Mechanical Engineering Faculty

The faculty of the Department of Mechanical Engineering have had distinguished careers in industry and/or government and are able to help students develop professional skill in defining and solving engineering problems.

Full-Time Faculty

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

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

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

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

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

Deify Law, PhD (Associate Professor)
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

Zhi Liang, PhD (Assistant Professor)
Micro/nanoscale Thermodynamics and Heat Transfer, Nanofluidic Energy Conversion and Storage Devices and Computational Modeling.

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

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

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

Part-Time Faculty

Henry Duong, PhD (Lecturer)
Digital and Software Electronics

Yukan Han, PhD (Lecturer)
Materials, Heat Transfer, and Scanning Electron Microscopy

Edbertho Leal-Quiros, PhD (Lecturer)
Energy Systems, Plasma, Environment Engineering and Renewables

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

FRESNO STATE®

Lyles College of Engineering

MECHANICAL ENGINEERING

For additional information, contact
Dr. The Nguyen, Associate Professor and Chair
Department of Mechanical Engineering
California State University, Fresno
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Fresno, CA 93740-8030
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Email: then@csufresno.edu

The Mechanical Engineering Career

Mechanical engineering is a broad technical field encompassing many areas. These areas include:

- Aerospace
- Automobile
- Biomedical
- Energy
- Environment
- Manufacturing
- Power Generation
- Product Design
- Transportation
- Defense

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.

Mechanical Engineering Program

The Mechanical Engineering program at California State University, Fresno is a broad-based, hands-on curriculum. The undergraduate program currently requires 123 units (8 semesters) for graduation. The programs key elements include:

- Courses in machine design, energy, and materials
- Hands-on experience via laboratories, class and club projects
- 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

Accreditation

The BSME program at California State University, Fresno is accredited by the Engineering Accreditation Commission of ABET, htttp://www.abet.org.

ME 164. Mechanical Systems of Engineer Design (3)

Prerequisites: ME 135 and successful completion of Upper Division 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 Upper Division 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 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 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 course cannot be used to meet graduation requirements. ***CR/NC*** grading only.

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)

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

General Preparation

Success for students majoring in mechanical engineering requires skills and knowledge in mathematics, physics, and chemistry, as well as the self-discipline to study. In addition, good writing, oral communication and computer skills are desired.

High School Preparation

Students should meet the California State University's admission requirements, grade point average, and test scores. Additional recommended courses are advanced mathematics, chemistry, physics, computer-assisted drawing (CAD), and computer programming.

Student Organizations

For additional information, contact the Department of Mechanical Engineering 559.278.4269.

Mechanical Engineering Specific

American Society of Mechanical Engineers (ASME)
ASME is the national professional society for mechanical engineers. All mechanical engineering majors are eligible to join the student chapter. Activities include participation in regional and national conferences and technical contests, visits to industries, and opportunities to hear invited speakers. Members interact with senior section members and participate in their activities. The student section organizes socials and provides freshmen and new transfer students with awareness of the profession.

American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
ASHRAE is a worldwide building technology society. The Society and its members focus on building systems, energy efficiency, indoor air quality and sustainability within the industry. Through research, standards writing, publishing and continuing education, ASHRAE shapes tomorrow's built environment today by advancing the arts and sciences of heating, ventilating, air conditioning and refrigerating to serve humanity and promote a sustainable world. ASHRAE is the global leader, the foremost source of technical and educational information, and the primary provider of opportunity for professional growth in the arts and sciences of heating, ventilating, air conditioning and refrigerating.

Human Powered Vehicle Challenge (HPVC) Project

ASME's Human Powered Vehicle Challenge (HPVC) provides an opportunity for students to demonstrate the application of sound engineering design principles in the development of sustainable and practical transportation alternatives. In the HPVC, students work in teams to design and build efficient, highly engineered vehicles for everyday use—from commuting to work, to carrying goods to market.

Pi Tau Sigma (ΠΤΣ)

PTS is the international mechanical engineering honor society. Members are chosen on a basis of sound engineering ability, scholarship, personality, and probable future success in their chosen field of Mechanical Engineering. Active members are selected from the junior and senior mechanical engineering classes at their respective schools whose mechanical engineering curriculum must be accredited by ABET.

Society of Automotive Engineers (SAE)

SAE International is a global association of engineers and related technical experts in the aerospace, automotive and commercial-vehicle industries. SAE International's core competencies are life-long learning and voluntary consensus standards development. Two important activities at Fresno State related to SAE International are administered through Bulldog Racing: Formula SAE and Mini Baja.

Formula SAE- Formula SAE is a student design competition. The concept behind Formula SAE is that a fictional manufacturing company has contracted a design team to develop a small Formula-style racecar.As an ASI-recognized "club", the Fresno State Formula SAE student team use IRA (Instructionally related activity) funding to design, build and test a prototype based on a series of rules whose purpose is both to ensure on-site event operations and promote clever problem solving.

Baja SAE - Baja SAE (formerly known as Mini Baja) is an intercollegiate design competition. Teams of students from universities all over the world design and build small off-road cars. As an ASI-recognized "club", the Fresno State Baja SAE student team use IRA (Instructionally Related Activity) funding to design, build and race off-road vehicles that can withstand the harshest elements of rough terrain. The vehicles used in Baja SAE racing are often similar in appearance to dune buggie.

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, ME 115, ME 134 (or concurrently), ME 145(or concurrently). 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 ME 154(or concurrently), ME 156 (or concurrently) and complete Upper Division Writing Requirement. Fundamentals of thermodynamics and heat transfer as applied to engineering problems.

ME 137. Turbomachinery (3)

Prerequisites: ME 116, ME 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 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. (1 lecture, 3 lab hours)

ME 112. Engineering Mechanics: Dynamics (3)
Prerequisites: CE 20; MATH 81 or ENGR 101. Development of principles of kinematics and kinetics in engineering.

ME 115. Instrumentation and Measurement Lab (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. (3 lab hours)

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. (One 3-hour lab)

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 compens ations; applications of different measuring devices and techniques used in engineering systems. Lecture/lab.

ME 125. Engineering Statistics and Experimentation (3)
Prerequisites: MATH 77 (or concurrently) completed. Provides fundamentals of statistical and uncertainity 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 uncertainity in experimental measurements.

Lyles College of Engineering Related

Engineers Without Borders (EWB)
EWB-USA supports community-driven development programs worldwide by collaborating with local partners to design and implement sustainable engineering projects, while creating transformative experiences and responsible leaders. Members consist of professionals and students from a variety of professions including engineering, public health, anthropology and business. Through its projects and programs, EWB-USA provides innovative professional educational opportunities that provide a global perspective.

Mechatronics Union
The Mechatronics Union is an organization that enables students to design and build robotic and electromechanical devices for fun and competition.

National Society of Black Engineers (NSBE)
NSBE is a student organization whose objective is to promote minority interest and active participation in engineering.

Society of Hispanic Professional Engineers (SHPE)
SHPE is a national non-profit organization that promotes Hispanics in engineering, math, science and other technical professions to achieve educational excellence, economic opportunity and social equity. SHPE members are brought together by heritage, social responsibility and the desire to improve the equality of all people through the use of science and technology. SHPE value excellence in education, professional pursuits and leadership, obtaining excellence through integrity, empowerment, achievement, diversity and continuous improvement.

Society of Women Engineers (SWE)
SWE is an organization centered around a passion for members' success and continues to evolve with the challenges and opportunities reflected in today's exciting engineering and technology specialties. SWE seeks to stimulate women to achieve full potential in careers as engineers and leaders, expand the image of the engineering profession as a positive force in improving the quality of life, and demonstrate the value of diversity. SWE strives to inform young women, their parents, counselors, and the general public of the qualifications and achievements of women engineers and the opportunities open to them; assist women in readying themselves for a return to active work after temporary retirement; serve as a center of information on women in engineering; encourage women engineers to attain high levels of education and professional achievement.

Sundogs Solar Club

Sundogs is a technical club whose sole purpose is to assist students to get involved and exposed to solar and "green" technical projects. This will allow students to acquire the experience and knowledge to be successful within the solar energy field. Sundogs has also partnered with local solar companies such as Solarcity, Sol-tek and Grid Alternatives to ensure that students network and gain hands on experience in the form of: solar installations, tours, projects and demonstrations.

Tau Beta Pi (TBΠ)

Tau Beta Pi is the only engineering honor society representing the entire engineering profession. It is the nation's second-oldest honor society founded in 1885, and seeks to be universally recognized as the premier honor society. Members are those who have conferred honor upon their Alma Mater by distinguished scholarship and exemplary character as students in engineering, or by their attainments as alumni in the field of engineering, and to foster a spirit of liberal culture in engineering colleges. The creed of TBP is: Integrity and excellence in engineering.

Valley Industry Partnership (VIP)

The VIP Program is a unique partnership between leading companies and the Lyles College of Engineering to provide internship opportunities for qualified students of Junior or Senior Level Standing. The Valley Industrial Partnership was formed as a cooperative effort between Fresno State and a number of local companies. The main goal of the program is to provide a richer, more well rounded, educational experience for engineering students. This is done by giving the students an opportunity to work in a real-world engineering environment. This program is very similar to the internship programs that you find in other disciplines. Internship programs help to give students a more focused outlook on what the demands of the profession are in the "real" world. This complements the work that they do in the classroom by giving the classes a real context.

Mechanical Engineering Courses

ME 1. Introduction to Mechanical Engineering (1)

Required of all freshmen and transfer students during their first or second semester of study. Introduction to engineering design; case studies in mechanical engineering; problem-solving using the engineering approach; introduction to engineering code of ethics, mechanical engineering profession, and career opportunities.

ME 2. Computer Applications in Mechanical Engineering Lab (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). (1 3-hr laboratory).

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.
(Two 3-hour lecture labs)

ME 29. Engineering Mechanics (3)

(Same as CE 29.) 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 matter and its effect on mechanical, electrical, magnetic, and thermal properties.

ME 32. Engineering Materials Laboratory (1)

Prerequisite: ME 31 or concurrently. Prerequisites: MATH 75 (or concurrently). Application of experimental methods to engineering materials. Study of stress and strain in metals; fatigue; hardness; toughness. (3 lab hours)

5th (Fall) SEMESTER		**Units**
ME 112	Engr Mech: Dyn	3
ME 115	Instu & Meas Lab	1
ME 136	Thermodynamics	3
ME 125	Engr Stat & Expt	3
CE 121	Mech of Mtls	3
		3
		13
6th (Spring) **SEMESTER**		
ME 116	Fluid Mechanics	3
ME 118**	Fluid Mech Lab	1
ME 156	Adv Thermo	3
ME 134[1]	Kinematics of Mach	3
ME 140	Adv Engr Analysis	3
		13
7th (Fall) SEMESTER		
Technical Area Course[3]		3
ME 135	Intro Dsgn-Sr Cap I	3
ME 145	Heat+Mass Trans	3
ME 154	Dsgn of Mach Ele	3
GE Area D3[2]	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 M/I	PLSI 120	3
		13

[1]Also counts as major GPA
[2]See Catalog for G.E. Courses
[3]Take a minimum 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 adviser's approval.
[4]ENGR 101 may be taken as an alternative for Math 81 with adviser'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 if the student fails the writing exam requirement.

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

Bachelor of Science Degree in Mechanical Engineering

Major Requirements 66

ME 1, 2, 26, 31, 32, 95, 112, 115, 116, 118, 125, 135, 136, 140
145, 154, 156..... (40)
CE 20, 121..... (6)
ECE 71/CSCI 40, ECE 91 and ECE 91L..... (7)

Design Applications..... (7)

ME 155, ME 159 and ME 166

Technical Area Courses..... (6)

Take a minimum of three units from the courses offered in Group A: ME 122, 137, 142, 144, 146, 162, or 164.
A maximum of three units from Group B may be substituted for a course in Group A with faculty advisor's approval: ME 180, 190, 191T; ECE 121, 121L, 155

Other Requirements..... 57

1. **General Education..... (36)**

COMM 3, 7, or 8 (GE Area A1); ENGL 10 (GE Area A2); HIST 11 or 12 (GE Area D1) and select one course from each of the following GE Areas: B2, C1 or fulfilled by major, and D3

The following courses are required to satisfy both GE and major requirements:

CHEM 1A (GE Area B1)..... MATH 75 (GE Area B4)
PHIL 20 (GE Area C2)..... PLSI 2 (GE Area D2)
ME 134 (GE Area 1B)..... PLSI 120 (GE Area M/I)
Fulfilled by major (GE Area IC)

2. **Additional Requirements..... (21)**
MATH 76, 77, 81; PHYS 4A, 4AL, 4B, 4C

TOTAL UNITS IN MAJOR.....123

Advising Notes:

1. Courses in mathematics, the physical sciences, or engineering taken CR/NC are not counted toward fulfillment of degree requirements in mechanical engineering.

2. Mechanical engineering majors might consider a math, physics, or business minor.

3. Since the mechanical engineering major curriculum is very demanding, many students, especially those not fully prepared in mathematics, chemistry and/or physics, take 4 1/2 or more years to graduate rather than the traditional 4 years.

4. **ADVISING IS MANDATORY** in the Lyles College of Engineering. A registration hold will be placed on students who fail to see their adviser at least once per academic year.

5. *The Upper-Division Writing Skills* requirement has to be completed no sooner than the term in which 60 units of coursework are completed or no later than the term in which 90 units are completed. This requirement can be met by passing the university writing examination or by taking ENGR 105W or a department-approved writing course. Must be taken and passed with a letter grade of "C" or better in the junior year if the student fails the writing exam requirement.

6. With faculty adviser approval, ENGR 101 may be taken instead of MATH 81.

MECHANICAL ENGINEERING

Bachelor of Science Degree

Recommended Program Sequence

1st (Fall) SEMESTER		Units
ME 1	Intro to ME	1
ME 26	Engr Graphics	3
ECE 71/CSCI 40	Engr. Comptatn	3/4
GE Area A2	ENGL 10	3
MATH 75*	Math Analysis I	4
GE Area B2[2]	Life Sciences	3
		17/18

2nd (Spring) SEMESTER		
ME 2	Cmpt App in ME	1
CHEM 1A	Gen Chemistry	3
CHEM 1AL	Gen Chemistry Lab	2
MATH 76	Math Analysis II	4
PHYS 4A	Mech+Wave Motion	1
PHYS 4AL	Lab Mech+Wave	3
GE Area D1	HIST 11 or 12	17

3rd (Fall) SEMESTER		
ME 31	Engr Materials	3
ME 32	Engr Materials Lab	1
MATH 77	Math Analysis III	4
PHYS 4B	Elec+Mag+Heat	3
GE Area A1	Oral COMM	3
GE Area C2	PHIL 20	3
		17

4th (Spring) SEMESTER		
ME 95/ IT 74	Manuf Processes	2/3
CE 20	Engr Mech:Statics	3
ECE 91	Intro Elec Engr	3
ECE 91L	Elec Cir Lab	1
MATH 81[4]	Applied Analysis	3
PHYS 4C	Light+Mod Phys	3
GE Area D2	PLSI 2	3
		18/19