar 3	Working with Raster Data			
	TH	Mar 5	Network based models		Lab 7 Working with networks	
	T	Mar 10	Working with directed networks			
	TH	Mar 12				
	T	Mar 17	Spring Break			
	TH	Mar 19	Spring Break			
8	T	Mar 24	Python functions		Lab 8 Writing functions	
	TH	Mar 26	Python functions			
9	T	Mar 31	Requirements analysis		Lab 9	
	TH	Apr 2	ArcGIS online			
10	T	Apr 7	Data Quality Issues			
	TH	Apr 9	Metadata		Project requirements analysis	
11	T	Apr 14	Python Tools			
	TH	Apr 16	Python Add-Ins			
12	T	Apr 21	Project development		Project conceptual model due	

	TH	Apr 23	Project development			
13	T	Apr 28	Project development			
	TH	Apr 30	Project development			
14	T	May 5	Finals Week (Final project presentations)		Project report due	
	Th	May 7				