

# Engineering - Graduate Programs

## College of Engineering

### Campus advisers:

#### M.S. in Civil Engineering

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#### M.S. in Engineering

##### Electrical Engineering Option

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#### M.S. in Engineering

##### Electrical Engineering Option

##### Mechanical Engineering Option

##### Edwards Air Force Base

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## Master of Science Programs

The College of Engineering offers a Master of Science in Civil Engineering and in Engineering (with options in Electrical and Mechanical Engineering). Students at Edwards Air Force Base (AFB) may enroll in the Master of Science in Engineering program through the Edwards AFB coordinator. It is not necessary for these students to visit the Fresno campus. To contact advisers for information on individual programs, see the list of advisers on this page.

## Master of Science Programs

### M.S. in Civil Engineering

See page 296

### M.S. in Engineering

#### (Options in Electrical and Mechanical Engineering)

The Master of Science in Engineering program has the following goals: (1) to develop the students' advanced analytical skills by developing an in-depth understanding of major theoretical and practical engineering concepts; (2) to develop students' written and oral communication skills applied to technical areas; (3) to achieve an appropriate level of competence by the students in solving practical electrical or mechanical engineering problems; (4) to develop students' critical and creative thinking skills in mastering new topics required to understand and solve complex engineering problems; and (5) to allow the students to demonstrate a sufficient depth of knowledge in a substantive area of electrical or mechanical engineering to pursue advanced academic or industrial work.

### Program Objectives

The program has the following objectives: (1) to complete a minimum of 30 units of graduate coursework, including appropriate core courses, (2) to successfully demonstrate knowledge base in culminating experience, and (3) to enhance the students' career goals by increasing their theoretical, research, and problem-solving skills in applied engineering.

### Program Requirements

The program consists of the following:

<b>A. Core Requirement</b> (3 courses required) .....	<b>9</b>
ENGR 202, 205, 206, 210	
<b>B. Elective Courses</b> .....	<b>15</b>
Approved upper-division and graduate courses. Maximum of 6 upper-division units. See page 303-307 for courses in Electrical Engineering and page 313-315 for courses in Mechanical Engineering.	
<b>C. Culminating Experience</b> .....	<b>6</b>
Choose between	
1. 6 units of electives plus comprehensive exam,	
2. EE 298 or ME 298 Project (3) plus 3 units of electives, or	
3. EE 299 or ME 299 Thesis (6)	
<b>Total</b> .....	<b>30</b>

Up to nine semester hours of satisfactory graduate credit may be transferred into the program from other institutions if not used in completing another graduate degree program. Undergraduate courses may be transferred if the courses were not used in completing another degree program. The total undergraduate upper-division semester hours applied to this degree program cannot exceed nine hours.

The Graduate Record Examination (GRE) Aptitude Test is required of all students prior to advancement to candidacy status. The Advanced Test in Engineering may be required as detailed in the section titled *Admission to Graduate Standing*. (Call the coordinator for information.) A GRE information booklet and application forms are available in the Edwards AFB resident coordinator's office or from the Division of Graduate Studies at California State University, Fresno.

The program requires extensive use of a computer; therefore, students are expected to have their own computer or access to one 24 hours a day.

**Faculty.** All faculty are from the Fresno campus and from among qualified engineers in the Edwards A.F.B. area.

**Admission to the University.** Requirements for admission to California State University, Fresno are in accordance with Title 5, Chapter 1, Subchapter 3 of the *California Code of Regulations*.

**Admission to the Program.** Students who apply to the program are placed in one of the following categories:

- 1. Graduate Standing, Classified.** Students with (a) an undergraduate degree in an appropriate engineering discipline from an ABET accredited program, (b) an undergraduate grade point average of 2.7, (c) a minimum GRE quantitative score of 450 are eligible for classified (degree status) graduate standing, and (d) a letter of recommendation from and academic or an industrial source. Students who meet requirements (a) and (c) with a GPA below 2.7 must take the GRE Advanced Test in Engineering and achieve a score above the 50th percentile. In addition, to achieve classified standing these students must take three courses chosen by the coordinator and the department chair and complete these courses with a grade of *B* or higher.

2. **Graduate Standing, Conditionally Classified.** Students from non-ABET accredited engineering programs, or with a degree in physical science or mathematics or a different engineering discipline, and who have not met the requirements of category 1, will be given conditionally classified graduate standing. Upon satisfactorily meeting any specified requirements, students will then be advanced to classified standing.

**Degree Candidacy.** The following requirements must be met prior to advancement to candidacy:

1. Classified graduate standing.
2. Completion at California State University, Fresno of at least 9 units of the proposed program with a 3.0 average on all completed work appearing on the program.
3. A minimum grade point average of 3.0 in all upper-division and graduate coursework from the date of commencing the first course of the proposed master's degree program.
4. Departmental recommendation for advancement to candidacy.
5. Satisfactory completion of the Graduate Writing Skills Requirement.

**Nondegree students.** Students with a bachelor's degree may take graduate courses (concurrently with regular students) for credit or audit. Prior approval is required.

See the catalog Web site for core courses that may be applied to the programs. Visit <http://www.csufresno.edu/catooffice/current/engcore.html>.

### Accelerated Graduate Programs

The accelerated M.S. program will provide a path to students who are talented and want to acquire additional knowledge in specialized areas of interest, as a continuation of their B.S., within a short period of time. The benefits to the students that participate in the program are as follows:

- More efficient use of their fourth academic year leading to a baccalaureate degree
- Ability to focus more rigorously on their areas of professional practice, culminating in a master's degree
- Opportunity to receive both B.S. and M.S. in five years

**Eligibility:** A student who has completed 75 units of required and elective G.E., math, science, and engineering coursework required for his/her undergraduate program may apply to the accelerated graduate program.

**Application Materials:** To apply to the accelerated graduate program, a student must submit the following:

- Application form
- A detailed statement of the purpose
- Two letters of recommendation, at least one from a faculty member of the program

**Timing of Application:** Application may be made no sooner than at the beginning of the sixth semester of study of an undergraduate degree program. Students officially enter the program no earlier than the seventh semester of an eight-semester undergraduate program.

**Requirements:** The applicants must satisfy the following requirements:

- Overall GPA of 3.0 or greater at the time of application
- Satisfactory GRE scores (consult program advisers)
- Complete all the courses specified by the program by the end of the sixth semester with GPA of 3.0 or greater
- Complete no less than 30 units of coursework in residence by the end of the sixth semester
- Complete undergraduate writing requirement by the end of the sixth semester
- Complete all G.E. requirements prior to taking 200-level courses

**Progress Toward Awarding of Degree:** Students can take up to 10 units of courses that qualify for the M.S. program (but no more than 6 units of 200-level courses per semester) before completion of the B.S. program. Students shall not proceed with further graduate-level coursework until they have obtained the classified standing. The classified standing can be obtained by filing the appropriate form with the Office of Graduate Studies after the completion of the B.S.

**Awarding of Degree:** Students must meet all programmatic requirements for each degree. This implies that no coursework, project, independent study, etc., may be simultaneously applied toward meeting the requirements of the B.S. and M.S. Students must complete the requirement for the B.S. at least two semesters prior to completing the requirement for the M.S.

### GRADUATE COURSES

(See *Catalog Numbering System*.)

#### Engineering (ENGR)

#### ENGR 202. Applied Engineering Analysis (3)

Study of analytical tools used in the analysis and modeling of engineering systems. Emphasis is placed on solving problems in engineering disciplines.

#### ENGR 205. Computing in Engineering Analysis (3)

Prerequisite: a first course in numerical analysis at the graduate level. Solution of engineering problems using digital computation. Modeling of engineering systems for numerical analysis.

#### ENGR 206. Probability Theory and Statistical Analysis (3)

A first course in probability theory and statistical analysis at the graduate level. Finite sample spaces, conditional probability and independence, one-dimensional random variables, functions of random variables, two- and higher-dimensional random variables, poisson and other discrete random variables, continuous random variables, moment-generating function, reliability theory, sums of random variables, samples and sampling distributions, estimation of parameters, testing hypothesis.

#### ENGR 210. Linear Control Systems (3)

A first-year graduate course covering the analysis, synthesis, and performance of linear control systems. Partial fraction expansion, Routh's criterion, the impulse function. Basic servo characteristics and types, block diagrams, transfer functions. A detailed treatment of the root locus method for analysis and synthesis. Frequency response, logarithmic and polar plots, Nyquist's criterion, stability characteristics, phase margin and gain margin.

#### ENGR 212. Advanced Control Systems (3)

Prerequisite: ENGR 210 or permission of coordinator. Describing function analysis of nonlinear control systems; phase-plane analysis; Liapunov stability analysis; discrete-time systems; z-transform-method; linear stochastic systems; application of statistical design principles; optimal and adaptive control systems; digital control systems.

For a complete listing and descriptions of all graduate courses, see department pages.