

# BACHELOR OF SCIENCE IN CIVIL ENGINEERING

## Undergraduate Programs in Engineering

Freshman applicants should have completed four years of high school mathematics, one year of high school chemistry, and one year of high school physics. Students are also encouraged to include courses in mechanical drawing and computer programming.

Community college transfers should complete the sequence of mathematics, chemistry, physics, and engineering courses listed in freshman and sophomore years under the "sample sequence of courses" at the community college.

The Bachelors of Science in Civil, Computer, Electrical, and Mechanical Engineering require 127, 128, 129, and 129-semester units, respectively. A minimum of 30 units must be earned in residence at San Francisco State University. Of these units, 24 must be upper-division courses, and 12 of these upper-division units must be in the major. Major requirements, including mathematics, chemistry, and physics prerequisites, comprise 93 units for Civil Engineering, 94 units for Computer Engineering, 95 units for Electrical Engineering, and 95 units for Mechanical Engineering. For Civil Engineering, 50 of the required units are lower-division and 43 units are upper-division. For Mechanical Engineering, 51 of the required units are lower-division and 44 units are upper-division. For Electrical Engineering, 50 of the required units are lower-division and 45 units are upper-division. For Computer Engineering, 49 of the required units are lower-division and 45 units are upper-division. The remaining 33 units satisfy the balance of the university requirements including communication skills and General Education in humanities and social sciences. Students are advised that, except for some General Education (GE) courses, all courses which are to be counted toward completion of an engineering degree must be taken for a letter grade; the CR/NC option may not be used in this context.

## Civil Engineering

The curriculum provides a broad-based common core of engineering science and the essential civil engineering subjects. The students conclude with 15 units of upper-division electives where the primary emphasis is design, practical applications, and computer solutions in selected areas of civil engineering. Graduates of the civil engineering program are expected to have, within a few years of graduation:

- Established themselves as practicing professionals or engaged in graduate study in civil engineering or a related field.
- Become licensed civil engineers or made appropriate progress toward professional registration.

Students must complete 21 units of upper-division engineering units before registering for ENGR 696.

Courses are scheduled during the day as well as late afternoon and evening. Other information and assistance in selecting courses can be obtained from a major advisor in the School of Engineering, by calling (415) 338-1174, by emailing engrasst@sfsu.edu, or by writing to:

School of Engineering  
San Francisco State University  
Science Building  
1600 Holloway Avenue

San Francisco, CA 94132

## Program Learning Outcomes

Upon completion of the Bachelor of Science in Civil Engineering a student will be able to demonstrate:

- an ability to apply knowledge of mathematics, science, and engineering.
- an ability to design and conduct experiments, as well as to analyze and interpret data.
- an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- an ability to function on multidisciplinary teams.
- an ability to identify, formulate, and solve engineering problems.
- an understanding of professional and ethical responsibility.
- an ability to communicate effectively.
- the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
- a recognition of the need for, and an ability to engage in life-long learning.
- a knowledge of contemporary issues.
- an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

## Civil Engineering (B.S.) – 91 units minimum General Education Requirements Met in the Major

The requirements below are deemed "met in the major" upon completion of the courses listed (even though the courses and their prerequisites are not approved for GE). This is true whether or not the student completes the major.

- Area A3 (Critical Thinking) is satisfied upon completion of ENGR 205 and either ENGR 201 or ENGR 213.
- Upper-Division General Education, Physical and Life Sciences (UD-B) is satisfied upon completion of ENGR 300 and either ENGR 301 or ENGR 302.

## Required Courses (79-81 units)

Code	Title	Units
CHEM 115	General Chemistry I: Essential Concepts of Chemistry	3-5
	or CHEM 180 Chemistry for Energy and the Environment	
ENGR 100	Introduction to Engineering	1
ENGR 101	Engineering Graphics	1
ENGR 102	Statics	3
ENGR 200	Materials of Engineering	3
ENGR 201	Dynamics	3
ENGR 205	Electric Circuits	3
ENGR 235	Surveying	3
ENGR 271	Introduction to MATLAB	1
ENGR 300	Engineering Experimentation	3
ENGR 302	Experimental Analysis	1
ENGR 304	Mechanics of Fluids	3

ENGR 309	Mechanics of Solids	3
ENGR 323	Structural Analysis	3
ENGR 425	Reinforced Concrete Structures	3
ENGR 429	Construction Management	3
ENGR 430	Soil Mechanics	3
ENGR 434	Principles of Environmental Engineering	3
ENGR 436	Transportation Engineering	3
ENGR 696	Engineering Design Project I	1
ENGR 697GW	Engineering Design Project II - GVAR	2
MATH 226	Calculus I	4
MATH 227	Calculus II	4
MATH 228	Calculus III	4
MATH 245	Elementary Differential Equations and Linear Algebra	3
PHYS 220 & PHYS 222	General Physics with Calculus I and General Physics with Calculus I Laboratory	4
PHYS 230	General Physics with Calculus II	3
PHYS 232	General Physics with Calculus II Laboratory	1
PHYS 240	General Physics with Calculus III	3
PHYS 242	General Physics with Calculus III Laboratory	1

### Upper-Division Engineering Electives (12 units)

Choice of upper-division electives must present a clearly identifiable educational objective and ensure that the program requirements in engineering science and design are met by all students. Distribution of credit units among engineering science and design is given in the Advising Guide. A study plan of intended upper division electives must be approved by the student's advisor and the program coordinator prior to the seventh semester of the engineering program.

A total of 12 units from the following list of courses is required, subject to the minimum number of units specified for each group. Students with a GPA of at least 3.0 and the required prerequisites may take graduate courses (numbered 800 and above) with the approval of their advisor or the program coordinator.

Code	Title	Units
ENGR 303	Engineering Thermodynamics	3
ENGR 426	Steel Structures	3
ENGR 427	Wood Structures	3
ENGR 431	Foundation Engineering	3
ENGR 432	Finite Element Methods in Structural and Continuum Mechanics	3
ENGR 435	Environmental Engineering Design	3
ENGR 439	Construction Engineering	3
ENGR 441	Fundamentals of Composite Materials	3
ENGR 461	Mechanical and Structural Vibrations	3
ENGR 468	Applied Fluid Mechanics and Hydraulics	3
ENGR 469	Alternative and Renewable Energy Systems	3
ENGR 610	Engineering Cost Analysis	3
ENGR 699	Independent Study	1-3
ENGR 826	Seismic Hazard Analysis	3
ENGR 827	Structural Design for Fire Safety	3
ENGR 829	Advanced Topics in Structural Engineering	3
ENGR 831	Advanced Concrete Structures	3

ENGR 832	Advanced Topics in Seismic Design	3
ENGR 833	Principles of Earthquake Engineering	3
ENGR 835	Advanced Steel Structures	3
ENGR 836	Structural Design for Earthquakes	3
ENGR 837	Geotechnical Earthquake Engineering	3

### General Education Requirements

Requirement	Course Level	Units	Area Designation
Oral Communication	LD	3	A1
Written English Communication	LD	3	A2
Critical Thinking	LD	3	A3
Physical Science	LD	3	B1
Life Science	LD	3	B2
Lab Science	LD	1	B3
Mathematics/Quantitative Reasoning	LD	3	B4
Arts	LD	3	C1
Humanities	LD	3	C2
Arts or Humanities	LD	3	C1 or C2
Social Sciences	LD	3	D1
Social Sciences: US History	LD	3	D2
Lifelong Learning and Self-Development (LLD)	LD	3	E
Ethnic Studies	LD	3	F
Physical and/or Life Science	UD	3	UD-B
Arts and/or Humanities	UD	3	UD-C
Social Sciences	UD	3	UD-D

#### SF State Studies

Courses certified as meeting the SF State Studies requirements may be upper or lower division in General Education (GE), a major or minor, or an elective.

American Ethnic and Racial Minorities	LD or UD	3	AERM
Environmental Sustainability	LD or UD	3	ES
Global Perspectives	LD or UD	3	GP
Social Justice	LD or UD	3	SJ

Note: LD = Lower-Division; UD = Upper-Division.

### First-Time Student Roadmap (4 Year)

- In order to choose your English Composition A2 course and your QR/Math B4 course, please complete the online advising activities at [writingadvising.sfsu.edu](https://writingadvising.sfsu.edu) (<https://writingadvising.sfsu.edu/>) and

mathadvising.sfsu.edu (<https://mathadvising.sfsu.edu/>). Questions? Contact Gator Smart Start. (<https://gatorsmartstart.sfsu.edu/>)

2. Select the row that matches your English course choice for A2.\*
3. Select the column that matches your QR/Math course choice for B4.
4. Click the Roadmap that lines up with your row and column.

For example, if you select ENG 104/ENG 105 and a multi-semester QR/math sequence for your first year, then choose Roadmap D.

Course Choice	One-Semester Course	Two-Semester Sequence or Support Course
ENG 114	Roadmap A ( <a href="http://bulletin.sfsu.edu/colleges/science-engineering/engineering/bs-civil-engineering/roadmap-i-ii-eng/">http://bulletin.sfsu.edu/colleges/science-engineering/engineering/bs-civil-engineering/roadmap-i-ii-eng/</a> )	Roadmap C ( <a href="http://bulletin.sfsu.edu/colleges/science-engineering/engineering/bs-civil-engineering/roadmap-iii-iv-eng/">http://bulletin.sfsu.edu/colleges/science-engineering/engineering/bs-civil-engineering/roadmap-iii-iv-eng/</a> )
ENG 104/ENG 105	Roadmap B ( <a href="http://bulletin.sfsu.edu/colleges/science-engineering/engineering/bs-civil-engineering/roadmap-i-ii-stretch/">http://bulletin.sfsu.edu/colleges/science-engineering/engineering/bs-civil-engineering/roadmap-i-ii-stretch/</a> )	Roadmap D ( <a href="http://bulletin.sfsu.edu/colleges/science-engineering/engineering/bs-civil-engineering/roadmap-iii-iv-stretch/">http://bulletin.sfsu.edu/colleges/science-engineering/engineering/bs-civil-engineering/roadmap-iii-iv-stretch/</a> )

\* Composition for Multilingual Students: If taking ENG 209 as your first English course, choose the ENG 114 row. If taking ENG 201 or ENG 212 for your first English course, choose the ENG 104/ENG 105 row.

## SF State Scholars

The San Francisco State Scholars program provides undergraduate students with an accelerated pathway to a graduate degree. Students in this program pursue a bachelor's and master's degree simultaneously. This program allows students to earn graduate credit while in their junior and/or senior year, reducing the number of semesters required for completion of a master's degree.

This roadmap opens in a new tab. (<http://bulletin.sfsu.edu/colleges/science-engineering/engineering/bs-civil-engineering/scholars-roadmap/>)

## General Advising Information for Transfer Students

1. Before transfer, complete as many lower-division requirements or electives for this major as possible.
2. The following courses are not required for admission but are required for graduation. Students are strongly encouraged to complete these units before transfer; doing so will provide more flexibility in course selection after transfer.
  - a course in U.S. History
  - a course in U.S. & California Government

For information about satisfying the requirements described in (1) and (2) above at a California Community College (CCC), please visit <http://www.assist.org> (<http://assist.org>). Check any geographically accessible CCCs; sometimes options include more than one college. Use ASSIST to determine:

- Which courses at a CCC satisfy any lower-division major requirements for this major;
- Which courses at a CCC satisfy CSU GE, US History, and US & CA Government requirements.

Remedial courses are not transferable and do not apply to the minimum 60 semester units/90 quarter units required for admission.

Additional units for courses that are repeated do not apply to the minimum 60 units required for upper-division transfer (for example, if a course was not passed on the first attempt or was taken to earn a better grade).

Before leaving the last California Community College of attendance, obtain a summary of completion of lower-division General Education units (IGETC or CSU GE Breadth). This is often referred to as a GE certification worksheet. SF State does not require delivery of this certification to Admissions, but students should retain this document for verifying degree progress after transfer.

Credit for Advanced Placement, International Baccalaureate, or College-Level Examination Program courses: AP/IB/CLEP credit is not automatically transferred from the previous institution. Units are transferred only when an official score report is delivered to SF State. Credit is based on the academic year during which exams were taken. Refer to the University Bulletin in effect during the year of AP/IB/CLEP examination(s) for details regarding the award of credit for AP/IB/CLEP.

Students pursuing majors in science, technology, engineering, and mathematics (STEM) disciplines often defer 6-9 units of lower-division General Education in Areas C and D until after transfer to focus on preparation courses for the major. This advice does not apply to students pursuing associate degree completion before transfer.

## Transferring From Institutions Other Than CCCs or CSUs

Review SF State's lower-division General Education requirements. Note that, as described below, the four basic skills courses required for admission meet A1, A2, A3, and B4 in the SF State GE pattern. Courses that fulfill the remaining areas of SF State's lower-division GE pattern are available at most two-year and four-year colleges and universities.

Of the four required basic skills courses, a course in critical thinking (A3) may not be widely offered outside the CCC and CSU systems. Students should attempt to identify and take an appropriate course no later than the term of application to the CSU. To review more information about the A3 requirement, please visit [bulletin.sfsu.edu/undergraduate-education/general-education/lower-division/#AAEL](http://bulletin.sfsu.edu/undergraduate-education/general-education/lower-division/#AAEL).

Waiting until after transfer to take a single course at SF State that meets both US and CA/local government requirements may be an appropriate option, particularly if transferring from outside of California.