



SOUTHWESTERN COLLEGE COURSE OUTLINE

School of: <u>Mathematics, Science, and Engineering</u>	Origination Date: 04/26/2018
Department: <u>Physical Sciences</u>	
Discipline: <u>Geography</u>	
Course Designator and Number: <u>GEOG 108</u>	Effective Date: 2019 Fall
Title: <u>Introduction to Unmanned Aerial Systems (Drones)</u>	Effective Catalog Year: 2019–2020
	Units 4 Lec 3 Lab 3
	Total Contact Hours: 108

Same as other course(s) designator(s),

Grading Basis: Grade or Pass/No Pass option available

Repeatable: 0

Corequisite:

Limitation on Enrollment:

Prerequisite:

Recommended Concurrent Enrollment:

Recommended Preparation:

Course Description & Scope: (50 words or less)

Introduces unmanned aerial systems (drones), including applications, safety, maintenance, mission planning and flying, and data acquisition (still images and video). [D; CSU]

Measurable Course Objectives and Minimum Standards, as Determined by Standards set by the instructor, at 70% Proficiency for a Grade of "C":

1. Student will discuss the history of small unmanned aerials systems (sUAS).
2. Student will identify the different classes of sUAS systems.
3. Student will discuss the legal aspects of sUAS operations and the associated FAA (Federal Aviation Administration) regulations.
4. Student will describe the type of sensors and applications that can be accomplished with sUAS.
5. Student will discuss mission planning and control and recovery systems.
6. Student will identify safety concerns for safe sUAS operations.
7. Student will describe the basic flight operations for multi-rotor and fixed-wing sUAS aircraft.
8. Student will demonstrate flight skills outdoors with a sUAS.
9. Student will capture still or video imagery while operating a drone.
10. Student will operate and program a drone equipped with a variety of sensors, including GPS (Global Positioning Systems), video, and still photography.

11. Student will describe post-processing techniques to obtain the desired outcome for an image or video.
12. Student will describe the variety of payloads that are associated with drones.
13. Student will discuss the basic maintenance of drones, including batteries, rotors, and propellers.
14. Student will demonstrate how to prepare a drone for flight.
15. Student will discuss various software products and apps used for data collection and analysis.

Core Content to be covered in all sections:

1. Approximately 20% of course
Introduction to drones
 - Types of drones
 - Small UAS (sUAS)
 - History
 - Physics of flight
 - Applications
 - Safety
 - FAA regulations
2. Approximately 20% of course
Sensors, radiation, and sensor-specific applications
 - Electromagnetic spectrum
 - CCD (Charge Coupled Device)
 - Visible sensor
 - Thermal infrared sensor
 - Near infrared sensor
 - Hyperspectral imagery
3. Approximately 20% of course
Equipment and maintenance
 - Motors
 - Propellers
 - Speed controls
 - Batteries
 - Remote controls
 - Assembly
 - Repair, replace, service, and maintenance
 - Emergency procedures
4. Approximately 20% of course
Flight operations
 - Mission planning
 - Flight operation and camera operation
 - First Person View (FPV) systems
 - Flight parameters
 - Flight times and wireless transmission
 - Limitations
 - Wayfinding
 - Software and apps
5. Approximately 20% of course
Post processing and delivery
 - Stabilize video
 - Panoramic photos
 - Lens distortion
 - Sharing images

NOTE: For specific details, see instructor's syllabus.

Method of evaluation to determine if objectives have been met by students:

1. Class activities
2. Competency-based written and practical tests
3. Essay
4. Homework
5. Laboratory classroom activity
6. Problem solving
7. Quizzes
8. Skills demonstration
9. Written assignments

Other Methods of evaluation:

Example of Assignments:

Reading

Read the FAA regulations regarding sUAS operations and explain how these rules pertain to your location.

Writing

In a one-page summary, describe a sUAS project that you would like to complete. In the summary, include a basic flight plan and the type of sensor needed.

Critical Thinking

You were asked if you could fly your drone over Southwestern College to shoot a commercial video. What limitations would you have (if any) for this project?

Instructional Methodology:

Requires a minimum of three (3) hours of work per unit, including class time.

1. Audiovisual
2. Demonstration
3. Discussion
4. Distance education
5. Individual assistance
6. Lab
7. Lecture
8. Web Enhanced

Required and major optional reading(s), including textbook(s) and software: (Author: Last name, First name. Title. 2nd ed. (or higher edition) Location: Publisher, Year)

Required:

- Marshall, Douglas, Richard K. Barnhart, Eric Shappee, and Michael Thomas Most. Introduction to Unmanned Aircraft Systems. 2nd ed. CRC Press, 2016. ISBN: 978-1482263930

Optional:

Codes

Is this an approved special class for students with disabilities? No

Is this course a part of a cooperative work experience program? No

Funding Agency Category: Y Not Applicable

Is this a basic skills course? No

Course Offered: Fall, Spring, Summer