MECHANICAL & AEROSPACE ENGINEERING

College of Engineering

Bahram Ravani, Ph.D., Chairperson of the Department; term ends September 30, 2022
Benjamin Shaw, Ph.D., Chairperson of the Department; October 1, 2022-June 30, 2026

Department Office
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- Aerospace Science & Engineering, Bachelor of Science (https://catalog.ucdavis.edu/departments-programs-degrees/mechanical-aerospace-engineering/aerospace-science-engineering-bs/)
- Mechanical Engineering, Bachelor of Science (https://catalog.ucdavis.edu/departments-programs-degrees/mechanical-aerospace-engineering/mechanical-engineering-bs/)

Aerospace Science & Engineering (EAE)

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 106 — 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 EAE 115 C- or better or MAT 128C C- or better or EME 115 C- or better).
Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s).
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EAE 129 — Stability & Control of Aerospace Vehicles (4 units)
Prerequisite(s): ENG 102 C- or better.
Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s).
Enrollment Restriction(s): Restricted to upper division standing.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EAE 127 — Applied Aircraft Aerodynamics (4 units)
This course version is effective from, and including: Winter Quarter 2023.
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 3 hour(s), Discussion 1 hour(s).
Grade Mode: Letter.
General Education: Science & Engineering (SE); Writing Experience (WE).

EAE 127 — Applied Aircraft Aerodynamics (4 units)
This version has ended; see updated course, below.
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 3 hour(s), Discussion 1 hour(s).
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EAE 129 — Stability & Control of Aerospace Vehicles (4 units)
Prerequisite(s): ENG 102 C- or better.
Learning Activities: Lecture 3 hour(s), Discussion 1 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)
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 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 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 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.
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. Elementary design analysis and case studies emphasizing aeronautical applications.
Prerequisite(s): ENG 104 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.
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 3 hour(s), Discussion 1 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 141 — Space Systems Design (4 units)
Starting Fall Quarter 2022, this course is no longer offered.
Course Description: Introduction to space systems design including space project organization, requirements definition and specification, concepts formulation, system tradeoffs, subsystem design. Prototype space mission concepts are presented and a multidisciplinary mission design is developed that considers all relevant architecture elements.
Prerequisite(s): ENG 102 C- or better; EME 106 C- or better.
Learning Activities: Lecture 2 hour(s), Discussion 2 hour(s).
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): ENG 102 C- or better; ENG 103 C- or better; ENG 105 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 3 hour(s), Discussion 1 hour(s).
Grade Mode: Letter.
This course version is effective from, and including: Fall Quarter 2022.
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 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 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 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.

Mechanical Engineering (EME)

EME 001 — Mechanical Engineering (1 unit)
Course Description: Description of the field of mechanical engineering with examples taken from industrial applications, discussions of the practice with respect to engineering principles, ethics, and responsibilities.
Learning Activities: Lecture 1 hour(s).
Grade Mode: Pass/No Pass only.

EME 005 — Computer Programming for Engineering Applications (4 units)
Course Description: Structured programming in C for solving problems in engineering. Introduction to MATLAB and comparison study of C/C++ with MATLAB.
Prerequisite(s): MAT 016A (can be concurrent) or MAT 021A (can be concurrent).
Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s).
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 050 — Manufacturing Processes (4 units)
Course Description: Modern manufacturing methods, safety, manufacturing instructions, computer-aided manufacturing and their role in the engineering design and development process.
Prerequisite(s): ENG 004 C- or better; PHY 009A C- or better.
Learning Activities: Lecture/Discussion 3 hour(s), Laboratory 3 hour(s).
Enrollment Restriction(s): Restricted to Mechanical Engineering and Mechanical Engineering/Materials Science Engineering majors.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 092 — Internship in Mechanical Engineering (1-5 units)
Course Description: Supervised work-study experience in engineering.
Prerequisite(s): Lower division standing; approval of project prior to period of internship.
Learning Activities: Internship.
Repeat Credit: May be repeated.
Grade Mode: Pass/No Pass only.

EME 097TC — Mentoring & Tutoring Engineering in the Community (1-4 units)
Course Description: Mentoring, coaching, tutoring and/or supervision of students in K-12 schools in Engineering-related topics.
Prerequisite(s): Consent of instructor.
Learning Activities: Variable 3-12 hour(s).
Repeat Credit: May be repeated.
Grade Mode: Pass/No Pass only.

EME 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.

EME 106 — Thermo-Fluid Dynamics (4 units)
Course Description: Inviscid incompressible flow, compressible flow, ideal gas mixtures, psychrometrics, reacting mixtures and combustion.
Prerequisite(s): ENG 103 C- or better; ENG 105 C- or better.
Learning Activities: Lecture 4 hour(s).
Enrollment Restriction(s): Restricted to Mechanical Engineering, Aerospace Science & Engineering, and Mechanical Engineering/Materials Science Engineering majors.
Grade Mode: Letter.
General Education: Science & Engineering (SE).
EME 108 — Measurement Systems (4 units)
Course Description: Experiments to illustrate principles of mechanical systems. Signal analysis; Demonstration of basic sensors for mechanical systems; Experimental project design; Experiments involving voltage measurement; strain gauges, dynamic systems of 1st order.
Prerequisite(s): ENG 100 C- or better; ENG 102 C- or better; ENG 104 recommended.
Learning Activities: Lecture 2 hour(s), Laboratory 3 hour(s), Discussion 1 hour(s).
Enrollment Restriction(s): Restricted to Mechanical Engineering.
Aerospace Science & Engineering and Mechanical/Materials Science & Engineering.
Credit Limitation(s): Only 3 units of credit for students who have previously taken EBS 165; 2 units of credit for students who have previously taken EBS 165; 1 unit of credit allowed for students who have completed EME 107B (former version of EME 108).
Grade Mode: Letter.
General Education: Science & Engineering (SE); Writing Experience (WE).

EME 109 — Experimental Methods for Thermal Fluids (4 units)
Course Description: Experiments illustrating principles of thermal-fluid systems and related measurement devices. Statistical design of experiments and uncertainty analysis of data; thermodynamic cycles, combustion, compressible and incompressible flows.
Prerequisite(s): EME 106 C- or better.
Learning Activities: Lecture 2 hour(s), Laboratory 1.50 hour(s), Discussion 1 hour(s), Extensive Writing.
Enrollment Restriction(s): Restricted to Mechanical Engineering.
Aerospace Science & Engineering and Mechanical/Materials Science Engineering Majors.
Credit Limitation(s): Only 3 units of credit for students who have previously taken ECH 155A; 2 units of credit for students who have previously taken ECH 155B; 3 units of credit for students who have previously taken ECI 141L; 1 unit of credit for students who have already completed EME 107A (former version of EME 109).
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 115 — Introduction to Numerical Analysis & Methods (4 units)
Course Description: Number representation, Taylor expansions, error and stability analysis, roots of nonlinear equations, sets of linear equations, numerical integration, ordinary differential equations.
Prerequisite(s): (ENG 006 C- or better or EME 005 C- or better or ECS 030 C- or better or ECS 032A C- or better or ECS 036A C- or better or ECH 060 C- or better or ECM 006 C- or better); ((MAT 021A C- or better, MAT 021B C- or better, MAT 021C C- or better, MAT 021D C- or better, (MAT 022A C- or better or MAT 027A C- or better), (MAT 022B C- or better or MAT 027B C- or better)), (PHY 009A C- or better, PHY 009B C- or better, PHY 009C C- or better).
Learning Activities: Lecture 3 hour(s), Lecture/Discussion 1 hour(s).
Credit Limitation(s): Not open for credit to students who have taken EAD 115.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 121 — Engineering Applications of Dynamics (4 units)
Course Description: Technical elective that revisits dynamic principles with emphasis on engineering applications; Equations of motion are derived and put into a format for computer solution; There is a computer laboratory where real engineering systems are simulated.
Prerequisite(s): ENG 102 C- or better; (ENG 006 C- or better or EME 005 C- or better or ECS 030 C- or better).
Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s).
Enrollment Restriction(s): Restricted to Mechanical Engineering.
Aerospace Science & Engineering, and Mechanical Engineering/Materials Science Engineering majors.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 134 — Vehicle Stability (4 units)
Course Description: Analytical and experimental studies of the dynamics, stability and control of vehicles such as cars, trailers, airplanes, motorcycles, bicycles and rail cars.
Prerequisite(s): ENG 102 C- or better.
Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s).
Enrollment Restriction(s): Restricted to Mechanical Engineering.
Aerospace Science & Engineering, and Mechanical Engineering/Materials Science Engineering majors.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 139 — Stability of Flexible Dynamic Systems (4 units)
Prerequisite(s): ENG 102 C- or better; ENG 103 C- or better.
Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s).
Credit Limitation(s): No credit for students who have completed EAE 139.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 150A — Mechanical Design (4 units)
Course Description: Principles of mechanics applied to design. Deformation and stress analysis. Structural integrity under static and fluctuating loads. Projects demonstrate progression from concept to engineering analysis, with emphasis on strength and durability.
Prerequisite(s): (ENG 045 C- or better or ENG 045Y C- or better); (ENG 104 C- or better, EME 050 C- or better (can be concurrent)).
Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s).
Enrollment Restriction(s): Restricted to Mechanical Engineering.
Aerospace Science & Engineering, Mechanical Engineering/Materials Science and Engineering majors.
Grade Mode: Letter.
General Education: Science & Engineering (SE); Writing Experience (WE).
EME 150B — Mechanical Design (4 units)

Course Description: Principles of engineering mechanics applied to the design and selection of mechanical components. Design projects, which concentrate on conceptual design, engineering analysis, methods of manufacture, material selection, and cost.
Prerequisite(s): EME 150A C- or better.
Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s).
Enrollment Restriction(s): Restricted to Mechanical Engineering.
Aerospace Science & Engineering, Mechanical Engineering/Materials Science and Engineering.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 151 — Statistical Methods in Design & Manufacturing (4 units)

Course Description: Methods of statistical analysis with emphasis on applications in mechanical design and manufacturing. Applications include product evaluation and decision making, probabilistic design, systems reliability, and fatigue under random loading.
Prerequisite(s): EME 150A C- or better.
Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s).
Enrollment Restriction(s): Restricted to Mechanical Engineering.
Aerospace Science & Engineering, Mechanical Engineering/Materials Science and Engineering.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 152 — Computer-Aided Mechanism Design (4 units)

Course Description: Principles of computer-aided mechanism design. Computer-aided kinematic, static, and dynamic analysis and design of planar mechanisms such as multiple-loop linkages and geared linkages. Introduction to kinematic synthesis of mechanisms.
Prerequisite(s): ENG 102 C- or better; (EME 005 C- or better or ENG 006 C- or better or ECS 030 C- or better).
Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s).
Enrollment Restriction(s): Restricted to Mechanical Engineering.
Aerospace Science & Engineering, Mechanical Engineering/Materials Science and Engineering.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 154 — Mechatronics (4 units)

Course Description: Overview of mechatronics system and control system design concepts, control software architecture, control hardware architecture, microcontroller and interface technology for mechatronics control, sensor for mechatronics systems, actuator drives.
Prerequisite(s): ENG 100 C- or better; ENG 102 C- or better; EME 050 C- or better.
Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s).
Enrollment Restriction(s): Restricted to Mechanical Engineering.
Aerospace Science & Engineering, Mechanical Engineering/Materials Science and Engineering.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 155 — Heat Transfer (4 units)

Course Description: Conduction, convection, and radiation heat transfer. Computational modeling of heat transfer in engineering. Applications to engineering equipment with the use of digital computers.
Prerequisite(s): (ENG 006 C- or better or EME 005 C- or better or ECS 030 C- or better); ENG 103 C- or better; ENG 105 C- or better.
Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s).
Enrollment Restriction(s): Restricted to Mechanical Engineering.
Aerospace Science & Engineering, Mechanical Engineering/Materials Science and Engineering.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 157 — Analysis, Simulation & Design of Mechatronic Systems (4 units)

Course Description: Modeling of dynamic engineering systems in various energy domains. Analysis and design of dynamic systems. Response of linear systems. Digital computer simulation and physical experiments.
Prerequisite(s): ENG 100 C- or better; ENG 102 C- or better.
Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s).
Enrollment Restriction(s): Restricted to Mechanical Engineering.
Aerospace Science & Engineering, Mechanical Engineering/Materials Science and Engineering.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 158 — Thermodynamics (4 units)

Course Description: This course is a study of thermodynamics including the development of basic thermodynamic concepts. Applications of thermodynamics in various engineering disciplines.
Prerequisite(s): ENG 100 C- or better; ENG 102 C- or better.
Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s).
Enrollment Restriction(s): Restricted to Mechanical Engineering.
Aerospace Science & Engineering, Mechanical Engineering/Materials Science and Engineering.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 159 — Fluid Mechanics (4 units)

Course Description: An introduction to fluid mechanics. Application of fluid mechanics to the design of pressure vessels, piping systems, and other fluid handling systems.
Prerequisite(s): ENG 100 C- or better; ENG 102 C- or better.
Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s).
Enrollment Restriction(s): Restricted to Mechanical Engineering.
Aerospace Science & Engineering, Mechanical Engineering/Materials Science and Engineering.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 160 — Machine Design & Manufacturing (4 units)

Course Description: Design and analysis of machine components. Stress analysis, load analysis, and design of shafts and gears.
Prerequisite(s): ENG 100 C- or better; ENG 102 C- or better.
Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s).
Enrollment Restriction(s): Restricted to Mechanical Engineering.
Aerospace Science & Engineering, Mechanical Engineering/Materials Science and Engineering.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 161 — Combustion & the Environment (4 units)

Course Description: Introduction to combustion kinetics; premixed and diffusion flames; turbulent combustion; pollutant formation; examples of combustion devices such as internal combustion engines, gas turbines, furnaces and incinerators; alternative fuels.
Prerequisite(s): EME 106 C- or better.
Learning Activities: Lecture 3 hour(s), Lecture/Discussion 1 hour(s).
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 163 — Internal Combustion Engines & Future Alternatives (4 units)

Course Description: Fundamentals of internal combustion engine design and performance. Future needs to adapt to environmental concerns, and the feasibility of better alternatives in the future.
Prerequisite(s): EME 050 C- or better; EME 106 C- or better.
Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s).
Enrollment Restriction(s): Restricted to Mechanical Engineering.
Aerospace Science & Engineering, Mechanical Engineering/Materials Science and Engineering.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 164 — Introduction to Heating, Ventilation & Air Conditioning Systems (4 units)

Course Description: Introduction to basic mechanisms and processes associated with heating, ventilation and air conditioning (HVAC), including equipment and systems used for HVAC in residential and commercial buildings.
Prerequisite(s): EME 106 C- or better; EME 165 C- or better.
Learning Activities: Lecture 4 hour(s).
Credit Limitation(s): Only 2 units for students who have completed ECI 125.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 165 — Heat Transfer (4 units)

Course Description: Conduction, convection, and radiation heat transfer. Computational modeling of heat transfer in engineering. Applications to engineering equipment with the use of digital computers.
Prerequisite(s): (ENG 006 C- or better or EME 005 C- or better or ECS 030 C- or better); ENG 103 C- or better; ENG 105 C- or better.
Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s).
Enrollment Restriction(s): Restricted to Mechanical Engineering.
Aerospace Science & Engineering, Mechanical Engineering/Materials Science and Engineering.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 166 — Internal Combustion Engines & Future Alternatives (4 units)

Course Description: Fundamentals of internal combustion engine design and performance. Future needs to adapt to environmental concerns, and the feasibility of better alternatives in the future.
Prerequisite(s): EME 050 C- or better; EME 106 C- or better.
Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s).
Enrollment Restriction(s): Restricted to Mechanical Engineering.
Aerospace Science & Engineering, Mechanical Engineering/Materials Science and Engineering.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 171 — Analysis, Simulation & Design of Mechatronic Systems (4 units)

Course Description: Modeling of dynamic engineering systems in various energy domains. Analysis and design of dynamic systems. Response of linear systems. Digital computer simulation and physical experiments.
Prerequisite(s): ENG 100 C- or better; ENG 102 C- or better.
Learning Activities: Lecture 3 hour(s), Laboratory 3 hour(s).
Enrollment Restriction(s): Restricted to Mechanical Engineering.
Aerospace Science & Engineering, Mechanical Engineering/Materials Science and Engineering.
Grade Mode: Letter.
General Education: Science & Engineering (SE).
EME 172 — Automatic Control of Engineering Systems (4 units)

Course Description: Classical feedback control systems; block diagrams; performance specifications; steady state errors; rise and settling times; root locus; PID controllers; Bode and Nyquist plots; stability; phase and gain margins; advanced topics as time allows.
Prerequisite(s): ENG 100 C- or better; ENG 102 C- or better.
Learning Activities: Lecture 3 hour(s), Discussion 1 hour(s).
Enrollment Restriction(s): Restricted to Mechanical Engineering, Aerospace Science & Engineering, Mechanical Engineering/Materials Science and Engineering.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 185A — Mechanical Engineering Systems Design Project (4 units)

Course Description: Major mechanical engineering design experience; the mechanical engineering design process and its use in the design of engineering systems incorporating appropriate engineering standards and multiple realistic constraints.
Prerequisite(s): EME 050 C- or better, EME 150A C- or better; EME 165 C- or better (can be concurrent); ENG 003, CMN 001 or CMN 003 recommended; upper division composition recommended.
Learning Activities: Lecture 1 hour(s), Laboratory 3 hour(s).
Enrollment Restriction(s): Restricted to Senior standing in Mechanical Engineering (EMEC).
Grade Mode: Letter.
General Education: Science & Engineering (SE); Oral Skills (OL); Visual Literacy (VL).

EME 185B — Mechanical Engineering Systems Design Project (4 units)

Course Description: Major mechanical engineering design experience; the mechanical engineering design process and its use in the design of engineering systems incorporating appropriate engineering standards and multiple realistic constraints.
Prerequisite(s): EME 185A; senior standing in the Department of Mechanical and Aerospace Engineering.
Learning Activities: Lecture 1 hour(s), Laboratory 3 hour(s).
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 185C — Mechanical Engineering Systems Design Project (4 units)

Course Description: Major mechanical engineering design experience; the mechanical engineering design process and its use in the design of engineering systems incorporating appropriate engineering standards and multiple realistic constraints.
Prerequisite(s): EME 185B; senior standing in the Department of Mechanical and Aerospace Engineering.
Learning Activities: Lecture 1 hour(s), Laboratory 3 hour(s).
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 189A — Selected Topics in Mechanical Engineering: Energy Systems & the Environment (1 unit)

Course Description: Directed group study in Energy Systems & the Environment.
Prerequisite(s): Consent of instructor.
Learning Activities: Variable.
Repeat Credit: May be repeated when topic differs.
Grade Mode: Letter.

EME 189B — Selected Topics in Mechanical Engineering: Engineering Controls (1-5 units)

Course Description: Directed group study in Engineering Controls.
Prerequisite(s): Consent of instructor.
Learning Activities: Variable.
Repeat Credit: May be repeated when topic differs.
Grade Mode: Letter.
General Education: Science & Engineering (SE).

EME 189C — Selected Topics in Mechanical Engineering: Engineering Dynamics (1-5 units)

Course Description: Directed group study in Engineering Dynamics.
Prerequisite(s): Consent of instructor.
Learning Activities: Variable.
Repeat Credit: May be repeated when topic differs.
Grade Mode: Letter.

EME 189D — Selected Topics in Mechanical Engineering: Biomechanics (1-5 units)

Course Description: Directed group study in Biomechanics.
Prerequisite(s): Consent of instructor.
Learning Activities: Variable.
Repeat Credit: May be repeated when topic differs.
Grade Mode: Letter.

EME 189E — Selected Topics in Mechanical Engineering: Fluid Mechanics (1-5 units)

Course Description: Directed group study in Fluid Mechanics.
Prerequisite(s): Consent of instructor.
Learning Activities: Variable.
Repeat Credit: May be repeated when topic differs.
Grade Mode: Letter.

EME 189F — Selected Topics in Mechanical Engineering: Manufacturing Engineering (1-5 units)

Course Description: Directed group study in Manufacturing Engineering.
Prerequisite(s): Consent of instructor.
Learning Activities: Variable.
Repeat Credit: May be repeated when topic differs.
Grade Mode: Letter.

EME 189G — Selected Topics in Mechanical Engineering: Mechanical Engineering & Product Design (1-5 units)

Course Description: Directed group study in Mechanical Engineering & Product Design.
Prerequisite(s): Consent of instructor.
Learning Activities: Variable.
Repeat Credit: May be repeated when topic differs.
Grade Mode: Letter.

EME 189H — Selected Topics in Mechanical Engineering: Mechatronics Systems (1-5 units)

Course Description: Directed group study in Mechatronics Systems.
Prerequisite(s): Consent of instructor.
Learning Activities: Variable.
Repeat Credit: May be repeated when topic differs.
Grade Mode: Letter.

EME 189I — Selected Topics in Mechanical Engineering: MEMS/Nanotechnology (1-5 units)

Course Description: Directed group study in MEMS/Nanotechnology.
Prerequisite(s): Consent of instructor.
Learning Activities: Variable.
Repeat Credit: May be repeated when topic differs.
Grade Mode: Letter.
EME 189J — Selected Topics in Mechanical Engineering:
Solid & Structural Mechanics (1-5 units)

Course Description: Directed group study in Solid & Structural Mechanics.
Prerequisite(s): Consent of instructor.
Learning Activities: Variable.
Repeat Credit: May be repeated when topic differs.
Grade Mode: Letter.

EME 189K — Selected Topics in Mechanical Engineering:
Thermodynamics (1-5 units)

Course Description: Directed group study in Thermodynamics.
Prerequisite(s): Consent of instructor.
Learning Activities: Variable.
Repeat Credit: May be repeated when topic differs.
Grade Mode: Letter.

EME 189L — Selected Topics in Mechanical Engineering:
Vehicle & Transportation Systems (1-5 units)

Course Description: Directed group study in Vehicle & Transportation Systems.
Prerequisite(s): Consent of instructor.
Learning Activities: Variable.
Repeat Credit: May be repeated when topic differs.
Grade Mode: Letter.

EME 192 — Internship in Engineering (1-5 units)

Course Description: Supervised work experience in mechanical engineering.
Prerequisite(s): Upper division standing; approval of project prior to period of internship.
Learning Activities: Variable.
Repeat Credit: May be repeated.
Grade Mode: Pass/No Pass only.

EME 197TC — Mentoring & Tutoring Engineering in the Community (1-4 units)

Course Description: Mentoring, coaching, tutoring and/or supervision of students in K-12 schools in Engineering-related topics.
Prerequisite(s): Consent of instructor. Upper division standing.
Learning Activities: Variable 3-12 hour(s).
Repeat Credit: May be repeated.
Grade Mode: Pass/No Pass only.

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

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

EME 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.