

San José State University
Department of Aviation and Technology
AVIA 150 - Unmanned Aerial Systems

Semester:	Fall 2017
Instructor:	Dr. Francesca Favaro
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Office Hours:	MW 1:00 pm – 2:30 pm
Class Days/Time:	MW 10:30 am – 11:45 am
Classroom:	ENG 303 (3 rd floor)
Prerequisites:	AVIA 31 or instructor consent

Course Format

The course heavily relies on lecture material presented in class. A device with internet connection (e.g., laptop, tablet) is required to access internet-based material that supplements the textbook and the lecture notes. The course involves a final group-project, which requires a report submission and classroom presentation.

Course Materials

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on the [Canvas Learning Management System course login website](http://sjsu.instructure.com) at <http://sjsu.instructure.com>. You are responsible for regularly checking with the messaging system through MySJSU at <http://my.sjsu.edu> to learn of any updates.

Course Description

Introduction to Unmanned Aerial Systems (UAS). Overview of UAS classes and typical UAS missions. Application of sensors/payload analysis, basic design concepts, current regulations in the U.S., and mishaps examination. Lecture: 2.5 hours, 3 units.

Course Learning Outcomes (CLO)

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

- CLO 1. Distinguish different classes of UAS, based on size and mission requirements
- CLO 2. Draw the differences in design and mission requirements for military and civilian uses of UAS
- CLO 3. Distinguish different UAS design options based on customer/mission requirements
- CLO 4. Select the appropriate sensors and/or subsystems required for a given mission
- CLO 5. Determine which regulations affect different classes of UAS
- CLO 6. Develop a preliminary Concept of Operation for a UAS and derive basic system requirements
- CLO 7. Complete the preparation required to sustain the FAA exam to become a certified remote pilot for commercial operation

Required Texts and Readings

Textbook

- Gundlach, Jay. *Designing Unmanned Aircraft Systems: A comprehensive approach*. AIAA Education Series. ISBN: 978-1600868436

Additional textbooks can be used as reference for the group project (although the main textbook provided above is sufficient):

- Fahlstrom, Paul, and Thomas Gleason. *Introduction to UAV systems*. John Wiley & Sons, 2012. ISBN: 978-1119978661
- Austin, Reg. *Unmanned aircraft systems: UAVs design, development and deployment*. Vol. 54. John Wiley & Sons, 2011. ISBN: 978-0470058190]

For students interested in pursuing the Part 107 FAA certification for remote pilots, the following is a textbook that contains sample FAA-test questions:

- ASA UAS Remote Pilot Test Prep, <http://www.asa2fly.com/Test-Prep-Remote-Pilot-eBook-PDF-P3574C738.aspx>

Other Readings

The following material is available on-line free of charge, and is required for this course:

- CFR Title 14 Part 107, available on the Federal Aviation Administration (FAA) [website](http://www.faa.gov/uas/media/RIN_2120-AJ60_Clean_Signed.pdf), at http://www.faa.gov/uas/media/RIN_2120-AJ60_Clean_Signed.pdf
- Advisory Circular AC 107-02, available on the FAA [website](http://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_107-2.pdf) at http://www.faa.gov/documentLibrary/media/Advisory_Circular/AC_107-2.pdf
- NASA Systems Engineering Textbook, available on the NASA website at <http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20080008301.pdf>

Course Requirements and Assignments

All assignments with descriptions, due dates, and submission guidelines will be posted on Canvas. No late submissions will be accepted, unless special arrangements are made with the instructor before the posted due date. The class does not feature typical homework assignments, but it is highly recommended that students in the same group start working on their project proposal as soon as possible and think of this one assignment as regular weekly homework. Time management and project organization will be part of the evaluation criteria.

Final Examination or Evaluation

The final exam will consist in the presentation to the class of the completed project assignment. A written report will also be submitted. Both the oral presentation and the written report will be due the last week of class, and are equally weighted in the overall grade. Other evaluations (midterms I and II) will review the class content presented during lectures. There will be no make-ups for missed tests, except for medical or other reasons outside the student's control, and such must be documented by email or written notice. Such notice must be given prior to the event whenever possible.

Grading Information

Project deliverables and midterms all contribute to the overall grade with the following weights:

Item	Weight
Midterm 1	20 %
Midterm 2	20 %
Group Proposal	10 %
Final Project: presentation	20 %
Final Project: report	20 %

Determination of Grades

There will be no curving of grades. Final grades will be assigned as follows:

- A = > 90%
- B = > 80% and < 90%
- C = > 70% and < 80%
- D = > 60% and < 70 %
- F = < 60%

Classroom Protocol

Class participation and attendance are strongly encouraged. In cases where a student's grade is uncertain, active participation in class discussion and activities can lead to the higher grade being selected. No cell-phones are allowed during class, so please put your devices in silent mode. There might be occasions in which time is given to work on the details of the group project. The project description will include a break-down of the work executed by each team member. Consistently missing class will indicate to the instructor a lower time commitment on the part of the team member that does not participate in the classroom discussions. As such, not all team members may be assigned the same grade as result of missed participation in the group activities.

University Policies

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' [Syllabus Information web page](http://www.sjsu.edu/gup/syllabusinfo/) at <http://www.sjsu.edu/gup/syllabusinfo/>.

AVIA 150 / UAS, Fall 2017, Course Schedule

The following schedule is subject to change with fair notice from the instructor. Changes to the schedule will be posted on Canvas.

Course Schedule

Week	Date	Topics and Deadlines
1	08/23	Introduction, History, and Overview of State of the Art
1	08/28	Classes and Missions of UAS
2	08/30	Integration in National Air Space and use Cases: military vs. civilian uses with examples
2	09/04	<i>Labor Day – non-instructional day</i>
3	09/06	Review of Aerodynamics Concepts (Part I)
3	09/11	Review of Aerodynamics Concepts (Part II) and Design Options (fixed-wing vs. multi-copters)
4	09/13	Propulsion and Power
4	09/18	Loads and Structure
5	09/20	Stability and Control
5	09/25	Materials and construction for small UAS
6	09/27	Documentary Video (e.g., PBS “Spies that fly”)
6	10/02	Midterm review
7	10/04	Midterm #1
7	10/09	Mission Planning
8	10/11	Overview of Control Stations
8	10/16	Sensors and Payload analysis
9	10/18	Launch and Recovery
9	10/23	Data-link
10	10/25	Drafting of Concept of Operations and requirements flow-down (I)
10	10/30	Drafting of Concept of Operations and requirements flow-down (II)
11	11/01	Human Factors in UAS and NextGen in Aviation and UAS, Project Proposal Submission
11	11/06	Regulations in place and current efforts: review of CFR title 14 part 107 (Part I)
12	11/08	Review of CFR title 14 part 107 (Part II); Review of AC 107-02
12	11/13	Review of AC 107-02 (finished)
13	11/15	Review for FAA small UAS Remote Pilot Certification (sample test for Midterm review)
13	11/20	Midterm #2

Week	Date	Topics and Deadlines
14	11/22	<i>Non-instructional day – Thanksgiving Break</i>
14	11/27	Safety Assessment and certification
15	11/29	Analysis of recent UAS mishaps
15	12/04	Classroom Presentations
16	12/06	Classroom Presentations
16	12/11	Course wrap-up
Final Exam	There is no official final exam. Students will be able to collect their graded written reports should they wish to discuss their overall performance.	