

San José State University
Aerospace Engineering
AE15 - Air & Space Flight: Past, Present, and Future - Fall 2019



Course and Contact Information

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|-------------------------|---|
| Instructor: | Professor Sean Montgomery |
| Email: | sean.montgomery@sjsu.edu or sean5montgomery@gmail.com |
| Office Hours: | After class |
| Class Days/Time: | Wednesdays 12:00 pm to 12:50 pm |
| Classroom: | ENGR 401 |

Course Website (Canvas)

Course materials such as syllabus, handouts, notes, assignment instructions, etc. can be found on my faculty web page at <http://www.sjsu.edu/people/firstname.lastname> and/or on [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](http://my.sjsu.edu) at <http://my.sjsu.edu> (or other communication system as indicated by the instructor) to learn of any updates.

Course Description

Introduction to the history, basic principles, current and future developments of the aerospace engineering field.

Course Goals

To introduce students to:

- The historical context in which aeronautical and astronautical systems have been developed.
- The basic principles of atmospheric flight and aircraft design.
- The basic principles of space flight and spacecraft design.
- The current and future developments in the field of aerospace engineering, the aerospace engineering industry status and outlook.

Course Learning Outcomes (CLO)

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

1. Identify the major milestones in the history of atmospheric and space flight, explain the driving forces behind each milestone, and discuss the impact on society and globalization.
2. Explain how aerospace vehicles generate lift and calculate lift using approximate methods.
3. Explain how aerospace vehicles generate drag at various flight regimes and calculate drag using approximate methods.
4. Communicate and collaborate effectively with teammates (by setting goals, managing time, resolving conflicts, delegating tasks, making critical decisions, etc.) while working on aerospace engineering problems.
5. Identify current and future development in aerospace engineering and discuss the challenges facing the aerospace industry in the 21st century.

Required Texts/Readings

None. Lecture notes will be available through Canvas. Students are expected to search online for assignments and class discussions.

Course Requirements and Assignments

Participation

Participation is essential to learning. Students are expected to participate in class discussions by asking questions and offering relevant responses. Students may also participate by writing their questions or comments on paper in class and turning them in at the end of the lecture. Other ways students may earn participation credit include asking or answering questions posted on Canvas, taking notes for the class, or helping the instructor keep track of participation credit. The grading scale for participation will be determined approximately half way through the semester since it will vary from class to class depending on the number of students enrolled.

Homework

Homework assignments will consist of writing short responses to open ended questions (for example: Why were most early airplanes biplanes?) The purpose of these homework assignments is for students to do some research on their own on topics that will be discussed at a future class. To answer the questions, students are expected to search online for information to help them write their response. While there's nothing wrong with

quoting sources, direct word for word quotes must be in quotation marks and include a source citation.
Plagiarized homework will not receive any credit.

Reflections

After each class, students will write a brief reflection on what they learned in class that day and any questions they may have.

Quizzes

Short quizzes will be given occasionally to check how well students understand key points.

Final Project

Instead of a final exam, all students must complete a group project for the class. **Project groups must be 2 to 4 students.** Students will present their projects during the scheduled final exam time. There are several projects options (choose one):

Option 1) Give a presentation on an aircraft or spacecraft your group is interested in.

Option 2) Rubber band powered airplane competition for the longest flight time.

Option 3) Rocket project launched off campus.

Option 4) Go observe in person a high power rocket launch and present or write about what you learn. This can be an individual project instead of a group project.

Details for each option:

Option 1)

You may present on any aircraft or spacecraft that interests you. If you chose an aircraft that was covered in lecture, make sure you don't just repeat what was said in the lecture. See the "LectureNotes" folder in the files section on Canvas for ideas of aircraft and spacecraft to present on. Prepare a slide show to go with your presentation. Aim for a length of **3 minutes per person** (6 minutes for groups of 2, 9 minutes for 3, 12 minutes for 4). Make sure each person in the group speaks for an equal amount of time.

Option 2)

- It's preferred that you come up with your own design. You can buy a kit and put it together, but you will receive a 15 second penalty compared to other groups that use their own design.
- **Take pictures of your group building the plane and upload them to Canvas.** The pictures should make it clear whether it's your own design or a kit.
- You must use the rubber band provided so that everyone has the same size "motor." You may use your own propeller or one that's provided.
- **Maximum of 24 inches (2 feet) length in any direction** (wingspan or tail to propeller).
- You should expect the competition to be held outside, so your plane should be able to handle a light breeze.
- Each group will get up to 5 tries to fly as long as possible. Your time still counts if your plane crashes or breaks on landing.
- No material restrictions, but your design must not be dangerous (no exposed sharp metal spikes or things like that). If your plane flies into someone, it shouldn't hurt that person. See me if you have questions.

- You can find supplies at local hobby shops such as Sheldon's Hobbies in San Jose and Aero Micro in Santa Clara. I would expect groups to spend about \$20 on supplies, \$40 at most.

Option 3)

- Only select this option if you already have experience with rockets, or you know someone that can help you launch them safely.
- You may design your rocket (such as a water rocket from a 2 liter bottle), or build one from a kit (such as Estes rockets).
- You must find your own safe launch site and launch your rocket before the day of the scheduled final exam time for AE15. Video the launch and show it during the project presentations to receive credit.
- **If you are reckless, you will receive an F for the project even if your rocket is successful.** If you've never launched rockets before start with a small rocket. See me if you have questions or want approval for an idea.

Option 4)

You can ask the rocket club about upcoming launches. These usually occur in Fresno, CA or Black Rock, NV. If you find a closer location, see me for approval. Talk to the people about their rocket and give a brief (3 to 5 minute) presentation on what you learned, OR write a 750 word report.

Grading Information

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|----------------------|----------------------------------|
| Attendance | 10% (1 absence without penalty) |
| In class assignments | 15% |
| Participation | 15% |
| Reflections | 15% |
| Homework | 25% (½ credit for late homework) |
| Final Project | 20% |

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| A+ | Depends on how much extra credit is offered (roughly >97%) |
| A | ≥ 92% |
| A- | 90% - 92% |
| B+ | 88% - 90% |
| B | 82% - 88% |
| B- | 80% - 82% |
| C+ | 78% - 80% |
| C | 72% - 78% |
| C- | 70% - 72% |
| D | 60% - 70% |
| F | < 60% |

University Policies

AE Department & SJSU Policies are posted at: <http://ae.sjsu.edu/program-policies>

AE 15 - Air & Space Flight: Past, Present, and Future

Course Schedule

Tentative schedule, subject to change.

Course Schedule

| Week | Topics, Readings, Assignments, Deadlines |
|------|--|
| 1 | Introduction / Early Aviation |
| 2 | WWI |
| 3 | Golden Age |
| 4 | WWII |
| 5 | Post WWII Aircraft |
| 6 | Early Rocketry |
| 7 | The Space Race |
| 8 | Spyplanes |
| 9 | Launch Vehicles |
| 10 | Airliners |
| 11 | Break |
| 12 | Space Probes |
| 13 | Stealth Aircraft |
| 14 | Unmanned Aircraft |
| 15 | SpaceX |
| 16 | Current and Future Spacecraft |
| 17 | Final Exam |