Introduction to GIS and Cartography (GEOG 3100/6100)
Spring 2019

MW/ 8:35 – 9:25 am (Lecture)
Lecture: GC 2560
Labs: GC 1855

Lecture: Josh Heyer
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Office Location: The DIGIT lab
Office Hours: MW 9:40-11:00 or by appointment
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Course description and goals

Geographic Information Systems (GIS) used to explore spatial-temporal problems are valuable to a variety of disciplines, in management, in data analytics, and anyone displaying geographic information. The goal of this course is to introduce students to major concepts and applications of GIS and cartography. During this course you will learn about spatial information, digital data, and how GIS is used to represent features, examine relationships between features, and display information. Class lectures will cover GIS principles, concepts, and applications, as well as the principles of cartography/map design and geo-visualization. The labs are designed to apply GIS concepts with hands on exercises in order to become familiar with, and learn the functionality of ArcGIS software.

The objective of the class is to learn how to solve problems using GIS, and to use GIS to display geographic information following cartographic principles in a way that facilitates communication and understanding. We will learn and practice GIS skills by completing exercises in class, labs and completing a final project, with the goal of being able to apply skills to solve real world problems.

This class fulfills a quantitative intensive (QI) requirement, which means the course content will develop analytic reasoning skills and deepen knowledge of quantitative methods. You will build upon and expand previous knowledge of quantitative methods and concepts by learning about, and practicing, the underlying quantitative theory behind core GIS concepts. The goal is that you will understand not just the software but also the theory when applying quantitative methods to practical issues and real world problems via spatial analysis.

Learning Outcomes

- Demonstrate an understanding of fundamental GIS concepts and methods
- Understand the concept of 'thinking spatially' and determine when spatial analysis is appropriate and needed
- Understand common approaches to spatial analysis and their applications
- Ability to effectively display and visualize spatial data and implement cartographic principles

Helpful Information

- Don't be afraid to ask questions during class. If you have additional questions following class, feel free to visit me during my office hours, or schedule a time outside of my office hours.

- I'll respond to emails within 24 hours, with the exception of holidays and weekends. If for some reason I don't respond to your email within 24 hours (Monday – Friday), please send me a second email.

- Assignments will be distributed and turned in via Canvas.

- If you plan on missing an assignment or test please inform the instructor or TA a week in advance to arrangement a makeup time.

- Late assignments lose ten percent per day, no late tests are allowed.

- All work turned in must be original and not plagiarized. Working in groups on assignments is allowed, provided that each person turns in an assignment written in their own words. Cheating, copying, and plagiarism will automatically result in a zero on the test or assignment.

- If you disagree with how an assignment or test was graded, please see me during my office hours to discuss the grade.

- Attendance is not recorded, but regular attendance is recommended, and will help you succeed in the class. If you miss a class, it is your responsibility to understand the material covered (i.e. obtain notes from other students).

- To be successful in this course you will need to attend labs in order to understand how to use ArcGIS software.

Required Textbooks

A Primer of GIS, Fundamental Geographic and Cartographic Concepts, by Francis Harvey (2nd edition) ISBN: 978-1-4625-2217-0

Designing Better Maps: A guide for GIS Users, by Cynthia Brewer (2nd edition) ISBN: 978-1-5894-8440-5

Student Assessment Activities and Grading

5% In class activities/lecture assignments

5% Map assessment
Maps are effective ways to relay all sorts of information. You will select a map, from print, popular media, social media, or other source, and write a critical analysis of the maps design and functionality and use of cartographic principles. Examples will be given in class.

30% Exams (2)
These will be composed of multiple choice, matching, and short answer questions.

20% Final Project
The design and implementation of a project solving a problem or answering a question using spatial data and analysis. Details on the format for the different components of the final project will be provided in lecture and lab.
10% Final project map/poster and presentation
10% Final project report

40% Labs

Class Schedule (subject to change, with notice)

Week	Readings	Lecture Topic	Lab Exercise Topics
1	*Chapter 1 – 2 Goals of GIS/Representation*	Course Plan, Motivation Introduction to GIS, GIS examples	*Overview of the ArcGIS Software Suite*

2	*Chapter 3 & 4– Issues/History of GIS*	Nature of geographic information/Types of GIS data/Uncertainty	*Interacting with Data, Symbology*
3	*Chapter 5– Projections*	Map Projections	*Creating a Map, Map Types*
4	*Chapter 6 & 7– Location and Coordinate Systems/Databases*	Geodesy and Datums Coordinate Systems Data Representation/Types/Modeling Databases and Tables	*Projections, Coordinate Systems*
5	*Chapter 8– GPS and digitization*	Surveying and GPS Digitizing, Creating, Editing Data, Metadata	*Querying data, features, joining and relating data*
6	*Chapter 10– Data Types*	Topology, Buffering, and Overlays	*Creating/Editing Features, Building Geodatabases, Metadata* *Exam Review*
7		Review **Exam #1**	
8	*Ch. 14– Online Mapping and Geocoding*	Online GIS, Geocoding	*Vector analysis: Overlays, Proximity, and Extraction*
9	*Chapters 9– Remote Sensing* *Brewer: Ch. 1-2*	Introduction to Remote Sensing and Data Sets Terrain Analysis	*Geocoding,Reverse geocoding*
10		**SPRING BREAK**	
11	*Chapter 11 & 12– Cartographic Representation/Misuse* *Brewer: Ch. 3-4*	Cartography and Geovisualization	*Online mapping*
12	*Chapter 15– GIS Analysis* *Brewer: Ch. 5-6*	Map Algebra, Local, Neighborhood, Zonal and Global Functions	*Advance cartography (labeling, representations, map element editing, etc.)*
13	*Chapter 16– Geostatistics* *Brewer: Ch. 7-8*	Spatial Estimations, Spatial Modeling	*Surface Analysis* *Extra Credit: Map Algebra*
14	*Chapter 17– Past and Future GIS* *Brewer: Ch. 9*	Special topics in GIS/ Future of GIS	Working on Term Project Exam Review
15		Wrap up material/review **Exam #2**	Working on Term Project

16		Early Presentations	Working on Term Project
17		*Finals Week*	**Term Project Presentations** **Written Reports Due**

The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability & Access, 162 Olpin Union Building, 801-581-5020. CDA will work with you and the instructor to make arrangements for accommodations.

All written information in this course can be made available in alternative format with prior notification to the Center for Disability & Access.