San José State University
Geography
Geog 124, Special Topics in Physical Geography: Introduction to Drone Mapping
Spring, 2021

Instructor(s):	Jeffrey Miller
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Office Hours:	Wednesdays, 11AM on Zoom: https://cccconfer.zoom.us/j/95610887030
Class Days/Time:	Online, Asynchronous format, More info at sjsu.edu/ecampus AND In-person, 12:30-3:15PM on the following dates: Aug 31 Sep 21 Oct 12 Nov 02 Nov 30
Classroom:	In-person classes will be outdoors at Spartan Stadium football field. https://goo.gl/maps/7LTxG2hxX6RJ8qup7 Students will be notified of the exact meeting locations on Canvas.
Prerequisites:	Geog 1

Course Description

Basic drone flight theory, operations, and mapping using applied photogrammetry techniques. Students will be introduced to the unmanned aerial systems (UAS) industry and learn about various camera and sensor payloads. Students will gain unique hands-on flying experience with a particular focus on mapping physical geography phenomena. Outcomes include the production of deliverables that can be imported into GIS environments.

Students will get fundamental training about UAS capabilities. They will gain valuable flying experience and learn how to acquire aerial data "on-demand." Students will learn how to turn data into actionable information, such as a 3D-model that could be used for asset management. The course will prepare students to become UAS mapping pilots.

Software and Computer Requirements

UAS hardware and image processing software will be used. There will be a combination of lecture and lab. Labs will require the use of Drone2Map by ESRI. It is required that students have access to a PC with a Windows OS to operate D2M. Access must allow for write permissions. Contact the instructor if you do not have direct access to a Windows-based machine.

Students will be provided license access to D2M and other ESRI products as necessary.

Canvas and MYSJSU Messaging

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on Canvas Learning Management System course login website at https://sjsu.instructure.com/courses/1416832. You are responsible for regularly checking with the messaging system through MySJSU on Spartan App Portal http://one.sjsu.edu (or other communication system as indicated by the instructor) to learn of any updates. For help with using Canvas see Canvas Student Resources page (http://www.sjsu.edu/ecampus/teaching-tools/canvas/student_resources)

Course Learning Objectives and Outcomes (CLO)

Student learning objectives:
A. Gain a broad understanding of the commercial UAS industry.
B. Learn how plan and execute drone mapping missions.
C. Learn how to choose the proper platform and sensor for the job.
D. Comprehend the principles of digital photogrammetry from UAS.

Student learning outcomes:
A. Fly drones in the field and develop manual flight techniques.
B. Execute mapping missions and acquire high-resolution aerial photos.
C. Create on-demand orthophotos and 3D-models.
D. Process data and develop geospatial deliverables for further consumption in GIS.

Required Texts/Readings

Textbook

Kennedy, F. (2017). Drone Photography & Video Masterclass. Ammonite Press.
ISB: 978-1781453001
https://www.amazon.com/Drone-Photography-Masterclass-Fergus-Kennedy/dp/1781453004

Other Readings

If applicable, will be provided by the instructor digitally.

Other technology requirements / equipment / material

Computer and software required. See Software Requirements.

Expectations and Student Success (Course Requirements)

Lecture and Exams
The course will be broken into modules on Canvas. Each week (or every other as posted), the instructor will provide pre-recorded video lectures that will correspond to a power point and chapter for the textbook or other assigned text that fit said module. Lectures will cover theory of that week's topic. There will be a UAS operations exam and a UAS mapping exam. The mapping exam will occur approximately one-month before the end of the semester.

Participation
It is expected that students engage with one another and the instructor on a weekly basis. Each week, there will be a discussion prompt about the topic at hand. Points will be earned for providing discussion feedback.

Field Days
There are limited opportunities to gather and fly drones. This environment will be a crucial learning component to success. Therefore, attendance is required for the in-person classes mentioned above. If a student cannot make an in-person class, they will need to contact the instructor in advance. One make-up opportunity is available but multiple missed classes will result in loss of points and key chances to learn. Specific information about the in-person classes will be available on Canvas.

Labs
One of the major goals will be to completely map and model Spartan Stadium. At-home labs will provide the student the opportunity to process data that is acquired in the field. The objective is to develop "field-to-finish" products. At the time of this writing, the goal is to have labs (mostly data processing). The instructor will provide lab instructions and brief tutorials on Canvas.

Final Report

A final report will be due at the end of the semester (Dec 14th, 2021). The premise will be a technical proposal to explain the use of UAS technology for a specific application and/or job. An example title could be: "Using drones to map seal populations at Point Reyes, CA." The final report will be the last thing to turn in.

Grading Information

Grades will be awarded based on points earned from assignments. These include:

- Exams = 100/each x 2 = 200 points
- Online Participation = 5/each x 15 = 45 points
- Field Days = 50/each x 5 = 150 points
- Labs = 25/each x 9 = 225 points
- Final Report = 100 points
- Total Points available = 720 points

The instructor does not curve grades. Points earned equals grade achieved as follows:

Grade	*Points*	*Percentage*
A	*648-720*	*90-100%*
B	*576-647*	*80-89%*
C	*504-575*	*70-79%*
D	*432-503*	*60-69%*
F	*431 or lower*	*<60%*

Grading Information for GE/100W (Delete if not applicable)

- **For Basic Skills** (A1, A2, A3, B4) include the following statement:

"This course must be passed with a C- or better as a CSU graduation requirement."

- **For 100W (Area Z)** courses, include the following statement:

"This course must be passed with a C or better as an SJSU graduation requirement."

- **For upper division GE courses (R, S, V)** include the following paragraph:

"Passage of the Writing Skills Test (WST) or ENGL/LLD 100A with a C or better (C- not accepted), and completion of Core General Education are prerequisite to all SJSU Studies courses. Completion of, or co-registration in, 100W is strongly recommended. A minimum aggregate GPA of 2.0 in GE Areas R, S, & V shall be required of all students."

University Policies

Per University Policy S16-9 *(http://www.sjsu.edu/senate/docs/S16-9.pdf)*, relevant university policy concerning all courses, such as student responsibilities, academic integrity, accommodations, dropping and adding, consent for recording of class, etc. and available student services (e.g. learning assistance, counseling, and other resources) are listed on Syllabus Information web page (https://www.sjsu.edu/curriculum/courses/syllabus-info.php). Make sure to visit this page to review and be aware of these university policies and resources.

Geog 124 / Special Topics in Physical Geography (Drone Mapping), Fall '21, Course Schedule

Course Schedule (subject to change)

/Module (Delete if not applicable)	Date	Topics, Readings, Assignments	Due Date
1	8/23	**UAS Industry, History** Kennedy: Chapter 1 Lecture 1	-
2	8/30	**Equipment** Kennedy: Chapter 2 Lecture 2	-
	8/31	**In-person Class** Spartan Stadium First-time flying experience	-
3	9/06	**Overview of Regulations** Provided Text Lecture 3 *Lab Assignment: Sample P107 Exam*	**9/12**
4	9/13	**Safety** Kennedy: Chapter 3 Lecture 4	-
5	9/20	**Autonomous Flight Modes** Kennedy: Chapter 4 Lecture 5	-
	9/21	**In-person Class** Spartan Stadium Safety and autonomous flight procedures	
6	9/27	**Still Photography** Kennedy: Chapter 5 Lecture 6 *Lab Assignment: Panoramic Photo*	**10/03**
7	10/04	**Shooting Video** Kennedy: Chapter 6 Lecture 7 *UAS Operations Exam*	**10/10**
8	10/11	**Mission Planning Theory** Kennedy: Chapter 7 Lecture 8 *Lab Assignment: Mission Planning Math*	**10/17**
	10/12	**In-person Class** Spartan Stadium Nadir Mapping Missions	

/Module (Delete if not applicable)	Date	Topics, Readings, Assignments	Due Date
9	10/18	**Mission Planning Lab** Provided Text Lecture 9 *Lab Assignment: Mission Planning with Pix4D*	**10/24**
10	10/25	**Orthophotos** Provided Text Lecture 10 *Lab Assignment: Create an Orthophoto*	**10/31**
11	11/01	**3D-Modeling** Provided Text Lecture 11 *Lab Assignment: Create a 3D-model*	**11/07**
	11/02	**In-person Class** Spartan Stadium 3D-Modeling the Stadium	
12	11/08	**Digital Elevation Models** Provided Text Lecture 12 *Lab Assignment: Contour Map*	**11/14**
13	11/15	**GIS Compatibility** Provided Text Lecture 13 *Lab Assignment: Integration with GIS* *UAS Mapping Exam*	**11/28**
	11/22	**THANKSGIVING**	
14	11/29	**Final Lab** Lecture 14 *Lab Assignment: Merge the 3D-Model*	**12/05**
	11/30	**In-person Class** Spartan Stadium Final Modeling of the Stadium	
	12/06	**Final Report**	**12/14**