San José State University
Aerospace Engineering Department
AE 100 – Fundamentals of Aerospace Engineering – Spring 2020

Course and Contact Information

Instructor:	Professor Sean Montgomery
Office Location:	TBD
Email:	sean.montgomery@sjsu.edu or sean5montgomery@gmail.com
Office Hours:	After class or by appointment
Class Days/Time:	MW 3:00 to 4:15 pm
Classroom:	E327
Prerequisites:	"C" or better in Math 30, Phys 50, Engr 10

Course Description

Introduction to the fundamental disciplines and concepts of aerospace engineering and in particular of aerodynamics, aerospace structures, stability and control, propulsion, and flight mechanics.

Course Goals

Introduce students to the fundamental disciplines of aerospace engineering. More specifically, introduce the basic principles of aerodynamics, aerospace structures and material selection, stability and control of aerospace vehicles, propulsion systems, airplane performance, flight and orbital mechanics.

Course Learning Outcomes

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

1. Explain the nature of aerodynamic forces and estimate lift and drag on aerodynamic bodies.
2. Analyze simple airplane and spacecraft structures.
3. Explain the concept of static and dynamic stability of aerospace vehicles.
4. Describe the effect of different vehicle parts on longitudinal, lateral and directional stability.
5. Calculate the thrust and propulsive efficiency of different types of air-breathing and rocket engines.
6. Analyze aircraft takeoff, climb, maneuvering, cruise, glide, loiter, and landing performance.
7. Design simple orbital maneuvers.
8. Calculate aerodynamic and heat loads on hypersonic vehicles.

Required Texts/Readings

Textbook

J.D. Anderson Jr., Introduction to Flight, 8th ed., McGraw Hill, 2015.
https://www.amazon.com/Introduction-Flight-John-Anderson-Jr/dp/0078027675/

Other Readings

Class notes

Course Requirements and Assignments

In-Class Problems and Homework: Problems will be given during class (workouts) and homework will be assigned regularly. Late assignments will receive ½ credit.

Midterm and Quizzes: At least one midterm exam will be given. A second midterm may be given depending on how well students appear to be learning the course material. Short quizzes may also be used to check students' comprehension.

Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week) for instruction, preparation/studying, or course related activities, including but not limited to internships, labs, and clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus.

Final Examination or Final Project

Students must either take a final comprehensive exam **OR** submit a final project in place of the final exam. The project must integrate at least 3 different areas from the class (aerodynamics, propulsion, stability and control, structures, materials, performance and dynamics). Students may work in groups of up to 3 people provided the project has been approved by the instructor. Students have a lot of flexibility in choosing a project as long as the project is related to aerospace. Students doing projects will give a presentation to the class and submit a written report.

Grading Information

In-Class Problems and Homework:	35%	(1/2 credit for late assignments)
Midterm and Quizzes:	25%	
Final Exam or Final Project:	40%	

Grading Scale: A+ 100 to 97%
A 96.9 to 93%
A- 92.9 to 90%
B+ 89.9 to 87%
B 86.9 to 83%;
B- 82.9 to 80%
C+ 79.9 to 77%
C 76.9 to 73%;
C- 72.9 to 70%
D 60 to 70%
F < 60%.

Classroom Protocol

Students will turn their cell phones off or put them on vibrate mode while in class. They will not answer their phones in class. In the classroom, students may use computers only for class-related activities, such as taking notes on the lecture underway, following the lecture on Web-based PowerPoint slides that the instructor has posted, and finding Web sites to which the instructor directs students at the time of the lecture. Attendance will not be taken during class, but if students miss a class they are still responsible for any material discussed or assignments given.

University Policies

Per University Policy S16-9 *(http://www.sjsu.edu/senate/docs/S16-9.pdf)*, relevant information to all courses, such as academic integrity, accommodations, dropping and adding, consent for recording of class, etc. is available on Office of Graduate and Undergraduate Programs' Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/

AE Department Policies

AE Department policies can be found at http://www.sjsu.edu/ae/programs/policies/

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Approximate Course Schedule

Course Schedule (*Tentative and subject to change. See CANVAS for updated schedule*)

Week	Topics
1	Introduction to aerospace engineering. Anatomy of airplanes and spacecraft.
2	Aerodynamics; lift and drag. Form, skin friction, vortex, and wave drag. Drag polars.
3	Airfoils and wings. High-lift systems.
4	Aerodynamic design of low and high-speed vehicles.
5	Importance of structural weight and integrity. Design of aircraft and spacecraft structures.
6	Fatigue. Aerospace materials. Loads. Weight estimation.
7	Strength of materials; free body diagrams and equilibrium equations.
8	Static and dynamic stability. Control of airplanes and spacecraft.
9	Airplane longitudinal, lateral, and directional stability.
10	Airbreathing engines: internal combustion engines, propellers and rotors, turboprops, turbojets, turbofans, ramjets, scramjets.
11	Rocket engines: solid and liquid propellant; advanced propulsion concepts.
12	Airplane performance: takeoff, climb, maneuvering, absolute and service ceilings, cruise, range and endurance, gliding, loiter, landing.
13	Earth and planetary entry.
14	Orbital maneuvers.
15	Hypersonic vehicles.
16	Review
17	Final Exam / Final Project Presentations