AEROSPACE SCIENCE & ENGINEERING (EAE)

College of Engineering

EAE 001 — Introduction to Aerospace Science Engineering (1 unit)

Course Description: Description of the field of aerospace engineering with examples from industry, government, and research. Aerospace engineering principles, ethics, and responsibilities.
Learning Activities: Lecture 1 hour(s).
Grade Mode: Pass/No Pass only.

EAE 010 — From the Wright Brothers to Drones & Quadcopters (2 units)

Course Description: History of aircraft and its influence on society. Topics covered will include Unmanned Aerial Vehicles, safety considerations, economics and privacy issues. Aerodynamics, stability and control will also be introduced.
Learning Activities: Lecture 2 hour(s).
Grade Mode: Letter.
General Education: Science & Engineering (SE) or Social Sciences (SS).

EAE 099 — Special Study for Undergraduates (1-5 units)

Course Description: Special study for undergraduates.
Prerequisite(s): Consent of instructor; lower division standing.
Learning Activities: Variable.
Grade Mode: Pass/No Pass only.

EAE 126 — Theoretical & Computational Aerodynamics (4 units)

Course Description: Development of general equations of fluid motion. Study of flow field kinematics and dynamics. Flow about a body. Thin airfoil theory. Viscous effects. Applications of numerical methods to wing analysis and design.
Prerequisite(s): ENG 103 C- or better; ENG 105 C- or better; (ENG 180 C- or better or EAD 115 C- or better or MAT 128C C- or better or EME 115 C- or better).
Learning Activities: Lecture/Discussion 4 hour(s).
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EAE 127 — Applied Aircraft Aerodynamics (4 units)

Course Description: Principles, governing equations, and predictive theories for aircraft aerodynamics. Lift and drag of 2D airfoils, 3D wings, and high-lift devices.
Prerequisite(s): EME 106 C- or better.
Learning Activities: Lecture/Discussion 4 hour(s).
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EAE 129 — Stability & Control of Aerospace Vehicles (4 units)

Course Description: Aircraft and spacecraft stability and control. Derivation of fundamental equations of motion for aircraft/spacecraft. Fundamentals of feedback. Aircraft flight control systems. Spacecraft attitude control systems.
Prerequisite(s): ENG 102 C- or better.
Learning Activities: Lecture/Discussion 4 hour(s).
Enrollment Restriction(s): Restricted to upper division standing.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EAE 130A — Aircraft Performance & Design (4 units)

This version has ended; see updated course, below.
Course Description: Major aircraft design experience with multiple realistic constraints including aerodynamics, performance analysis, weight estimation, stability and control, and appropriate engineering standards.
Prerequisite(s): (EAE 126 or EAE 127 C- or better); EAE 129 C- or better (can be concurrent).
Learning Activities: Lecture 2 hour(s), Discussion 1 hour(s), Laboratory 3 hour(s).
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EAE 130A — Aircraft Performance & Design (4 units)

Course Description: Major aircraft design experience with multiple realistic constraints including aerodynamics, performance analysis, weight estimation, stability and control, and appropriate engineering standards.
Prerequisite(s): EAE 127 C- or better; EAE 129 C- or better (can be concurrent).
Learning Activities: Lecture/Discussion 3 hour(s), Laboratory 3 hour(s).
Grade Mode: Letter.
General Education: Science & Engineering (SE).
This course version is effective from, and including: Winter Quarter 2027.

EAE 130B — Aircraft Performance & Design (4 units)

This version has ended; see updated course, below.
Course Description: Major aircraft design experience including detailed design, cost analysis, analysis of aircraft structure, propulsion system, aerodynamics, aircraft handling qualities, manufacturing, or meeting relevant engineering standards.
Prerequisite(s): EAE 130A C- or better.
Learning Activities: Lecture 2 hour(s), Discussion 1 hour(s), Laboratory 3 hour(s).
Enrollment Restriction(s): Restricted to upper division standing.
Grade Mode: Letter.
General Education: Science & Engineering (SE); Oral Skills (OL).

EAE 130B — Aircraft Performance & Design (4 units)

Course Description: Major aircraft design experience including detailed design, cost analysis, analysis of aircraft structure, propulsion system, aerodynamics, aircraft handling qualities, manufacturing, or meeting relevant engineering standards.
Prerequisite(s): EAE 130A.
Learning Activities: Lecture/Discussion 3 hour(s), Laboratory 3 hour(s).
Enrollment Restriction(s): Restricted to upper division standing.
Grade Mode: Letter.
General Education: Science & Engineering (SE); Oral Skills (OL).
This course version is effective from, and including: Winter Quarter 2027.

EAE 133 — Finite Element Methods in Structures (4 units)

Course Description: Introduction to the aerospace structural design process. History of aircraft and spacecraft materials. Effects of loading beyond elastic limit. Deflections and stresses due to combined loading. Virtual work principles, and finite element methods. Applications to aerospace structures.
Prerequisite(s): ENG 104 C- or better or ENG 104V C- or better.
Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s).
Enrollment Restriction(s): Open to College of Engineering Students.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EAE 135 — Aerospace Structures (4 units)

Course Description: Analysis and design methods used in aerospace structures. Shear flow in open, closed and multicell beam cross-sections, buckling of flat and curved sheets, tension field beams, local buckling.
Prerequisite(s): ENG 104 C- or better or ENG 104V C- or better; EAE 126 or EAE 127 recommended.
Learning Activities: Lecture 4 hour(s).
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EAE 137 — Structural Composites (4 units)

Course Description: Overview of materials and technology for creating structures from fiber reinforced resin matrix composite material systems. Elementary design analysis and case studies emphasizing aeronautical applications.
Prerequisite(s): ENG 104 C- or better or ENG 104V C- or better.
Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s).
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EAE 138 — Aircraft Propulsion (4 units)

Course Description: Analysis/design of modern aircraft gas turbine engines. Development/application of cycle performance prediction techniques. Introduction to design of inlets, compressors, burners, turbines, and nozzles. Cycle design for specific applications.
Prerequisite(s): EME 106 C- or better.
Learning Activities: Lecture/Discussion 4 hour(s).
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EAE 140 — Rocket Propulsion (4 units)

Course Description: Fluid and thermodynamics of rocket engines, liquid and solid rocket propulsion. Space propulsion concepts and space mission requirements.
Prerequisite(s): EME 106 C- or better.
Learning Activities: Lecture 4 hour(s).
Enrollment Restriction(s): Restricted to upper division standing.
Credit Limitation(s): Not open for credit to students who have taken identical EAE 189A prior to Fall Quarter 2013.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EAE 142 — Orbital Mechanics (4 units)

Course Description: Satellite orbits, multistage rockets, current global boosters, and new technologies. Design application problems include satellites, trajectory optimizations, and interplanetary trajectories.
Prerequisite(s): ENG 102 C- or better.
Learning Activities: Lecture 4 hour(s).
Enrollment Restriction(s): Restricted to upper division standing.
Credit Limitation(s): Not open for credit to students who have completed EAE 189B prior to Fall Quarter 2013.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EAE 143A — Space Vehicle Design (4 units)

This version has ended; see updated course, below.
Course Description: Governing equations and operational practices of robotic and human space travel. Principles of Systems Engineering are introduced and are used as a basis for a team project in spacecraft reverse-engineering and design.
Prerequisite(s): EAE 140 C- or better; EAE 142 C- or better.
Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s).
Grade Mode: Letter.

EAE 143A — Space Vehicle Design (4 units)

Course Description: Governing equations and operational practices of robotic and human space travel. Principles of Systems Engineering are introduced and are used as a basis for a team project in spacecraft reverse-engineering and design.
Prerequisite(s): EAE 140 C- or better; EAE 142 C- or better.
Learning Activities: Lecture/Discussion 4 hour(s).
Grade Mode: Letter.
This course version is effective from, and including: Fall Quarter 2026.

EAE 143B — Space Mission Design (4 units)

This version has ended; see updated course, below.
Course Description: Introduction to space systems design including space project organization, requirements definition & specification, concepts formulation, system tradeoffs, and subsystem design. Prototype space mission concepts & multidisciplinary mission design.
Prerequisite(s): EAE 143A C- or better.
Learning Activities: Lecture 2 hour(s), Discussion 2 hour(s).
Enrollment Restriction(s): Open to Mechanical Engineering and Aerospace Science & Engineering majors only.
Credit Limitation(s): Not open for credit to students who have completed EAE 141.
Grade Mode: Letter.

EAE 143B — Space Mission Design (4 units)

Course Description: Introduction to space systems design including space project organization, requirements definition & specification, concepts formulation, system tradeoffs, and subsystem design. Prototype space mission concepts & multidisciplinary mission design.
Prerequisite(s): EAE 143A C- or better.
Learning Activities: Lecture/Discussion 4 hour(s).
Enrollment Restrictions: Open to Mechanical Engineering and Aerospace Science & Engineering majors only.
Credit Limitation(s): Not open for credit to students who have completed EAE 141.
Grade Mode: Letter.
This course version is effective from, and including: Fall Quarter 2026.

EAE 189C — Flight Simulation & Testing in Design of Aircraft & Spacecraft (4 units)

Course Description: Teaches flight test techniques together with data analysis methods to prepare students for any type of flight testing including fixed wing, rotary wing and launch vehicles.
Prerequisite(s): ENG 102; consent of instructor.
Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s).
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EAE 192 — Internship in Aerospace Science & Engineering (1-5 units)

Course Description: Supervised work experience in Aerospace Science and Engineering.
Prerequisite(s): Consent of instructor; approval of project prior to period of internship.
Learning Activities: Internship 0-3 hour(s).
Enrollment Restriction(s): Upper division standing.
Repeat Credit: May be repeated based on approved internship.
Grade Mode: P/NP only.

EAE 198 — Directed Group Study (1-5 units)

Course Description: Directed group study.
Prerequisite(s): Consent of instructor.
Learning Activities: Variable 1-5 hour(s).
Grade Mode: Pass/No Pass only.

EAE 199 — Special Study for Advanced Undergraduates (1-5 units)

Course Description: Special study for advanced undergraduates.
Prerequisite(s): Consent of instructor.
Learning Activities: Variable.
Grade Mode: Pass/No Pass only.