FRESNO STATE

Mechanical Engineering

For additional information, contact:

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THE MECHANICAL ENGINEERING CAREER

Mechanical engineering is a broad technical field encompassing many areas:

Aerospace

Automobile

Biomedical

Energy

Environment

Manufacturing

Power Generation

Product Design

Transportation

Well-known multi-national companies, as well as local firms, employ our graduates. Some of our graduates pursue management degrees upon receiving BSME degrees to prepare them for management careers.

Accreditation

The BSME program at California State University, Fresno (CSUF) is accredited by the Engineering Commission of ABET, http://www.abet.org

STUDENT ORGANIZATIONS:

American Institute of Aeronautics and Astronautics (AIAA)

American Society of Mechanical Engineers (ASME)

American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)

Human Powered Vehicle Challenge (HPVC) Project

Pi Tau Sigma (ΠΤΣ)

Society of Automotive Engineers (SAE)

Formula SAE

Baja SAE

Engineers Without Borders (EWB)

Mechatronics Union

National Society of Black Engineers

Society of Hispanic Professional Engineers (SHPE)

MECHANICAL ENGINEERING PROGRAM

The Mechanical Engineering program at CSUF is a broad-based, hands-on curriculum. The undergraduate program currently requires 123 units (8 semesters) for graduation. The program's key elements include:

- Courses in machine design, energy, and materials
- Hands-on experience via laboratories, classes, and clubs
- Industry sponsored senior class projects
- Paid internships with leading companies (VIP program)
- Participation in professional society activities (ASME, SAE)
- Preparation towards the Professional Engineers license
- Preparation for graduate studies

Recommended Program Sequence

MECHANICAL ENGINEERING

Bachelor of Science Degree **(66 Units in Engineering, 127 Total Units)**

Student:		**ID#**		**Adviser:**	
Telephone:		**Catalog Year:**		**Graduation Date:**	
Email:					

ADVISING SHEET MAJOR CODE: 054402 2024-2025

1st (Fall) SEMESTER		Units	Grade	Sem	Trnsfr
ENGR 1	Intro to ME	1			
ME 26	Engr Graphics	3			
ECE71/CSCI40	(Intro Prog)	4			
GE Area A[2]	ENGL 10	3			
MATH 75*	Math Analysis 1	4			
GE Area B[2]	Life Sciences	3			
		18			

2nd (Spring) SEMESTER		Units	Grade	Sem	Trnsfr
ME 2	Cmpt App in ME	1			
CHEM 1A	Gen Chemistry	3			
CHEM 1AL	Gen Chemstry Lab	2			
Math 76	Math Analysis II	4			
PHYS 4A	Mech+Wave Motion	3			
PHYS 4AL	Mech+Wave Lab	1			
GE Area D[1]	HIST 11 or 12	3			
		17			

3rd (Fall) SEMESTER		Units	Grade	Sem	Trnsfr
ME 31	Engr Materials	3			
ME 32	Engr Materials Lab	1			
MATH 77	Math Analysis III	4			
GE Area A[U]	Elec+Mag+Heat	3			
	Oral Communication	3			
GE Area C[2]					
	PHIL 20	3			
		16			

4th (Spring) SEMESTER		Units	Grade	Sem	Trnsfr
ME 95	Manuf Processes	2			
CE 20	Engr Mech: Statics	3			
ECE 91	Prin Elec Cir	3			
	Prin Elec Cir Lab	1			
Math 81/ENGR101	Applied Analysis	3			
PHYS 4C	Light+Mod Phys	3			
		18			

ME 112	Engr Mech: Dyn	3			
ME 115	Instru & Meas Lab	1			
ME 136	Thermodynamics	3			
ME 125	Engr Stat & Expt	3			
CE 121	Mech of Mtls	3			
Upper-division writing		3			
		16			

ME 116	Fluid Mechanics	3			
ME 118**	Fluid Mech Lab	1			
ME 156	Adv Thermo	3			
ME 134[4]	Kinematics of Mach	3			
ME 140	Adv Engr Analysis	3			
		13			

7th (Fall) SEMESTER					
Technical Area Course[3]		3			
ME 135**	Intro Desgn-Sr Cap I	3			
ME 145	Heat+Mass Trans	3			
ME 154	Dsgn of Mach Elem	3			
GE Area D[4]	Social Sciences	3			
		15			

8th (Spring) SEMESTER					
Technical Area Course[3]		3			
ME 155	Sr Cap Design II	3			
ME 166	Energy Sys Design	3			
ME 159	Mech Sys Dsgn Lab	1			
GE Area F	Ethnic Studies	3			
		13			

[1]Also counts as major GPA

[2]See Catalog for GE Courses

[3]Take a miminum of 6 units in Group A (ME 122, 137, 142, 144, 146, 162 or 164 (to be offered in alternate years)). A maximum of 3 units from Group B (ME 180, 190, 191T) may be substituted for a course in Group A with faculty advisor's approval.

[4]ENGR 101 may be taken as an alternative for Math 81 with faculty advisor's approval

*Math 75 is a pre/co-requisite for all engineering courses except ME 1.

**NOTE: Department approved writing course or equivalent must be taken in the junior year, prior to taking ME118 and ME135, if the student fails the writing exam requirement.

Must have a minimum grade of "C" or better on all math, science, and engineering courses.

MECHANICAL ENGINEERING COURSES

ENGR 1: Introduction to Engineering (1)
An active learning orientation to the various disciplines of the engineering and construction management professions, the design process, functioning effectively on a team, ethical responsibilities of engineers and construction managers, and best practices for success in a degree program within the LCOE.

ME 2: Computer Applications in Mechanical Engineering Laboratory (1)
Prerequisites: MATH 75 (or concurrently). Students develop fundamental skills in basic analytical and design tools used in mechanical engineering. Topics covered include spreadsheet applications, graphing data, technical communication, programming concepts, and computer-aided design (CAD).

ME 26: Engineering Graphics (3)
Prerequisites: MATH 75 (or concurrently). Basic computer literacy required. Principles of orthographic projection, dimensioning, and descriptive geometry. Applications to the solution of engineering problems including the use of interactive computer graphics.

ME 29: Engineering Mechanics (3)
Prerequisites: MATH 77 (or concurrently); PHYS 4A. Not open to mechanical or civil engineering majors. Study of fundamental principles of statics and dynamics by scalar and vector methods.

ME 31: Engineering Materials (3)
Prerequisites: CHEM 1A and MATH 75 (or concurrently). Fundamental nature and properties of engineering materials; structure of ,atter and its effect on mechanical, electrical, magnetic, and thermal properties.

ME 32: Engineering Materials Laboratory (1)
Prerequisite: ME 31 or concurrently. Application of experimental methods to engineering materials. Study of stress and strain in metals; fatigue; hardness; toughness.

ME 95: Product Development (2)
Prerequisites: ME 2 (or concurrently), ME 26, ME 31, and ME 32 (or concurrently) and MATH 75 (or concurrently). Examines the overall process of product development including preliminary design, drafting, material selection, fabrication, inspection, assembly, and testing. Laboratory component introduces basic machining and fabrication skills.

ME 112: Engineering Mechanics / Dynamics
Prerequisites: CE 20; MATH 81 or ENGR 101. Development of principles of kinematics and kinetics in engineering.

ME 115: Instrumentation and Measurement Laboratory (1)
Prerequisites: ECE 71 or CSCI 40, ECE 91, ECE 91L. Application of different measuring devices and techniques used in engineering systems. Calibration and response characteristics of instruments will be examined. Use of data acquisition system in the recording and analyzing of experimental data. Technical reports are required.

ME 116: Fluid Mechanics (3)
(ME 116 same as ENGR 116). Prerequisites: CE 20, MATH 81 or ENGR 101, and ME 112 (or concurrently). Fundamentals of fluid mechanics as applied to engineering problems.

ME 118: Fluid Mechanics Laboratory (1)
Prerequisites: ENGR 105W or successful completion of university writing exam, ME 115 (or concurrently); ME 116 (or concurrently). Applications of experimental methods used in engineering practice to fluid systems.

ME 122: Dynamic Systems and Controls (3)
Prerequisites: ME 112 and ME 115. Modeling of mechanical systems; mechanical feedback systems; time domain analysis; stability, frequency response, and root locus plots; performance criteria, and system compensations; applications of different measuring devices and techniques used in engineering systems. Lecture/lab.

MECHANICAL ENGINEERING COURSES

ME 125: Engineering Statistics and Experimentation (3)
Prerequisites: MATH 77 completed or concurrent. Provides fundamentals of statistical and uncertainty analysis applied to engineering measurements, experimental methods, product design, and manufacturing processes. Includes probability distributions, data sampling, confidence intervals, quality control, reliability, life testing, and analysis of uncertainty in experimental measurements.

ME 134: Kinematics of Machinery (3)
Prerequisites: ME 26, ME 112, CE 121; MATH 81 or ENGR 101. Analytical, graphical, and computer solutions applied to design problems in machinery, mechanisms. Cam design, different types of followers, cam manufacturing considerations. Gear design, different types of gears, gear trains. Students will be assigned class projects related to the topics covered in class. (2 lecture, 3 lab hours)

ME 135: Introduction to Design—Senior Capstone Design I (3)
Prerequisites: ME 95 and 134. Introduction to product engineering with consideration given to economic, safety, quality, aesthetic, environmental, liability, and patent law issues. Open-ended design project is required.

ME 136: Thermodynamics (3)
Prerequisites: CHEM 1A, PHYS 4A, MATH 77, and upper-division standing. Fundamentals of thermodynamics and heat transfer as applied to engineering problems.

ME 137: Turbomachinery (3)
Prerequisites: ME 116 and 136. Applications of fluid mechanics and thermodynamics and rotor -fluid energy interchange. Steady flow problems of pumps, compressors, and turbines with incompressible and compressible fluids. Both closed- and open-ended homework problems.

ME 140: Advanced Engineering Analysis (3)
Prerequisites: CE 121; ECE 71 or CSCI 40; ME 112 (or concurrently), ME 116 (or concurrently). Development of finite element method of engineering analysis; applications to heat flow, fluid flow, vibrations, and stresses in mechanical design using appropriate numerical techniques and closed-form solutions of partial differential equations.

ME 142: Mechanical Vibration (3)
Prerequisites: ME 112. Mathematical and physical basis of vibration theory with applications to engineering analysis and design. Includes transient and steady state phenomena, distributed and lumped parameter systems, coupled systems, and computer solutions.

ME 144: Advanced Mechanics of Materials (3)
Prerequisites: CE 121, ME 125, MATH 81. Advanced topics in mechanics of materials. Statistical considerations in design, stress and strain theories; contact stresses, strain energy, Castigilano's theorem; failures resulting from static and dynamic loading; static and fatigue theories of failure; stress concentrations.

ME 145: Heat and Mass Transfer (3)
Prerequisites: ME 116, ME 136, ME 140 or concurrently. Analytical, numerical, and electrical analogy methods are used to solve a variety of heat transfer and mass transfer problems. Advanced topics in radiation, boundary layer flow, and heat exchanger design.

ME 146: Air Conditioning (3)
Prerequisites: ME 116, 136. Theory and practice in air conditioning including psychrometrics, load estimating, heating and cooling systems, fluid design and controls.

ME 154: Design of Machine Elements (3)
Prerequisites: ME 31, CE 121. Design of machine elements and components using theory learned in prerequisite courses. Both individual and team-type open-ended design projects are required. Use of computers for design is required. (2 lecture, 3 lab hours)

MECHANICAL ENGINEERING COURSES

ME 155: Senior Capstone Design II (3)
Prerequisites: ME 135 and completion of Upper Division Writing Requirement, Engineering design process with consideration given to economic, safety, quality, aesthetics, environmental, liability, and patent law issues. Meeting client-based specifications; optimizing designs, working in a team environment, and developing project management skills form the basis for the course. second semester of a two-semester capstone design experience

ME 156: Advanced Thermodynamics—Fluid Mechanics (3)
Prerequisites: ME 136. Advanced topics in thermodynamics including analysis of conventional and alternative energy conversion processes.

ME 159: Mechanical Engineering Laboratory (1)
Prerequisites: ME 118, ME 125, ME 145, ME 156 (or concurrently), and senior standing. Analysis of mechanical engineering and measurement systems. Students conduct experiments dealing with advanced thermal and mechanical systems. Using knowledge and experience gained from experimentation, students design and conduct their own group experiments. Both written and oral technical reports are required.

ME 162: Computer-Aided Design (3)
Prerequisites: ME 2, ME 26, ME 140, ME 145 (or concurrently). Survey of computer applications for design, analysis of mechanical systems, and manufacturing of mechanical components. Typical programming language software packages used in industry (CAD/CAM and FEA) will be introduced.

ME 164: Mechanical Systems of Engineer Design I (3)
Prerequisites: ME 135 and successful completion of university writing requirement. Open ended design problems of complete machine systems. Integration of prerequisite course material into final design project. Team project report/presentation required.

ME 166: Energy Systems Design (3)
Prerequisites: ME 135 and successful completion of university writing requirement. Design of conventional and alternative energy conversion systems i.e. solar; selection and integration of components of the system; use of codes and standards. Group project report required. Satisfies the senior major requirement for B.S. in Mechanical Engineering.

ME 170: Aerodynamics (3)
Prerequisites: ME 116 and ME 136. Fundamental principles and applications of aerodynamics over airfoils, finite wings, and airplane configurations in the subsonic and supersonic flow regimes. Topics covered in the course include incompressible and inviscid flow field, viscous boundary layers, characteristic parameters for airfoil and wing aerodynamics, incompressible flows around airfoils and finite wings.

ME 171: Orbital Mechanics (3)
Prerequisite: ME 112. This course covers physics of orbiting satellites: Kepler's and Newton's laws, conservation laws, conic sections; coordinate systems and transformations including time; Kepler's equation and two-body propagation; orbital maneuvering; and attitude dynamcics.

ME 172: Aerospace Propulsion (3)
Prerequisites: ME 116 and ME 136. Explores aerospace propulsive devices as intricate systems, analyzing their functional requirements, engineering and environmental limitations, and design constraints. It covers both air-breathing and rocket engines, providing a foundation for integrating propulsive systems into vehicle designs. Mission analysis, performance fundamentals, and practical design examples and presented.

MECHANICAL ENGINEERING COURSES

ME 173: Flight Control Systems (3)
Prerequisites: ME 112. Fundamental principles of flight control systems. The course aims at developing the basic physical understanding of the forces and moments generated on the aircraft and at the various control surfaces, developing non-linear dynamic models based on these physical considerations, linearizing these models and designing linear flight control laws for the linearized model. Time permitting, gain-scheduling and piecewise-affine controllers will also be discussed.

ME 180: Special Projects (1-3; max total 3)
Prerequisites: senior standing in mechanical engineering, approved subject, department apporved writing course or successful completion of writing exam. Study of a problem under supervision of a faculty member; final typewritten report required. Individual project except by special permission.

ME 190: Independent Study (1-3; max total 6)
See Academic Placement -- Independent Study. Approved for ***RP*** grading.

ME 191T: Topics in Mechanical Engineering (1-3; max total 6)
Prerequisite: permission of instructor. Investigation of selected mechanical engi neering subjects not in current courses.

ME 193: Mechanical Engineering Cooperative Internship (1-6; max total 12)
Prerequisite: permission of adviser. Engineering practice in an industrial or government installation. Each cooperative internship period usually spans a summer-fall or spring-summer interval. This

AEROSPACE ENGINEERING, MINOR

Aerospace Engineering, Minor

REQUIREMENTS

The minor requires twelve (12) upper-division distinct units in residence in total. Distinct units cannot be doubled for any major.

Student pursuing the Aerospace Engineering Minor must choose to complete twelve (12) units from any of the following listed courses:

ME 144—Advanced Mechanics of Materials Units: 3

ME 170—Aerodynamics Units: 3

ME 171—Orbital Mechanics Units: 3

ME 172—Aerospace Propulsion Units :3

ME 173—Flight Control Systems Units: 3

Minor Advising Notes

All course prerequisites are enforced.
All courses counting toward the minor must be taken on a letter-grade basis and must be completed with a grade of C or higher.
The Aerospace Engineering Minor must be completed with a minimum GPA of 2.50.
Students are advised to seek their advisor's input upon course selections.

Aerospace Engineering Minor Objectives

The Department of Mechanical Engineering offers a minor to Fresno State students who are interested in aerospace applications of engineering theory related to subsonic and supersonic aerodynamics, flight vehicle stability and control, satellite dynamics, aerospace propulsion, and aerospace structure and materials.

FACULTY

The faculty members possess depth and breadth in aerospace engineering fields and are active in bringing these experiences and skills to the classroom. The identifiable strengths of the academic program are the hands-on experience for students, the proper attention given to the scientific and mathematical engineering, and the rigor of upper-division aerospace engineering courses coupled with design projects.

-The department requires mandatory advising to help students make sound academic decisions
-For faculty phone numbers and e-mail, see the campus directory
-For more on the faculty, see the faculty pages

MECHANICAL ENGINEERING FACULTY

Full-time Faculty

Sankha Banerjee, PhD (Associate Professor and Graduate Coordinator)
Design, Materials, and Numerical Methods

Alaeddin Bani Milhim, PhD (Assistant Professor)
Mechatronics, Robots, Autonomous Vehicles/Systems, Nanomanipulation

Mazen Eldeeb, PhD (Associate Professor)
Thermodynamics, Heat Transfer and Combustion

Gemunu Happawana, PhD (Professor)
Applied Mechanics, Vibrations, Dynamics and Control

Aaron Hoskins, PhD (Associate Professor)
Aerospace Engineering and Numerical Methods

Michael Jenkins, PhD, PE (Professor)
Mechanics, Materials, Test Methods, Brittle Materials and Reliability

Deify Law, PhD (Professor and Department Chair)
Computational Fluid Dynamics (CFD), Experimental Fluid Mechanics, Aerodynamics, HVAC, Two-Phase Flow and Heat Transfer

Ho-Lung Li, PhD (Lecturer)
Machine Design, Robust Control, Circuit Design, 3D Multi-material Printing Machine

The Nguyen, PhD (Associate Professor)
Controls, Mechatronics, Advanced Materials and Design

Ajith Weerasinghe, PhD (Associate Professor)
Energy Systems, Solar Cells and Life Cycle Analysis

Yuanyuan Xie, PhD (Associate Professor)
Design/Numerical Methods and Battery Technologies

Part-time Faculty

Tikiri Amarasinghe, (Lecturer)
Applied Mathematics, Differential Equations with Applications

Troy Watson, MSME (Lecturer)

Jiaxin Zhao, PhD (Lecturer)
Machine Design, Fluid Mechanics, and Tribology