

Geospatial Field Methods (GEOG 3170/5170)

'GPS and Drones'

Fall 2020, Department of Geography

**** Please note the schedule, class will meet four Mondays at the beginning of the semester.*

Other course content (labs, test, lectures) will be completed online. This is a hybrid class.

*The situation with COVID-19 is evolving, and safety always comes first, meaning that plans for the in-person/field portion of class may change. I will give you as much notice as possible if the schedule/timeline for the course is being adapted. ****

Classroom Lectures: Mon, Aug 26th- Sep 28th 9:40 am – 11:35 am

Lecture Location: First class will be over Zoom, remaining classes will meet first in BEH 112, come prepared to spend most of class outside (face coverings still required for outdoor class time)

Instructor: Dr. S. McKenzie Skiles

Email: m.skiles@geog.utah.edu

Office Hours: *Office hours will be held over Zoom, on class meeting days' office hours are from 12-1:30 pm, and during data processing (first two weeks of October) office hours will held on Mon/Wed 9-11 am*

Course description and goals

This field based course is a hands-on introduction to geospatial field methods. Course content will focus on Global Positioning Systems (GPS)/Global Navigation Satellite Systems (GNSS) and unmanned aerial systems (UAS; commonly referred to as drones), but will also broadly cover the various tools and resources geospatial scientists employ to gather, process/analyze, and visualize/present geospatial field data. Concurrent with the field session online lectures will cover the basics needed to successfully understand field collection and analysis, including projections and coordinate systems, remote sensing, georeferencing, digital surface/elevation models, and basic spatial analysis using Geographic Information Systems (GIS). In the field students, will learn safe field practices, field note taking and metadata collection, how to write up field reports, will get guided hands on experience with geospatial data field instrumentation including surveying equipment, GPS, and UAS, and will independently collect data for their course projects.

Specifically, in terms of GPS/GNSS, students will learn: 1) the basic principles of how GPS works, 2) the difference between GPS systems and receivers and associated levels of uncertainty, 3) how to post-process and visualize GPS data, and 4) how to georeference field observations, photos, and data for analysis and reports. In terms of UAS, students will learn how to: 1) fly a quadcopter UAS safely after demonstrating an understanding of restrictions/limitations, 2) collect aerial imagery for different applications, 3) process and georeference imagery by applying GPS information, and 4) produce digital surface and orthophoto models using structure from motion photogrammetry.

The objective of the class is to learn how to collect geospatial data, process and analyze geospatial data while understanding and constraining uncertainties, and display the information in a way that facilitates communication and understanding. We will focus on practical skills and field implementation, and will use software that is commonly used by industry professionals. Students will learn and practice skills by covering theory and completing exercises/labs in class, and applying that knowledge during field sessions. Following field sessions there will be a hands demonstration of data processing and visualization. Students will complete a final project relating to the data collected during the field sessions, and will prepare a professional report summarizing results. *There are no prerequisites for the course, but a previous GIS or remote sensing class may provide the student with a better background for some course content.*

Learning Outcomes

- Demonstrate understanding of the fundamental concepts and methods for geospatial data collection

- Understand the concept of ‘thinking spatially’ and determine when geospatial data collection is appropriate and needed
- Understand common approaches to geospatial data analysis, their applications, and sources of uncertainty
- Gain the skills needed to confidently operate field instruments, navigate in outdoor environments, and produce field reports
- Ability to effectively display and visualize geospatial spatial data and implement GIS/cartographic principles

Helpful Details

Attendance is required during the three in person field sessions (September 14th, 21st, 28th). We will spend most of class outside, and all students are still required to wear face coverings and socially distance. If you are concerned about coming to class, please discuss this with me *before* the class.

Don’t be shy. I am happy to answer questions during class and office hours, or through email.

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.

There is a suggested e-book, but no required textbooks, assigned readings will be provided and will be posted on Canvas at the beginning of the course.

Assignments will be distributed and turned in via Canvas.

Late assignments lose 10% per day.

Work must be original, 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.

This is a 3 credit hr course, it is structured differently than most traditional classes, but students should expect to spend the same amount of time/effort on this class relative to regular weekly course.

Student Assessment Activities and Grading

30%	Labs
20%	Participation
20%	Test Will be composed of multiple choice, matching, and short answer questions and will be based on material learned in the lecture and in the field (expect questions on both theory and methods)
30%	Final Project The design and implementation of a project using geospatial field data collected in the field. Details on the format for the different components of the final project will be provided in class and on Canvas.

Class Schedule (subject to change, with notice)

Dates	Lecture Topic	Lab Exercise/Field Topics
Aug 24	Course Plan, Motivation Details about course scheduling Field Reports and Metadata // Lecture Online: Projections and coordinate systems, GPS/GNSS	<i>Lab: Mapping, Location, Basics of GPS</i>
Sep 14	Lecture Online: Remote sensing basics, creating/editing data, surveying	<i>Lab: GPS in GIS Field: Collecting GPS data</i>
Sep 21	Lecture Online: Basic of imagery, photogrammetry, and unmanned aerial systems (UAS)	<i>Lab: Georeferencing/ Digital Surface Models, Field: UAS flying practice</i>
Sept 28	Lecture Online: Connecting GPS and UAS Georeferencing and Structure from Motion Analyzing Digital Surface Models	<i>Lab: Structure from Motion, Field: GPS+UAS Final Project data collection</i>
Week of Oct 5	<i>Available for processing help online</i>	<i>Test (On Canvas) Processing Field Data</i>
Week of Oct 12	<i>Available for processing help online</i>	<i>Processing Field Data</i>
Week of Oct 26		Written Reports Due

Labs

There will be four labs during the first four weeks of class, all software is accessed through Citrix server or you can use computer labs in Gardner Commons, if they remain open and accessible this semester. Labs are due by Friday at midnight the week that they are assigned. Labs turned in late will lose 10% of their value each day they are late.

You can ask questions to your peers and myself about lab content or technical details, but are expected to do your own work on the labs. Labs are to be submitted to Canvas by midnight on their due date. Labs are expected to be well formatted and free of spelling and grammatical errors.

Exam

Exams cannot be made up unless the instructor is contacted prior to an absence.

Participation

Participation points are related to field activities, both attendance and assignments. These cannot be made up if class is missed.

COVID-19

Based on CDC guidelines, the university requires everyone to wear face coverings in shared public spaces on campus, including our classroom. As a reminder, when I wear a face covering, I am protecting you. When you wear a face covering, you are protecting me and all of your classmates. If you forget your face covering, I will ask you to leave class to retrieve it. If you repeatedly fail to wear a face covering in class, I will refer you to the Dean of Students for a possible violation of the Student Code. Note that some students may qualify for accommodations through the Americans with Disabilities Act (ADA). If you think you meet these criteria and desire an exception to the face covering policy, contact the [Center for Disability and Access \(CDA\)](#). Accommodations should be obtained prior to the first day of class so that I am notified by CDA of any students who are not required to wear a face covering.

Given the nature of this course, attendance is required for the three field sessions, and adjustments cannot be granted to allow non-attendance. However, if you need to seek an ADA accommodation to request an exception to this attendance policy due to a disability, please contact the [Center for Disability and Access \(CDA\)](#). CDA will work with us to determine what, if any, ADA accommodations are reasonable and appropriate.

Please remember, you must self-report if you test positive for COVID-19 via coronavirus.utah.edu.

Disabilities

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.

Academic Misconduct

All students are required to be familiar with the Academic Honesty policy of the university and to comply with the policy. Plagiarized or copied work, or any other form of plagiarism, cheating, or fabrication/falsification, will result in a grade of 0 for the relevant assignment or exam, and additional disciplinary action may be pursued.

- *Academic misconduct includes, but is not limited to, cheating, misrepresenting one's work, inappropriately collaborating, plagiarism, and fabrication or falsification of information. It also includes facilitating academic misconduct by intentionally helping or attempting to help another to commit an act of academic misconduct.*
- *"Cheating" involves the unauthorized possession or use of information, materials, notes, study aides, or other devices in any academic exercise, or the unauthorized communication with another person during such an exercise.*
- *"Plagiarism" means the intentional unacknowledged use or incorporation of any other person's work in, or as a basis for, one's own work offered for academic consideration or credit or public presentation. Plagiarism includes, but is not limited to, representing as one's own, without attribution, any other individual's words, phrasing, ideas, sequence of ideas, information, or any other mode or content of expression.*
- *"Fabrication" or "falsification" includes reporting experiments or measurements or statistical analyses never performed; manipulating or altering data or other manifestations of research to achieve a desired result;*

falsifying or misrepresenting background information, credentials, or other academically relevant information; or selective reporting, including the deliberate suppression of conflicting or unwanted data.

Safety & Wellness

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. For more information regarding safety and to view available training resources, including helpful videos, visit safeu.utah.edu.

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.