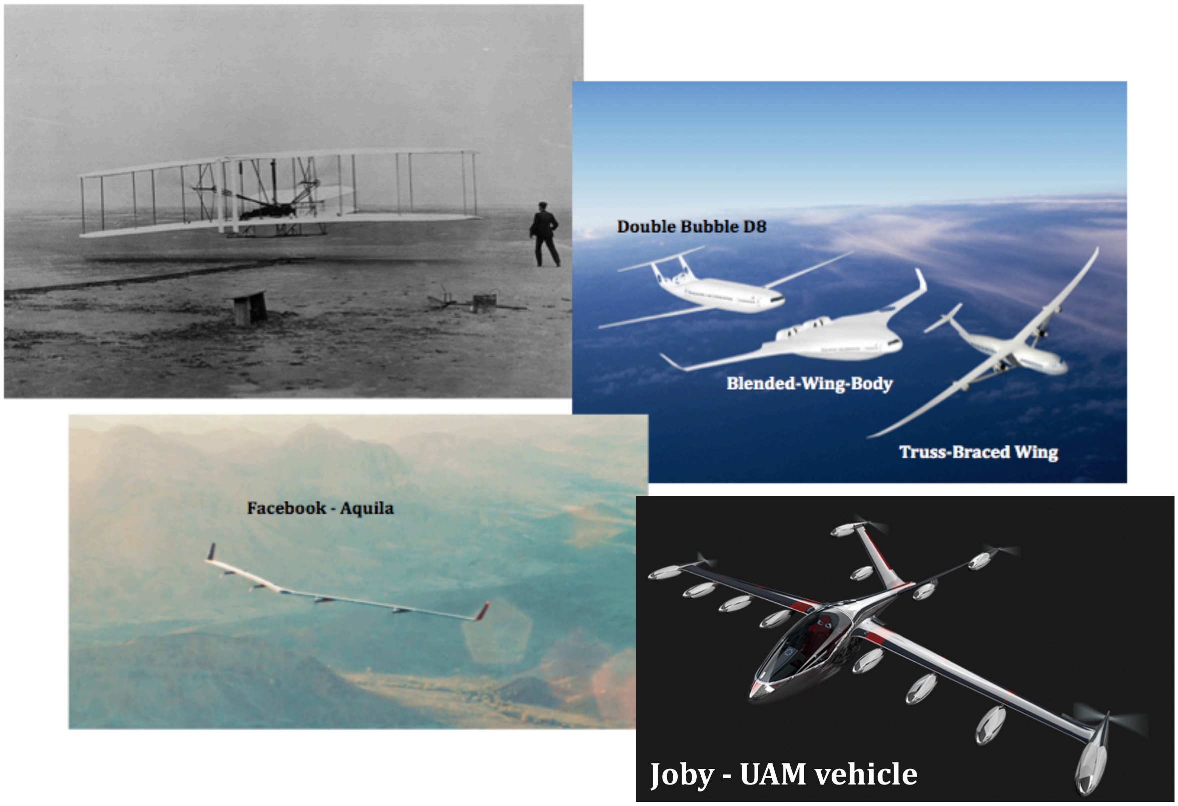
San Jose State University

Department of Aerospace Engineering

AE 165: Flight Mechanics

Spring 2020



INSTRUCTOR: Dr. Sean Swei
NASA Ames Research Center
(650) 604-0314 (O)
seanswei@gmail.com

TIME/ROOM: TTh 4:30 – 5:45pm ENG BLD 331

OFFICE HOUR: TTh 5:45 – 6:45pm AE Office 272 G

TAs: Esuyawkal Engdaw (Esu) (eengdaw12@gmail.com)
Melissa Pardo Bedoya (melissa.pardobedoya@sjsu.edu)

PRE/CO-REQUISITE: “C-“ or better in AE138, AE162

TEXTBOOK: **Class Notes**
J.D. Anderson, *Introduction to Flight,* McGraw Hill

REFERENCES: R.E. Nelson, *Flight Stability and Automatic Control*, McGraw Hill
Jerry Jon Sellers, *et al.*, *Understanding Space: An Introduction to Astronautics*, McGraw-Hill

DESCRIPTION: Trajectory dynamics of atmospheric flight (aircraft and missiles) and spaceflight (orbital mechanics). Influence of vehicle design on trajectory. Aircraft static performance, stability and control. Rocket launch and re-entry dynamics. Computer simulations.

GOALS: The goals of this course are to study:

- Aircraft performance analysis for range and endurance
- Aircraft static stability
- Longitudinal and lateral stability and control derivatives
- Launch vehicles for space missions
- Kepler's laws and orbiting satellites

LEARNING OBJECTIVES: Upon completion of this course, students should be able to:

- Calculate thrust and power required for level flight
- Compute the range and endurance of battery powered propeller-driven aircraft
- Compute aerodynamic coefficients; lift and drag (lift-induced drag)
- Derive basic aircraft stability derivatives
- Analyze aircraft trim conditions
- Identify each element of a space system
- Find elliptical orbit parameters
- Design a Hohmann orbit transfer and compute the total ΔV
- Describe and discuss various design methodologies and their trade-offs.

GRADING: Grading is based on the following:

- Homework: 20% (**NO late HW!)**
- Two mid-terms: 40%
- Final: 40%

GRADING SCALE: A+: 100 – 97%; A: 96.9 – 93%; A-: 92.9 – 90%; B+: 89.9 – 87%; B: 86.9 – 83%; B-: 82.9 – 80%; C+: 79.9 – 77%; C: 76.9 – 73%; C-: 72.9 – 70%; D+: 69.9 – 67%; D: 66.9 – 63%; D-: 62.9 – 60%; F: < 59.9%. All exams must be taken to receive a passing grade.

APPROXIMATE WEEKLY SCHEDULE:

Week	Lecture Topic(s)
01	Introduction
02	Basic Aerodynamics
03	Aircraft Performance
04	Flight range and endurance
05	Power and thrust requirements
06	Take-off and landing performance
	Mid-Term #1
07	Aircraft static stability
08	Longitudinal stability/control derivatives
09	Lateral stability/control derivatives
10	Aircraft trim analysis
	Mid-Term #2
11	Orbital mechanics
12	Describing orbits
13	Orbital maneuvers and Hohmann transfer
14	Parabolic and hyperbolic orbits
15	Lifting re-entry
16	Summary and review
17	Final