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: 2/28/2022

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

Approval and Dates

Version:	02	Course Created/Approved:	3/13/2017
Version Created:	8/21/2019	Course Last Modified:	6/4/2022
Submitter:	Donald Laird	Course last full review:	2/28/2022
Version Status:	Approved (Changed Course)	Prereq Created/Approved:	3/1/2022
Version Status Date:	9/9/2019	Semester Last Taught:	Spring 2022
Version Term Effective:	Spring 2020	Term Inactive:	Fall 2022

COURSE CONTENT

Student Learning Outcomes:
At the conclusion of this course, the student should 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

OTHER REQUIRED ELEMENTS

STUDENT PREPARATION

Matric Assessment Required:	E	Requires English Assessment
Prerequisites-generate description:	NP	No Prerequisite
Advisories-generate description:	A	Auto-Generated Text
Prereq-provisional:	N	NO
Prereq/coreq-registration check:	N	No Prerequisite Rules Exist
Requires instructor signature:	N	Instructor's Signature Not Required

BASIC INFORMATION, HOURS/UNITS & REPEATABILITY

Method of instruction:	02	Lecture
	04	Laboratory
	72	Internet-Based, Delayed Interaction
	71	Internet-Based, Simultaneous Interaction
Area department:	CS	Computer Studies
Division:	72	Arts & Humanities
Special topic course:	N	Not a Special Topic Course
Program status:	1	Both Certificate and Major Applicable
Repeatability:	00	Two Repeats if Grade was D, F, NC, or NP
Repeat group id:		

SCHEDULING

Audit allowed:	N	Not Auditable
Open entry/exit:	N	Not Open Entry/Open Exit
Credit by exam:	N	Credit by examination not allowed
Budget code: Program:	0000	Unrestricted
Budget code: Activity:	0701	Computer & Information Science

OTHER CODES

Discipline:	Computer Information Systems	
Basic skills:	N	Not a Basic Skills Course
Level below transfer:	Y	Not Applicable
CVU/CVC status:	Y	Distance Ed, Not CVU/CVC Developed
Distance Ed Approved:	Y	Hybrid (i.e., a mix of face-to-face and technology-based instruction)
Emergency Distance Ed Approved:	Y	Partially Online Online with flexible in-person activities
Credit for Prior Learning:	N	Agency Exam
	N	CBE
	N	Industry Credentials
	N	Portfolio
Non-credit category:	Y	Not Applicable, Credit Course
Classification:	Y	Career-Technical Education
SAM classification:	C	Clearly Occupational
TOP code:	0614.60	Computer Graphics and Digital Imagery
Work-based learning:	N	Does Not Include Work-Based Learning
DSPS course:	N	Not a DSPS Course

In-service:	N	Not an in-Service Course
Lab Tier:	21	Credit Lab - Tier 1