COLLEGE OF ENGINEERING

Engineering Bldg. (192), Room 301
Phone: 805.756.2131
https://engineering.calpoly.edu

Dean: Amy Fleischer
Executive Associate Dean: Rakesh K. Goel
Interim Associate Dean: Robert Crockett
Interim Associate Dean: Eric Mehiel

Academic Programs

<table>
<thead>
<tr>
<th>Program name</th>
<th>Program type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerospace Engineering</td>
<td>BS*, MS</td>
</tr>
<tr>
<td>Biomedical Engineering</td>
<td>BS, MS, Specialization</td>
</tr>
<tr>
<td>Civil and Environmental Engineering</td>
<td>MS</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>BS*</td>
</tr>
<tr>
<td>Computer Engineering</td>
<td>BS*</td>
</tr>
<tr>
<td>Computer Science</td>
<td>BS**, MS, Minor</td>
</tr>
<tr>
<td>Computing for Interactive Arts</td>
<td>Minor</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>BS*, MS</td>
</tr>
<tr>
<td>Engineering Management</td>
<td>MS</td>
</tr>
<tr>
<td>Environmental Engineering</td>
<td>BS*</td>
</tr>
<tr>
<td>Fire Protection Engineering</td>
<td>MS</td>
</tr>
<tr>
<td>General Engineering</td>
<td>BS</td>
</tr>
<tr>
<td>Industrial Engineering</td>
<td>BS*, MS</td>
</tr>
<tr>
<td>Manufacturing Engineering</td>
<td>BS*</td>
</tr>
<tr>
<td>Materials Engineering</td>
<td>BS*</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>BS*, MS</td>
</tr>
<tr>
<td>Software Engineering</td>
<td>BS*</td>
</tr>
</tbody>
</table>

Joint Programs

<table>
<thead>
<tr>
<th>Program name</th>
<th>Program type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross Disciplinary Studies Minor in Data Science</td>
<td>Minor</td>
</tr>
<tr>
<td>Environmental Studies</td>
<td>Minor</td>
</tr>
<tr>
<td>Liberal Arts &amp; Engineering Studies</td>
<td>BA</td>
</tr>
<tr>
<td>Transportation Planning</td>
<td>MCRP/MS</td>
</tr>
</tbody>
</table>

Graduate Certificate Programs

<table>
<thead>
<tr>
<th>Program name</th>
<th>Program type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire Protection Engineering Applications</td>
<td>Certificate</td>
</tr>
<tr>
<td>Fire Protection Engineering Science</td>
<td>Certificate</td>
</tr>
</tbody>
</table>

* Engineering programs accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org/
** BS Computer Science program accredited by the Computing Accreditation Commission of ABET, http://www.abet.org/

Engineering and computer science programs at Cal Poly are strongly oriented toward preparing graduates for immediate entry into professional practice. Students declare their majors when they enter as freshmen, and they generally take at least one course in that major each quarter. This early introduction better motivates and prepares students to master the foundational mathematics, basic science, and engineering science or computer science central to success in all the engineering disciplines.

The undergraduate bachelors of science engineering disciplines listed above provide the education needed for entry to the engineering profession and for continued academic work toward advanced degrees. Many of our graduates enter graduate programs at Cal Poly or other institutions. Cal Poly engineering and computer science graduates are highly desired by industry and find a variety of professional opportunities awaiting them, such as engineering design, computer hardware and software engineering, test and evaluation, systems analysis, modeling and simulation, manufacturing, applied research, development, sales and field engineering. Graduates pursue careers in a broad cross-section of industry, government agencies, public utilities, marketing groups, and educational institutions.

The College of Engineering is an internationally-recognized, premier undergraduate engineering college. Its mission is to provide an excellent Learn by Doing education and to graduate in-demand, Day One-ready professionals. The College vision is to transform students into world class, innovative and collaborative engineers to meet the challenges of the 21st century.

State-of-the-art facilities and laboratories form the core of Engineering’s project-centered curriculum. Ranging from the Aircraft Design Lab to the Rotor Dynamics Laboratory, these facilities offer advanced technological systems that allow students to link theory with practice. College buildings also promote interdisciplinary project activities, including the Advanced Technology Laboratories, Bonderson Projects Center, and Engineering IV. With 19,000 square feet of space for individual and team-based projects, the Bonderson Center offers enriched opportunities for multidisciplinary projects and collaboration with industry. Engineering IV, a 104,000-square-foot building includes modern classrooms and laboratories for aerospace, mechanical, civil, environmental, industrial and manufacturing engineering programs.

Engineering Student Services

Engineering South (40), Room 115
Phone: 805.756.1461
Director: Kim Marsalek

Engineering Student Services provides an inclusive, respectful, encouraging environment that fosters the retention and graduation of all undergraduate engineering students. Through our Advising, Multicultural Engineering (MEP), and International Exchange Program (IEP) our staff provides comprehensive services to guide and empower students to achieve their goals.

Advising Center

Engineering South (40), Room 115
Phone: 805.756.1461
https://eadvise.calpoly.edu

Senior Academic Advisor: Dawn Sirois
Academic Advisor: Ashlee Burt
Academic Advisor: Greg Roldan
Academic Advisor: Jamey Stamets
Academic Advisor: Maria Zavala

As a division of Engineering Student Services, the Advising Program is dedicated to providing accurate and timely academic resources and guidance to undergraduate engineering students. Through a welcoming and inclusive environment, advising’s services promote student success.
Outreach activities are directed at students from kindergarten through community college. These programs are designed to encourage pre-university women and girls to consider engineering as a career choice. Outreach recruitment activities include: Building an Engineer workshops, High School Shadow an Engineering Student day, Girl Scout Engineering Badge day, robotics competitions, elementary school workshops, and career fairs.

The Women’s Engineering Program provides on-campus support to Cal Poly women engineering students through a variety of academic, leadership and social activities. These activities help students connect to their peers while concurrently assisting them in achieving their educational goals.

On-campus support activities include: scholarships, academic counseling and referrals, pre-registration counseling, big sibling program, test files, SWE meetings, social events, and community service activities.

Professional preparation activities are designed to prepare students for a productive career by facilitating networking with professionals and corporations. Professional preparation activities include: Evening With Industry banquet, Team Tech national design competition, Industry Tours, Resume Book, bi-weekly industry presentations and corporate information sessions.

Graduate Programs

**MS Fire Protection Engineering**

**General Characteristics**

The profession of Fire Protection Engineering is directed toward the identification, analysis and mitigation of fire hazards and risks across a broad spectrum of applications, including buildings, consumer products, industrial processes, transportation vehicles, infrastructure facilities and the wildland-urban interface.

The Master of Science in Fire Protection Engineering prepares individuals to assess and reduce the potential for property and human loss from fire in these and other settings. Students learn to analyze how buildings are used, how fires start, how fires grow, and how fire and smoke affect people, buildings and property. Fire protection engineers use the latest engineering and construction technologies to:

1. Design systems that control fires, alert people to danger and provide means for escape;
2. Evaluate buildings to identify fire risks of and the means to prevent or mitigate them;
3. Conduct fire safety research on consumer products and construction materials; and
4. Investigate fires to discover how fires start, how they spread, why protective measures fail, and how those measures could be designed more effectively.

To meet these program goals, the fire protection engineering curriculum requires that students successfully complete a total of 45 units including a fire protection engineering project as the culminating experience (FPE 596). The culminating experience will be innovative and require independent thinking. Typically, the students will perform a detailed fire and life safety evaluation of a selected building, the preparation of a comprehensive report documenting the results of this evaluation and the presentation of their analysis and findings in an oral defense to a review
the current cost of the program.

Tuition and Fee Schedule. Please refer to http://www.fpe.calpoly.edu/ for the current cost of the program.

Program Goals
The Fire Protection Engineering program is designed to build on the skills, knowledge, and broad engineering principles students acquire in an undergraduate engineering program. The required and elective courses composing the Master of Science degree in Fire Protection Engineering address the specific body of knowledge required by the fire protection engineering profession. Students completing the program will possess the technical knowledge, skills and tools required to practice fire protection engineering in a variety of local, national and international settings. Upon completion of this program, students should possess the necessary knowledge and skills to pursue professional certification and licensure in the fire protection engineering discipline. Furthermore, the program addresses unique fire challenges faced by California and other western states, including wildland-urban interface fires and post-earthquake fires. Upon completing the requirements for a Master of Science degree in Fire Protection Engineering, students should be able to:

- Identify relevant fire safety codes, standards and regulations, comprehend the fire safety performance objectives and criteria associated with these documents, and apply these fire safety objectives and criteria to a broad range of applications.
- Analyze the flammability characteristics of different materials, interpret the results of standard and non-standard fire test methods and evaluate the fire hazards associated with different materials in a range of anticipated settings.
- Analyze the dynamics of fires in and around buildings and other structures through the application of fundamental principles and the use of state-of-the-art computer-based fire simulation models.
- Understand how people interact with fire conditions in buildings and calculate evacuation times through the application of fundamental principles of people movement and the use of state-of-the-art computer-based evacuation models.
- Design fire detection and alarm systems, fire suppression systems, smoke management systems, egress systems and structural fire protection to achieve specified performance objectives.
- Perform comprehensive fire and life safety evaluations of buildings and other structures through application of the knowledge, skills and tools acquired in this program and effectively communicate the results and findings of such evaluations.

Prerequisites
For admission as a classified graduate student, an applicant should hold a bachelor’s degree in engineering or a closely related field from a regionally accredited institution, college, or university. An undergraduate grade point average of 3.0 is required. On occasion, where other credentials are exceptionally strong, a GPA in the 2.5-3.0 range may be accepted.

Tuition and Fees
As a special session program through Extended Education, the MS Fire Protection Engineering program is administratively and academically completely self-supporting. As such, the program carries a separate tuition and fee schedule. Please refer to http://www.fpe.calpoly.edu/ for the current cost of the program.

MCRP/MS Engineering, Specialization in Transportation Planning
The MCRP/MS Engineering with Specialization in Transportation Planning (http://catalog.calpoly.edu/collegesandprograms/interdisciplinaryprograms/mcrpmsengineeringtransportationplanning) is a joint interdisciplinary program between the College of Engineering and the City and Regional Planning Department of the College of Architecture and Environmental Design. Participation in the program requires enrollment in both Colleges. Participants successfully completing the program are awarded both the MCRP and the MS in Engineering, each with a Specialization in Transportation Planning.

Graduate Certificate Programs
Fire Protection Engineering Applications
General Characteristics
The courses offered in the Fire Protection Engineering Applications graduate certificate program will prepare students for a specialized career in fire protection engineering. Students completing the certificate program will be prepared for careers in:

- Consulting/Design Engineering Firms
- Fire Equipment and Systems Manufacturers
- Hospitals and Health Care Facilities
- Insurance Industry
- Research and Testing Laboratories
- Fire Departments
- Government

Program Goals
Upon completing the requirements for the graduate certificate, students should be able to:

1. Identify relevant fire safety codes, standards and regulations, comprehend the fire safety performance objectives and criteria associated with these documents, and apply these fire safety objectives and criteria to a broad range of applications.
2. Understand how people interact with fire conditions in buildings and calculate evacuation times through the application of fundamental principles of people movement and the use of state-of-the-art computer-based evacuation models.
3. Design fire detection and alarm systems, fire suppression systems, structural fire protection systems, and egress systems to achieve specified performance objectives.

To meet these program goals, the fire protection engineering applications curriculum requires that students successfully complete a total of 16 units.

Fire Protection Engineering Science
General Characteristics
The courses offered in the Fire Protection Engineering Science graduate certificate program will prepare students for a specialized career in fire protection engineering. Students completing the certificate program will be prepared for careers in:

- Forensic Investigations;
- Nuclear Fire Safety;
- Fire Science Research (R&D facility, Testing Lab, etc.)
Program Goals
Upon completing the requirements for the graduate certificate, students should be able to:

1. Apply concepts associated with the thermal sciences, including thermodynamics, fluid mechanics, and heat transfer, to the analysis of fire protection engineering problems.
2. Analyze the flammability characteristics of different materials, interpret the results of standard and non-standard fire test methods and evaluate the fire hazards associated with different materials in a range of anticipated settings.
3. Analyze the dynamics of fires in and around buildings and other structures through the application of fundamental principles and the use of state-of-the-art computer-based fire simulation models.

To meet these program goals, the fire protection engineering science curriculum requires that students successfully complete a total of 16 units.

Fire Protection Engineering Science & Fire Protection Engineering Applications
Tuition and Fees
As a special session programs through Extended Education, the MS Fire Protection Engineering program and Fire Protection Engineering graduate certificate are administratively and academically completely self-supporting. As such, the programs carry a separate tuition and fee schedule. Please refer to http://www.fpe.calpoly.edu/ for the current cost of the program.

FPE Courses
FPE 500. Individual Study. 1-4 units
Term Typically Offered: TBD
Prerequisite: Consent of graduate coordinator and supervising faculty member.

Advanced study planned and completed under the direction of a member of the program faculty. Open only to graduate students in the FPE program who have demonstrated ability to do independent work. FPE 500 must be taken as a 4-unit class when substituting for a required course in the FPE program.

FPE 501. Fundamental Thermal Sciences. 4 units
Term Typically Offered: F
Prerequisite: Graduate standing or consent of instructor.

Introduction to the thermal sciences, including thermodynamics, fluid dynamics and heat transfer, as they relate to fire protection engineering. Includes 1st and 2nd laws of thermodynamics, conservation relations, hydrostatics, internal and external flows, and heat transfer by conduction, convection and radiation. 4 lectures.

FPE 502. Fire Dynamics. 4 units
Term Typically Offered: W
Prerequisite: FPE 501 or consent of instructor.

First exposure to fire dynamics phenomena. Includes fundamental fire and combustion topics such as thermodynamics of combustion, fire chemistry, premixed and diffusion flames, ignition, burning of liquids and solids, heat release rates, flame spread and fire plumes. 4 lectures.

FPE 503. Flammability Assessment Methods. 4 units
Term Typically Offered: SP
Prerequisite: FPE 502.

Characterization of flammability properties of gaseous, liquid and solid materials. Fire test methods for evaluating flammability properties of materials and burning characteristics of products. Overview of regulatory requirements for restricting the flammability of products and materials used in buildings. 4 lectures.

FPE 504. Fire Modeling. 4 units
Term Typically Offered: SU
Prerequisite: FPE 502, FPE 503.

Fire modeling techniques for fire safety assessment. Application of various engineering correlations and computer-based fire models, including zone models and computational fluid dynamics models, to representative fire problems. 4 lectures.

FPE 521. Egress Analysis and Design. 4 units
Term Typically Offered: F
Prerequisite: Graduate standing or consent of instructor.

Regulatory requirements for egress systems in buildings, including occupancy classifications, occupant loads, means of egress components and exit capacities. Introduction to human behavior in fire and to methods for calculating people movement under emergency conditions, including computer-based evacuation models. 4 lectures.

FPE 522. Fire Detection, Alarm and Communication Systems. 4 units
Term Typically Offered: SP
Prerequisite: Graduate standing or consent of instructor.

Analysis of the operating characteristics of fire detection devices and alarm notification appliances. Introduction to modern fire alarm systems and components. Introduction to mass communication systems. Current installation and approval standards. 4 lectures.

FPE 523. Water-based Fire Suppression. 4 units
Term Typically Offered: W
Prerequisite: Graduate standing.

Analysis and design of water-based fire suppression systems, including water supply analysis and hydraulic calculations. Overview and design considerations for automatic sprinkler, water spray, water mist and foam suppression systems. Typical contemporary installations and current installation and approval standards. 4 lectures.
FPE 524. Structural Fire Protection. 4 units
Term Typically Offered: SU
Prerequisite: Graduate standing or consent of instructor.
Regulation and analysis procedures for structural components of wood, steel, concrete, composites. Structural capabilities, modifications under fire induced exposures. Calculation methods for predicting fire resistance of structural components. Definition of types of building construction. 4 lectures.

FPE 551. Fire Safety Regulation and Management. 4 units
Term Typically Offered: F
Prerequisite: Graduate standing or consent of instructor.
Use of model building and fire codes, administrative regulation, retrospective codes, performance-based codes, and risk-based regulation to manage fire safety. Identification and application of different fire risk management tools and techniques. 4 lectures.

FPE 552. Smoke Management and Special Hazards. 4 units
Term Typically Offered: W
Prerequisite: FPE 502 and FPE 504.
Analysis and design of smoke management systems. Assessment of smoke hazards. Identification of special hazards. Analysis and design of fire suppression systems used for fire control of special hazards, including gaseous and chemical agents and systems. 4 lectures.

FPE 554. Forensic Fire Analysis. 4 units
Term Typically Offered: SP
Prerequisite: Consent of graduate coordinator and instructor. Recommended: FPE 504.
Introduction to the processes of fire investigation and reconstruction. Engineering analysis of structural and wildland fires. Identification of failure mechanisms in fire safety systems. Case studies of actual fire incidents to address and reinforce concepts related to different types of system and performance failures. 4 lectures.

FPE 555. Fire Protection Management in the Wildland-Urban Interface (WUI). 4 units
Term Typically Offered: TBD
Prerequisite: Graduate standing or consent of instructor. Recommended: LA/NR 318 and NR 340.
Social, economic, political, and technological issues affecting fire management in urbanized landscapes where fire continues its ecological role. Fire risk analysis; needs assessment, legislative codes, standards and policies; liability issues; evacuation; incident response planning. 3 lectures, 1 laboratory.

FPE 556. Advanced Heat Transfer III. 4 units
Term Typically Offered: TBD
Prerequisite: ME 347 or FPE 502; and ME 350.
Advanced principles of heat transfer. Classical solution techniques to problems in radiation with applications related to the role of radiation heat transfer in the development of fire in buildings. 4 lectures. Crosslisted as FPE/ME 556.

FPE 593. Curricular Practical Training (CPT) for Fire Protection Engineering. 1-5 units
Term Typically Offered: SU
Prerequisite: Consent of Graduate Coordinator.
Curricular Practical Training (CPT) to gain work experience directly related to fire protection engineering. Intended for international students. CPT work authorization is required for all paid or non-paid, part- or full-time employment and internships. Total credit limited to 5 units.

FPE 596. Culminating Experience in Fire Protection Engineering. 1-5 units
Term Typically Offered: W, SP
Prerequisite: FPE 504, advanced graduate standing, completion of, or concurrent enrollment in, engineering courses in program, and consent of instructor.
Performance of comprehensive fire and life safety evaluations of buildings and other structures. Communication of the results and findings of such evaluations in written report and by oral presentation. Conducted under supervision of faculty.

FPE 599. Design Thesis. 1-9 units
Term Typically Offered: TBD
Prerequisite: Consent of graduate coordinator and graduate standing.
Each individual will be assigned a thesis project for solution under faculty supervision as a requirement for the master's degree, culminating in a written thesis.