Mapping with Drones

GEOG 490, Spring 2019

Instructor: Aaron Zettler-Mann (azettler@uoregon.edu)
Office: 105 Condon Hall
Office Hours: TBD

Class: Mondays & Wednesdays 4:00 to 5:20
Plus 1 or 2 Field Trips for extended flying. Dates and times TBD

Course Materials

1. Small Unmanned Aerial Vehicle (sUAS) for personal use and practice flying. Details, criteria and a list of suggested UAVs at a range of price points will be supplied in class.
2. Other course materials will be made available on canvas.uoregon.edu

Course Objectives

UAV's represent a new exciting technology which has already expanded our ability to view, map, and examine the world. This course is designed to give you an understanding of what it means to produce maps, implement Structure-from-Motion using established best-practices, conduct an aerial survey using appropriate UAV flight planning and execution.
This class will take a strong 'applied' approach to mapping and UAVs. This means that I expect you to be able to think critically about what you kinds of maps you can produce, the types of information you can map or monitor using a UAV, and what the limitations are.

We will focus on:

- What is a map. This includes what a map is, and isn't, and issues related to geodesy.
- The basics of remote sensing. What kinds of things can we learn from UAV generated data?
- An introduction to cameras and photogrammetry. This includes the basics of cameras and photography and how they relate to map quality. Photogrammetry, and Structure-from-Motion (SfM) are different, but related processes. This course will look at how SfM can be applied, where it excels, and what its shortcomings are.
- Flight planning and implementation. This includes thinking critically about how to fly to generate the type and quality data you need. Specifically, this will include considering the stake holders who are interested in the data you produce and relevant FAA regulations.
- Finally, this is NOT an FAA Part 107 Commercial UAV Pilot License preparation course. While many of the topics we will discuss in this course are covered by the Part 107 exam, this class is far broader and more applied that that exam. I do hope to provide some of the framework and language necessary to begin studying for that exam, should that be something you want to do.

Tentative Schedule

Week	Topics	Reading	Assignment
1	Why is this Geography? History of remote sensing and UAS. Types of UAS. Pros and Cons of using UAS in remote sensing. Software introduction		
2	Naming conventions and data management - suggestions Sensors and need-to-know regulations before you fly Begin cameras & photogrammetry		
3	Continue cameras & photogrammetry Geodesy, georeferencing, scale RS/UAS Applications		
4	Flight planning – setting yourself up for success Flight based sources of error		
5	Model quality and sources of low quality Map interpretation		
6	Discussion: effectiveness of your flight plan. Problems? Sources of error in photograph collection		
7	Introduce term project and location (Guest speaker?) Continue sources of error discussion		
8	Error and error assessment – models versus 'truth' Accuracy, Precision, Uncertainty.		
9	Drones in public, private, academic settings Begin FAA regulations, Part 107 introduction		
10	FAA regulations, Part 107		**Final Projects Due**

Grading

I do not give grades. I simply evaluate and assign the grade that you earn.

It is up to you to earn the grade that you want. If you want a higher grade put in the effort throughout the term. The best way to do this is simply come to class prepared, listen and take good notes, and put in the effort on all assignments.

Your final grade will be calculated by weighting your performance in the different components of the class:

Lower grade boundaries are:
A+:>98; A:93; A-:90;
B+:88; B:83; B-:80;
C+:78; C:73; C-:70;
D+:68; D:63; D-:60

Assignments

Assignments will include reading responses, flight plans, exams, and written reports. In addition, you will produce original data and be expected to discuss its strengths and weaknesses. There will also be at least one field trip which will occur during the second half of the class where we will partner with a local organization to produce usable product. It is important that you will be able to attend this field trip as it is the culmination of the course material and will be where you get to apply the knowledge and flight planning for the entire course.

Academic integrity

Violations of academic integrity, such as cheating and plagiarism, will not be tolerated. You may work with other students on exercises, but all the work (tests, quizzes and exercises) that you turn in for a grade must be your own work, in your own words, and produced exclusively for this course. Violators may receive an F or N. Violations or suspected violations will be reported to the Director of Student Conduct. For the consequences of academic misconduct, or if you are in doubt regarding what constitutes academic misconduct, please consult Academic Misconduct under the Student Conduct Code at http://uodos.uoregon.edu/StudentConductandCommunityStandards, or ask the instructor or GTF.

Accommodation for students with disabilities

The University of Oregon is working to create inclusive learning environments. Please notify me if aspects of the instruction or course design result in disability related barriers to your participation or you have a notification letter. You are also encouraged to contact the Accessible Education Center (164 Oregon Hall; 541-346-1155; http://aec.uoregon.edu).

Communication and questions regarding class

Questions or concerns? Office hours are a great way to address them. If you cannot make the designated office hours let me know and we can figure out a time that will work.