

**CS 76.11 Course Outline as of Spring 2020****CATALOG INFORMATION**

Dept and Nbr: CS 76.11 Title: COMMERCIAL DRONE IMAGING

Full Title: Drone Piloting and Imaging

Last Reviewed: 3/13/2017

Units		Course Hours per Week		Nbr of Weeks	Course Hours Total	
Maximum	3.00	Lecture Scheduled	2.50	17.5	Lecture Scheduled	43.75
Minimum	3.00	Lab Scheduled	1.50	6	Lab Scheduled	26.25
		Contact DHR	0		Contact DHR	0
		Contact Total	4.00		Contact Total	70.00
		Non-contact DHR	0		Non-contact DHR	0

Total Out of Class Hours: 87.50

Total Student Learning Hours: 157.50

Title 5 Category: AA Degree Applicable

Grading: Grade or P/NP

Repeatability: 00 - Two Repeats if Grade was D, F, NC, or NP

Also Listed As:

Formerly:

**Catalog Description:**

An introduction to using drones for digital imaging. This course is designed to give the student the ability to photograph both stills and videos from drones. Emphasis is placed on safety, equipment selection, flying, and becoming licensed to use drones for commercial purposes. Provides a starting point to using drones in multiple disciplines and careers.

**Prerequisites/Corequisites:****Recommended Preparation:**

Eligibility for ENGL 100 or ESL 100

**Limits on Enrollment:****Schedule of Classes Information:**

Description: An introduction to using drones for digital imaging. This course is designed to give the student the ability to photograph both stills and videos from drones. Emphasis is placed on safety, equipment selection, flying, and becoming licensed to use drones for commercial purposes. Provides a starting point to using drones in multiple disciplines and careers. (Grade or P/NP)

Prerequisites/Corequisites:

Recommended: Eligibility for ENGL 100 or ESL 100

Limits on Enrollment:

Transfer Credit: CSU;

Repeatability: Two Repeats if Grade was D, F, NC, or NP

## **ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:**

**AS Degree:**      **Area**      Effective:      Inactive:

**CSU GE:**      **Transfer Area**      Effective:      Inactive:

**IGETC:**      **Transfer Area**      Effective:      Inactive:

**CSU Transfer:** Transferable      Effective:      Fall 2017      Inactive:

**UC Transfer:**      Effective:      Inactive:

**CID:**

**Certificate/Major Applicable:**

Both Certificate and Major Applicable

## **COURSE CONTENT**

**Student Learning Outcomes:**

Upon completion of the course, students will be able to:

1. Safely operate common Unmanned Aerial Systems (UAS) (drones).
2. Capture still and video images from a UAS.
3. Prepare to take the Federal Aviation Administration (FAA) UAS commercial pilot license exam.
4. Understand the varied uses of unmanned vehicles in multiple disciplines and careers.

**Objectives:**

Upon completion of the course, students will be able to:

1. Define terminology related to UAS (Unmanned Aerial System) technology.
2. Differentiate among different kinds of drones.
3. Compare features of popular drone models.
4. Select the proper equipment required for UAS photography.
5. Discuss the safety and ethical issues related to drone photography.
6. Capture still and video images while flying a UAS.
7. Prepare to take the FAA UAS commercial pilot license exam.
8. Analyze the uses of UAS in multiple discipline and career areas.
9. Understand the fundamental mechanics of flight.

**Topics and Scope:**

- I. Digital Imaging with Drones\*
  - A. Drone imaging equipment
  - B. Imaging limitations
  - C. Camera direction
    1. Lighting

- 2. Shot composition
- D. Still vs. video
- E. Post processing
- II. UAS Uses
  - A. Real Estate
  - B. Agriculture
  - C. Public Safety
    - 1. Police
    - 2. Fire
    - 3. Search and rescue
  - D. Surveying/Mapping
  - E. Wildlife management
  - F. Forest management
  - G. Video production
  - H. Photography
  - I. Architecture
  - J. Journalism
  - K. Equipment maintenance
- III. Aviation History
- IV. UAS Terminology
- V. Mechanics of Flight
  - A. Aerodynamics
    - 1. Lift
    - 2. Drag
    - 3. Roll
    - 4. Pitch
    - 5. Yaw
  - B. Control
    - 1. Sensor Input
    - 2. Actuator Result
    - 3. Open vs. Closed Loop Systems
  - C. Materials
  - D. Propulsion
    - 1. Fixed Wing
    - 2. Rotary Wing
  - E. Sensors
    - 1. Visual
    - 2. Ultrasound
    - 3. Thermal/Infrared
    - 4. Gyroscope
    - 5. Accelerometer
    - 6. LIDAR
    - 7. GPS
- VI. UAS Equipment and Technology
  - A. Size
    - 1. Micro
    - 2. Mini
    - 3. Small
    - 4. Large
  - B. Type
    - 1. Glider
    - 2. Wing Body

3. Helicopter
  4. Ducted Fan
  5. Quadcopter
  6. Hexcopter
  7. Fixed-wing
- C. Features
1. GPS
  2. Cameras
  3. Controllers
  4. Propulsion
    - a. Electric
    - b. Gas
- D. Performance
1. Speed
  2. Battery Life
- E. Parts
1. Body
  2. Motors
  3. Propellers
  4. Batteries
  5. Cameras
  6. Controllers
  7. Storage options
- VII. Safety and Ethics
- A. Personal safety
  - B. Property safety
  - C. Privacy concerns
- VIII. UAS Laws and Regulations
- A. FAA regulations
    1. Airspace issues
    2. Hobby vs. commercial usage
    3. Licensing
  - B. Local laws
- IX. Flying\*
- A. Flight planning
  - B. Hovering and tilting
  - C. Flight patterns
    1. Tracking
    2. Following
    3. Waypoints
  - D. Options vs. limitations
  - E. Flight Logging
  - F. Aircraft Maintenance
- X. FAA Certification
- A. Remote Pilot
  - B. Weather
  - C. Charts
  - D. Air Traffic Control
  - E. Visual Line of Sight (VLOS)

\*The above sections are covered in Lab

## Assignment:

### Lecture Related Assignments:

1. Ten to twenty pages of reading per week
2. Digital imaging drone project proposal: contains rough ideas, sketches, shots that team members will create, required equipment, along with a description of the message to convey to target audience
3. Weekly forum posts on class-related topics
4. FAA exam preparation worksheets
5. Midterm and Final exams
6. Written paper discussing job possibilities in this developing industry

### Lab Related Assignments:

1. Drone flight test

## Methods of Evaluation/Basis of Grade:

**Writing:** Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Written proposal, forum posts, job possibility paper

Writing  
15 - 40%

**Problem Solving:** Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Exam preparation worksheets

Problem solving  
10 - 25%

**Skill Demonstrations:** All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

Drone flight test

Skill Demonstrations  
20 - 35%

**Exams:** All forms of formal testing, other than skill performance exams.

Exams to include multiple choice, matching items, completion, short answer

Exams  
10 - 30%

**Other:** Includes any assessment tools that do not logically fit into the above categories.

Attendance and participation

Other Category  
0 - 10%

## Representative Textbooks and Materials:

Aerial Photography and Videography Using Drones. Cheng, Eric. Peachpit Press. 2015

Getting Started with Hobby Quadcopters and Drones: Learn about, buy and fly these amazing aerial vehicles. Issod, Craig. CreateSpace Independent Publishing Platform. 2013

