

Lecture Contact Hours: 24-27; Outside-of-class Hours: 48-54;  
Laboratory Contact Hours: 72-81; Outside-of-class Hours: 0;  
Total Student Learning Hours: 144-162

**CUYAMACA COLLEGE**  
**COURSE OUTLINE OF RECORD**

**Surveying 102 – Unmanned Aerial System (Drone) Technologies: Mapping and Surveying Deliverables**

1.5 hours lecture, 1.5 units  
4.5 hours laboratory, 1.5 units  
Total units: 3

**Catalog Description**

The culmination of the Unmanned Aerial System Technologies courses, students will learn how to process collected data from drones to create deliverables for the surveying industry. Students will combine their knowledge from previous courses to complete a mock industry project. The projects will demonstrate the ability of the students to complete an industry project from the start to finish.

**Prerequisite**

"C" grade or higher or "Pass" in SURV 101 and SURV 218 or equivalent FAA Certified Remote Pilot License

**Recommended Preparation**

The ability to communicate via reading and writing. Basic ability to use computers.

**Entrance Skills**

Without the following skills, competencies and/or knowledge, students entering this course will be highly unlikely to succeed:

- 1) Create flight plans to collect specified surveying data
- 2) Operate a drone to collect specified surveying data
- 3) Perform quality assurance practices on collected surveying data

**Course Content**

- 1) General overview of types of drone deliverables used in industry
  - a. Labs incorporating the creation of surveying deliverables
- 2) Capstone project – Industry project and deliverables
  - a. Students will identify a project that reflects industry needs
  - b. Students will execute a plan to fulfill the project from start to finish using drones. These plans can include, but are not limited to, the following:
    1. Identifying a drone and payload that can achieve the tasks for the project
    2. Assembly, disassembly, and transportation of the drone for the project
    3. Creation of a flight plan for the project
    4. Properly report flight plan to FAA
    5. Execute the flight plan to gather required surveying data for the project
    6. Perform quality assurance practices, including using ground control points, to ensure the accuracy of the collected data
    7. Process the collected data into a map or other deliverables for the project
    8. Document the process and steps of the project into a final report/deliverable.

**Course Objectives**

Students will be able to:

- 1) Demonstrate a variety of drone deliverables used in industry

- 2) Execute a surveying project using drones from start to finish

### **Method of Evaluation**

A grading system will be established by the instructor and implemented uniformly. Grades will be based on demonstrated proficiency in the subject matter determined by multiple measurements for evaluation, one of which must be essay exams, skills demonstration or, where appropriate, the symbol system.

- 1) Classroom assessment tools, possibly including reading quizzes, concept quizzes, attention quizzes, and lecture activities working through example problems with students. An example would be a multiple-choice question answered using an audience response system in which students demonstrate their understanding of logging a flight plan with the FAA.
- 2) Homework requiring students to interact with the course material and to evaluate their ability to extend the classroom and reading experience to novel situations. An example would be having students describing what drone payload is best used to achieve a specific task.
- 3) Periodic quizzes, midterm/final examinations, and/or projects to evaluate student learning and retention of the material on the time scale of weeks. Questions are mostly word problems but with some short answer conceptual questions. An example would be a capstone project where students demonstrate their abilities to use drones to complete a surveying project from start to finish.

### **Special Materials Required of Student**

FAA Certified Remote Pilot License

### **Minimum Instructional Facilities**

- 1) Access to representative drones used in the surveying field, such as DJI Mavic 3E (2 students to one drone)
- 2) Access to land/space on campus to fly drones
- 3) Smart classroom with overhead projector/screen
- 4) Computer lab
- 5) Trimble Business Center or other equivalent software

### **Method of Instruction**

- 1) Group Projects/Activities
- 2) Guest Speakers
- 3) Lab
- 4) Lecture
- 5) Observation
- 6) Videos/Film
- 7) Demonstration
- 8) Discussion

### **Out-of-Class Assignments**

Weekly homework including reading and writing assignments

### **Texts and References**

- 1) Required (representative example): *Deliverables: Step by Step Guide (Survey Mapping Made Simple)*, Jim Crume, 2018. ISBN-13: 978-1723934391
- 2) Supplemental: None

### **Student Learning Outcomes**

Upon successful completion of this course, students will be able to:

- 1) Demonstrate a variety of drone deliverables used in industry
- 2) Execute a surveying project using drones from start to finish