

Introduction to GIS and Cartography (GEOG 3100/6100)

Fall 2019

MW/ 8:35 – 9:25 am (Lecture)

Lecture: GC 2660

Labs: GC 1825

Lectures: Dr. S. McKenzie Skiles

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Office Location: GC 4884

Office Hours: MW 9:40-11:00 or by appointment

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Lab TA: Chelsea Ackroyd

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Office Hours: MW 11:35-12:55 or by appointment

Course description and goals

This course is an introduction to the major concepts and applications of Geographic Information Systems (GIS) and cartography. GIS is a system for management, analysis, and display of geographic information. In this course, you will learn about spatial information, digital data, and how GIS is used as a tool to represent features, examine relationships between features, and display information. In lecture, we will cover principles and concepts and learn about the applications and uses of GIS, as well as covering the principles of cartography/map design and geo-visualization. The labs are designed to apply the concepts with hands on exercises while becoming familiar with, and learning the functionality of, ArcGIS software.

The objective of the class is to learn to solve problems using GIS and display the information in a way that facilitates communication and understanding and follows cartographic principles. We will learn and practice skills by completing exercises in class and labs and completing a final project, with the goal of being able to apply skills to solve real 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 method 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 understanding of the fundamental concepts and methods in geographic information science
- 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 Details

Don't be shy! Please feel free to ask me as many questions as you can think of during class, or during my office hours. I also welcome feedback about the class, and what you find works or doesn't work for your learning process.

I will respond to emails within 24 hours, with the exception of holidays and weekends, over which I will still do my best to respond in a timely fashion- do not be afraid to email me twice if you think your email may have been overlooked.

Assignments will be distributed and turned in via Canvas.

Tests are taken on Canvas. They are open all day on the test day, you do not need to attend class to take the test, you can take it online wherever you are most comfortable taking a test, but you must complete it fully on the day it is open on Canvas (see schedule below).

If you are going to miss an assignment or test, please make arrangement with the instructor or TA at minimum a week ahead of time.

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

Attendance is not taken during lecture but regular attendance is encouraged. Most in class days will be a mix of lecture and activity, many of which will be graded. If a class is missed in class activities cannot be made up and it is the responsibility of the student to understand the material covered (i.e. obtain notes from other students).

Work must be original, while you will frequently work on things together, for individual assignments each person must turn in their own assignments in their own words. Cheating, copying, and plagiarism will automatically result in a zero on the test or assignment.

The books listed below are suggested to supplement what you learn in class. You will only be tested on material that was covered in lecture/lab (i.e. I will never test you on something in the book that has not been covered in lecture/lab).

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 visualize a variety of topics. 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% Tests (2)

These will be given on Canvas, and 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 content and format for the components of the final project will be provided in lecture and lab.

5% Final project maps

15% Final project report

40% Labs

Class Schedule (subject to change, with notice)

Week	Reading	Lecture Topic	Lab Exercise Topics
1 Aug 19/21	Chapter 1&2- Goals of GIS/Representation	Course Plan, Motivation Introduction to GIS, GIS examples	Overview of the ArcGIS Software Suite
2 Aug 26/28	Chapter 3&4 - Issues/History of GIS	Nature of geographic information/Types of GIS data/Uncertainty	Interacting with Data, Symbology
3 Sep 4	Chapter 5 & 6 - Projections, Location and Coordinate Systems Brewer: Ch. 1-2	Map Projections Geodesy and Datums Coordinate Systems	Creating a Map, Map Types
4 Sep 9/11	Chapter 7- Databases Brewer: Ch. 3-4	Wrap up coordinate systems Data Representation/Types/Modeling Databases and Tables	Projections, Coordinate Systems

5 Sep 16/18	Chapter 8– GPS and digitization Brewer: Ch. 5-6	Surveying and GPS Digitizing, Creating, Editing Data, Metadata	Querying data, features, joining and relating data
6 Sep 23/25	Chapter 10 – Data Types Brewer: Ch. 7-8	Topology, Buffering, and Overlays	Creating/Editing Features, Building Geodatabases, Metadata
7 Sep 30/Oct 2		Wrap up material/review Exam #1	
8		Fall Break	
9 Oct 14/16	Chapter 11/12 Cartographic Representation/Misuse Brewer: Ch. 9	Cartography and Geovisualization	Vector Analysis
10 Oct 21/23	Ch. 14- Online Mapping and Geocoding	Online GIS/Geocoding	Advanced cartography (labeling, representations, map element editing, etc.)
11 Oct 28/30	Chapters 9- Remote Sensing	Introduction to Remote Sensing and Data Sets Terrain Analysis	Geocoding/Reverse Geocoding
12 Nov 4/6	Chapter 15 GIS Analysis	Map Algebra, Local, Neighborhood, Zonal and Global Functions	Online Mapping
13 Nov 13	Chapter 16 Geostatistics	Spatial Estimations, Spatial Modeling	Raster Analysis
14 Nov 18/20	Chapter 17 Past and Future GIS	Special topics in GIS/ Future of GIS	Map Algebra
15 Nov 25		Exam #2	Working on Term Project
16 Dec 2/4		Final Project Presentations (Required 6100, Extra Credit 3100)	Working on Term Project
17		<i>Finals Week</i>	Final Projects Due

The Americans with Disabilities Act. 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.

Addressing Sexual Misconduct. Title IX makes it clear that violence and harassment based on sex and gender (which includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, SSB 328, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).

Diversity and Inclusivity. It is my intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is my intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups. In addition, if any of our class meetings conflict with your religious events, please let me know so that we can make arrangements for you.

Preferred Names and Pronouns. Class rosters are provided to the instructor with the student's legal name as well as "Preferred first name" (if previously entered by you in the Student Profile section of your CIS account, which managed can be managed at any time). While CIS refers to this as merely a preference, I will honor you by referring to you with the name and pronoun that feels best for you in class or on assignments. Please advise me of any name or pronoun changes so I can help create a learning environment in which you, your name, and your pronoun are respected. If you need any assistance or support, please reach out to the LGBT Resource Center. https://lgbt.utah.edu/campus/faculty_resources.php

Undocumented Student Support. Immigration is a complex phenomenon with broad impact—those who are directly affected by it, as well as those who are indirectly affected by their relationships with family members, friends, and loved ones. If your immigration status presents obstacles to engaging in specific activities or fulfilling specific course criteria, confidential arrangements may be requested from the Dream Center. Arrangements with the Dream Center will not jeopardize your student status, your financial aid, or any other part of your residence. The Dream Center offers a wide range of resources to support undocumented students (with

and without DACA) as well as students from mixed-status families. To learn more, please contact the Dream Center at 801.213.3697 or visit dream.utah.edu.