Introduction to GIS and Cartography (GEOG 3100/6100)

Spring 2020

MW, 8:35 – 9:25 am (Lecture)

Lecture: GC 2560

Labs: GC 1825

Lectures: Dr. Alexander Hohl

Email: alexander.hohl@geog.utah.edu

Office Location: GC 4841

Office Hours: MW, 11:50-12:50 or by appointment

Office Phone: 801-581-6021

Labs:

MW, 9:40am-11:35am, GC 1855

W, 12:55pm-2:50pm, GC 1825

Lab TA: Daniel Quintanilla

Email: daniel.quintanilla@utah.edu

Office Hours: 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 do my best to respond to emails within 24 hours, with the exception of holidays and weekends, over which I will still try 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 the take 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.

Textbooks


Student Assessment Activities and Grading

• 5% In class activities/lecture assignments
• 5% Map assessment
  o 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)
  o These will be given on Canvas, and will be composed of multiple choice, matching, and short answer questions.
• 20% Final Project
  o 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.
  o 5% Final project maps
  o 15% Final project report
• 40% Labs
## Class Schedule (subject to change, with notice)

<table>
<thead>
<tr>
<th>Week</th>
<th>Reading</th>
<th>Lecture Topic</th>
<th>Lab Exercise Topics</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>1/6 Jan</td>
<td>Chapter 1&amp;2- Goals of GIS/Representation</td>
<td>Course Plan, Motivation Introduction to GIS, GIS examples</td>
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<tr>
<td>2</td>
<td>13/15 Jan</td>
<td>Chapter 3&amp;4 - Issues/History of GIS</td>
<td>Nature of geographic information/Types of GIS data/Uncertainty</td>
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<td>3</td>
<td>20 Jan</td>
<td>Martin Luther King Jr. Day</td>
<td>No class</td>
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<tr>
<td>3</td>
<td>22 Jan</td>
<td>Chapter 5 &amp; 6 - Projections, Location and Coordinate Systems Brewer: Ch. 1-2</td>
<td>Map Projections Geodesy and Datums Coordinate Systems</td>
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<tr>
<td>4</td>
<td>27/29 Jan</td>
<td>Chapter 7 – Databases Brewer: Ch. 3-4</td>
<td>Wrap up coordinate systems Data Representation/Types/Modeling Databases and Tables</td>
</tr>
<tr>
<td>5</td>
<td>3/5 Feb</td>
<td>Chapter 8 – GPS and digitization Brewer: Ch. 5-6</td>
<td>Surveying and GPS Digitizing, Creating, Editing Data, Metadata</td>
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<td>6</td>
<td>10/12 Feb</td>
<td>Chapter 10 – Data Types Brewer: Ch. 7-8</td>
<td>Topology, Buffering, and Overlays</td>
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<tr>
<td>7</td>
<td>17 Feb</td>
<td>Presidents’ Day</td>
<td>No class, but you should study for the exam</td>
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<td>7</td>
<td>19 Feb</td>
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<td>Exam #1</td>
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<tr>
<td>8</td>
<td>24/26 Feb</td>
<td>Ch. 14 - Online Mapping and Geocoding</td>
<td>Online GIS/Geocoding</td>
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<td>Date</td>
<td>Chapters/Topics</td>
<td>Lab/Project</td>
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<tr>
<td>9 Mar 2/3</td>
<td>Chapters 9-Remote Sensing</td>
<td>Introduction to Remote Sensing and Data Sets</td>
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<td></td>
<td></td>
<td>Terrain Analysis</td>
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<tr>
<td>10 Mar 9/11</td>
<td>Spring Break</td>
<td>No classes</td>
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<tr>
<td>11 Mar 16/18</td>
<td>Chapter 15 GIS Analysis</td>
<td>Map Algebra, Local, Neighborhood, Zonal and Global Functions</td>
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<tr>
<td>12 Mar 23/25</td>
<td>Chapter 16 Geostatistics</td>
<td>Spatial Estimations, Spatial Modeling</td>
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<tr>
<td>13 Mar 30/Apr 1</td>
<td>Chapter 11/12 Cartographic Representation/Misuse Brewer: Ch. 9</td>
<td>Cartography and Geovisualization</td>
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<tr>
<td>14 Apr 6/8</td>
<td>Chapter 17 Past and Future GIS</td>
<td>Special topics in GIS/ Future of GIS</td>
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<tr>
<td>15 Apr 13/15</td>
<td>Exam #2 Final Project Presentations (Required 6100, Extra Credit 3100)</td>
<td>Working on Term Project</td>
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<tr>
<td>16 Apr 20/22</td>
<td>Final Project Presentations (Required 6100, Extra Credit 3100) Reading Day</td>
<td>Working on Term Project</td>
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<td>Apr 23 - 29</td>
<td>Final Exam period</td>
<td>Final Projects Due</td>
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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](https://lgbt.utah.edu/campus/faculty_resources.php) (Links to an external site.)

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.

Safety & Wellness Statement. Your safety is our top priority. In an emergency, dial 911 or seek a nearby emergency phone (throughout campus). Report any crimes or suspicious people to 801-585-COPS; this number will get you to a dispatch officer at the University of Utah Department of Public Safety (DPS; dps.utah.edu). If at any time, you would like to be escorted by a security officer to or from areas on campus, DPS will help — just give a call. The University of Utah seeks to provide a safe and healthy experience for students, employees, and others who make use of campus facilities. In support of this goal, the University has established confidential resources and support services to assist students who may have been affected by harassment,
abusive relationships, or sexual misconduct. A detailed listing of University Resources for campus safety can be found at https://registrar.utah.edu/handbook/campussafety.php. Your well-being is key to your personal safety. If you are in crisis, call 801-587-3000; help is close. The university has additional excellent resources to promote emotional and physical wellness, including the Counseling Center (https://counselingcenter.utah.edu), the Wellness Center (https://wellness.utah.edu), and the Women’s Resource Center (https://womenscenter.utah.edu). Counselors and advocates in these centers can help guide you to other resources to address a range of issues, including substance abuse and addiction. The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy escort, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit safeu.utah.edu.
CSBS EMERGENCY ACTION PLAN

BUILDING EVACUATION
EAP (Emergency Assembly Point) – When you receive a notification to evacuate the building either by campus text alert system or by building fire alarm, please follow your instructor in an orderly fashion to the EAP marked on the map below. Once everyone is at the EAP, you will receive further instructions from Emergency Management personnel. You can also look up the EAP for any building you may be in on campus at http://emergencymanagement.utah.edu/eap.

CAMPUS RESOURCES
U Heads Up App: There's an app for that. Download the app on your smartphone at alert.utah.edu/headsup to access the following resources:

- **Emergency Response Guide**: Provides instructions on how to handle any type of emergency, such as earthquake, utility failure, fire, active shooter, etc. Flip charts with this information are also available around campus.
- **See Something, Say Something**: Report unsafe or hazardous conditions on campus. If you see a life threatening or emergency situation, please call 911!

**Safety Escorts**: For students who are on campus at night or past business hours and would like an escort to your car, please call 801-585-2677. You can call 24/7 and a security officer will be sent to walk with you or give you a ride to your desired on-campus location.