College of Engineering

Engineering Bldg. (192), Room 301
Phone: 805.756.2131
http://ceng.calpoly.edu/

Dean: Debra S. Larson
Associate Dean: Fred W. DePiero
Associate Dean: Rakesh K. Goel

Academic Programs

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Joint Programs

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Graduate Certificate Programs

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<td>Fire Protection Engineering Applications</td>
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<td>Fire Protection Engineering Science</td>
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<td>Space Systems Technology</td>
<td>Certificate</td>
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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 Affairs

Engineering Bldg (192), Room 301
Phone: 805.756.2131

Associate Dean: Fred W. DePiero

The College of Engineering Student Affairs encompasses the Advising Center, International Exchange Program, Multicultural Engineering Program, Outreach Services, and the Women’s Engineering Program.

Advising Center

Engineering South (40), Room 111
Phone: 805.756.1461
eadvise.calpoly.edu

Director for Engineering Student Affairs: Kim Marsalek
Lead Academic Advisor: Dawn Sirois
Academic Advisor: Jamey Stamets
Academic Advisor: Greg Roldan
Academic Advisor: Maria Sklar

The Engineering Advising Center is a student centered office that works in partnership to provide support services that foster student success.

The College of Engineering’s Academic Advisors meet with students from all thirteen majors within the College of Engineering. There are also trained Peer Advisors who can answer general questions. Students are encouraged to seek advice early and often throughout their time at Cal Poly.
Areas of Speciality
- Academic advising and planning courses towards graduation
- Assist students with strategies for success in their academics
- Advising students on academic probation
- Interpretation of curriculum sheets and flowcharts, articulation agreements, requirements towards degree, and online advising tools
- Change of major advising
- Study abroad advising
- College and University policies and procedures
- Process forms related to student's degree progress
- Quarterly advising workshops and programs
- Former Returning Engineering Students (Readmission)

In addition, students are assigned a faculty advisor within their department. A faculty advisor can help with questions regarding: course content, technical electives/concentration, career goals, internships and graduate school.

International Exchange Program
Engineering South (40), Room 111
Phone: 805.756.1461
eadvise.calpoly.edu

IEP Advisor: Maria Sklar
The College of Engineering has established exchange agreements with reputable engineering overseas universities. These exchange programs differ from the University wide exchange programs in that they offer students the opportunity to attend overseas universities with an engineering focus, while paying Cal Poly tuition. The partner universities have been specifically selected by the College for their innovative technology and engineering coursework. Most of our partner universities guarantee on-campus housing and offer courses in English, making it easier for our students to take coursework to meet their degree requirements. Participation brings many lasting benefits that enhance students' personal and professional life. Students typically return with improved communication skills, a better understanding of other cultures, a global engineering perspective, and a more marketable resume for industry. The current list of partner universities is located at: www.eadvise.calpoly.edu/iep/.

Multicultural Engineering Program (MEP)
Engineering South (40), Room 115
Phone: 805.756.1433
Email: mep.calpoly.edu

Coordinator: Maria Manzano
Advisor: Jackie Duerr
The Cal Poly Multicultural Engineering Programming (MEP) mission is to raise the consciousness of the institution and industry of the potential of disadvantaged students, especially those from underrepresented groups, and MEP in a way that results in higher retention and graduation rates and demonstrates industry commitment so that students will be successful in their engineering or computer science field. This compliments the university's goals of increasing retention and graduation rates of disadvantaged students.

This is accomplished through intrusive first year advising, academic support services, and community building. Community building starts with the MEP First Year Seminar offered Fall quarter which focuses on: University expectations and resources, acquiring team building skills, clarifying career goals, and building a resume.

Community building is then strengthened by the close association with the three professional student engineering clubs supported by MEP operations - American Indian Science & Engineering Society (AISES), Society of Hispanic Professional Engineers (SHPE) and the Society of Black Engineers and Scientists (SBES). In addition, study and tutoring centers are available for students to develop supportive academic peer groups.

An Industry Advisor Board partners with MEP to foster professional development. Industries that recognize MEP as a valuable source for skilled future employees help coordinate summer jobs, internships, and scholarship opportunities.

Outreach Services
Engineering South (40), Room 119
Phone: 805.756.1320
outreach@calpoly.edu

Outreach is an important part of the mission of Cal Poly's College of Engineering. The K-14 outreach programs stimulate student interest in engineering. Cal Poly attracts non-traditional and underrepresented students to engineering through the outreach activities of the Multicultural Engineering Program and the Women's Engineering Program. By partnering with K-12 schools and community colleges in the community, Cal Poly offers engineering projects and presentations in the classroom. For middle and high school students, schools are invited to visit Cal Poly labs to inspire students with the exciting hands-on opportunities in engineering. The schools are encouraged to implement an engineering curriculum and partner with Cal Poly for support, tutoring and curriculum development.

The Engineering Possibilities in College (EPIC) summer camp provides a hands-on learning opportunity for high school students to explore engineering disciplines.

Cal Poly students are encouraged to volunteer for outreach activities to increase their speaking abilities and share their experiences with aspiring young minds.

Women's Engineering Program (WEP)
Engineering South (13), Room 216
Phone: 805.756.2350
wep.calpoly.edu

Director: Helene Finger
The mission of the Women's Engineering Program (WEP) is to recruit and retain women engineering and computer science students by focusing on outreach, on-campus support and professional preparation objectives. To meet these objectives, WEP works closely with the Society of Women Engineers (SWE) Cal Poly student section, one of the top student sections in the nation, in supporting a variety of programs directed at pre-college, undergraduate and graduate students.

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.

**MS Engineering**

**General Characteristics**

The Master of Science degree program in Engineering has the following goals:

- Provide an empowering terminal professional degree for students who intend to become practicing engineers, retaining the strong laboratory emphasis and industrial interaction found in the BS curriculum.
- Provide preparation for further study in engineering, leading to the Doctor of Engineering or Ph.D. degree.
- Provide job-entry education for the more complex and evolving interdisciplinary areas of engineering, such as research and development, innovative design, systems analysis and design, bioengineering, biomedical engineering, manufacturing, mechatronics, and engineering management.
- Update and upgrade opportunities for practicing engineers.
- Allow graduates to maintain currency in their fields.

To meet the above goals, and to prepare graduates to become effective professionals and leaders, the MS program has the following learning outcomes;

1. Technical competency;
2. Effective communication skills;
3. Awareness of the impacts of technology on society and the environment;
4. Understanding the ethics and responsible professional conduct;
5. Strong interpersonal and teamwork skills;
6. Appreciation of the need for life-long learning;
7. Leadership/planning/decision-making skills;
8. Critical thinking/complex problem-solving skills.

A number of these desired learning outcomes are similar to some of the ABET program outcomes (“A through K”) that guide the accreditation process for our undergraduate degree programs. One expects that persons entering our graduate programs, whether or not from an undergraduate engineering program, would already possess many of these attributes to a significant degree. The graduate education would be expected to provide substantial enhancement. Consequently, the learning outcomes for the graduate programs build on the foundation of undergraduate engineering education while taking a more advanced focus appropriate for graduate-level study.

**Prerequisites**

For admission as a classified graduate student, an applicant should hold a bachelor’s degree in engineering or a closely related field with a minimum grade point average of 2.5 in the last 90 quarter units (60 semester units) attempted. Some programs impose higher GPA requirements. Applicants for most graduate engineering programs are required to submit scores for the General Test of the Graduate Record Examination. An applicant who meets program standards but lacks prerequisite coursework may be admitted as a conditionally classified student and must make up any deficiencies before advancement to classified graduate standing. Contact the individual program graduate coordinator for details.

**Program of Study**

Each graduate student must prepare a formal study plan with his or her advisor early in the program, usually before the 12th unit of approved courses is completed.

The formal program of study must include a minimum of 45 units (at least 23 of which must be at the 500 level) with a specialization in one of the following areas: Biochemical Engineering, Biomechanical Engineering, Biomedical Engineering, Integrated Technology Management, Materials Engineering, Water Engineering, or another individualized course of study.

**Requirements**

The broad curriculum requirements for the Master of Science degree in Engineering are:

1. a number of required units in the field of specialization, in many cases supplemented by analytical and technical breadth requirements;
2. additional units taken as advisor-approved electives;
3. at least 23 units of the 45 unit program at the 500 level;
4. at least 32 units taken “in residence.”

In some specializations, two culminating requirement options are available: a thesis/project option, which requires coursework and an up-to-9 unit thesis or project with oral defense; or a non-thesis/project option, which involves additional coursework and a comprehensive examination. The non-thesis option is normally allowed only for students who have completed a senior project or have had significant prior engineering project experience.

The College of Engineering offers two joint programs: in conjunction with the Orfalea College of Business, the MBA/MS Engineering, with a specialization in Engineering Management (http://catalog.calpoly.edu/collegesandprograms/interdiciplinaryprograms/mbamsengineering); and with the College of Architecture and Environmental Design (City and Regional Planning Department), the MCRP/MS Engineering, with a specialization in Transportation Planning (http://catalog.calpoly.edu/collegesandprograms/interdiciplinaryprograms/mcrpmsengineeringtransportationplanning).
MS Engineering, Specialization in Bioengineering

MS Engineering, Specialization in Biomedical Engineering

Degree Requirements and Curriculum (http://catalog.calpoly.edu/collegesandprograms/collegeofengineering/msengineeringspecializationinbiomedicalengineering)

MS Engineering, Specialization in Integrated Technology Management

The Master of Science in Engineering with specification in Integrated Technology Management (MS ENGR ITM) is designed as a terminal degree program with a professional focus. Its objectives are to provide the student greater breadth and depth of technical knowledge and to help the student practice communication, leadership, and project management skills.

MS Engineering, Specialization in Water Engineering

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 committee. Other innovative culminating experiences of similar scope and complexity may be submitted for approval.

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/financial/index.html for the current cost of the program.
Degree Requirements and Curriculum (http://catalog.calpoly.edu/collegesandprograms/collegeofengineering/msfireprotectionengineering)

MBA/MS Engineering, Specialization in Engineering Management

The dual-degree Engineering Management Program (EMP) is an interdisciplinary program linking the MBA and MS in Engineering degree programs. The MBA/MS Engineering, Specialization in Engineering Management (http://catalog.calpoly.edu/collegesandprograms/interdisciplinaryprograms/mbamsengineering) is a cooperative effort between the Orfalea College of Business and the Cal Poly College of Engineering (Industrial and Manufacturing Engineering Department). Students are required to have a prerequisite degree in engineering, computer science, or equivalent technical degree to be admitted to both the College of Engineering and the Orfalea College of Business, and to be enrolled in both degree programs. Successful participants are awarded both MBA and MS in Engineering degrees, each with a specialization in Engineering Management.

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.)
• Government
• Fire Departments

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/financial/index.html for the current cost of the program.

Blended BS + MS Engineering Program

The blended program provides motivated students with an accelerated route to the MS Engineering, with simultaneous conferring of both bachelor's and master's degrees. Students in the blended program are
provided with a seamless process whereby they can progress from undergraduate to graduate status.

Students who matriculate from an ABET accredited BS program into this blended program have an additional requirement for their thesis. ABET requires that curricula include a major design experience, to ensure that students are ready for engineering practice. The experience should build on prior coursework, and should incorporate engineering standards and constraints. Hence, students matriculating from an ABET accredited program must have a master’s thesis that includes this major design experience in order to complete their undergraduate degree requirements.

**Eligibility for Blended BS+MS Engineering**

Students majoring in BS General Engineering, BS Computer Engineering, BS Manufacturing Engineering, and BS Materials Engineering may be eligible to pursue the blended program toward the MS Engineering with a specialization in Bioengineering, Biomedical Engineering, or Integrated Technology Management. They may also be able to pursue blended programs incorporating other MS degrees or specializations in the College of Engineering.

In addition, students in departments with their own master’s degrees may be able to pursue masters degrees in other areas, or the MS Engineering degree via the blended program, based on agreements between their bachelors granting program and their target masters program.

Participation in the program is based on prior academic performance and other measures of professional promise. Students are selected by a faculty committee, chosen on the basis of the student’s area of interest.

**Program of Study**

Some programs allow students to complete a capstone experience that integrates the senior project with the graduate thesis. This arrangement also increases the possibilities for industrial interaction in students' professional programs.

The blended program may allow students to earn graduate credit for several senior electives, effectively decreasing the summed unit requirements for both degrees. Requirements concerning shared units vary by degree program. Contact the program graduate coordinator for details.

**Other Blended Programs**

Blended BS+MS programs are also available in Aerospace Engineering (http://catalog.calpoly.edu/collegesandprograms/collegeofengineering/aerospaceengineering), Biomedical Engineering (http://catalog.calpoly.edu/collegesandprograms/collegeofengineering/biomedicalengineering), Civil and Environmental Engineering (http://catalog.calpoly.edu/collegesandprograms/collegeofengineering/civilenvironmentalengineering), Computer Science (http://catalog.calpoly.edu/collegesandprograms/collegeofengineering/computerscience), Electrical Engineering (http://catalog.calpoly.edu/collegesandprograms/collegeofengineering/electricalengineering), Industrial Engineering (http://catalog.calpoly.edu/collegesandprograms/collegeofengineering/industrialmanufacturingengineering), and Mechanical Engineering (http://catalog.calpoly.edu/collegesandprograms/collegeofengineering/mechanicalengineering).

Additional information about these programs may be obtained from the individual departments.