

# CIVIL ENGINEERING BS

## More Information

### Advising Requirement

Advising is mandatory for this program. Consult your department advisor or program coordinator for information.

### E-advising Tools

Students are encouraged to use the interactive e-advising tools that have been designed to help them graduate within four years. These tools can be accessed through the Student Center.

With the Bachelor of Science in Civil Engineering, graduates are well prepared for professional work or graduate school in a broad spectrum of engineering activities. The program is balanced, stressing environmental engineering; soil mechanics and foundations; structural analysis and design; surveying and mapping; transportation and traffic engineering; and water resources and hydraulics. The program emphasizes quality undergraduate teaching with most courses taught by tenure track faculty and active student learning, including extensive use of laboratories and co-curricular activities.

The Civil Engineering program is accredited by the Engineering Accreditation Commission (EAC) of ABET, <http://www.abet.org>. Students should consult with an advisor to ensure selected courses satisfy ABET requirements for humanities, social science, mathematics, base science, and engineering topics.

## Civil Engineering Program Mission

The civil engineering program prepares graduates for immediate entry into a variety of professional careers and provides a solid undergraduate foundation in general principles enabling continued education at advanced levels.

## Civil Engineering Educational Objectives

Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve. Graduates of the civil engineering program will be able to

- Secure a professional position in civil engineering and become a licensed engineer.
- Attend graduate school in civil engineering or a related discipline to achieve a graduate degree in a specialty area.
- Engage in lifelong learning through formal and informal professional development.
- Assume management or leadership roles in their respective organization.
- Contribute to society through involvement in service activity.

## Civil Engineering Program Learning Outcomes

Students completing the civil engineering program must demonstrate the ability to

1. Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

2. Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. Communicate effectively with a range of audiences.
4. Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. Acquire and apply new knowledge as needed, using appropriate learning strategies.

## Civil Engineering Design Experience

The civil engineering program provides an essential balance of engineering science and design. Design content permeates the curriculum, beginning at a fundamental level in the lower division followed by a natural progression to comprehensive design in upper-division courses. Fundamental design problems typically have a unique solution and may involve only a few, simple constraints. Comprehensive design incorporates a multitude of realistic constraints with a variety of possible outcomes commonly referred to as "open-ended" design.

Required courses in the program provide proficiency in civil engineering design, beginning in the first year (CIVL 140) progressing to advanced design in the third and fourth years (CIVL 415, CIVL 431, CIVL 441, and CIVL 461), and culminating with comprehensive design in the capstone (e.g., CIVL 558C, CIVL 561C, etc.). This ensures a breadth of design experience that is further enhanced and focused in elective courses.

## American Public Works Association Internship Program

The APWA Internship Program (<https://www.csuchico.edu/ce/resources/apwa.shtml/>) provides civil engineering students with valuable real-world experiences. Participation in the program is elective but can be used for academic credit toward the degree. While students are responsible for finding their own internship opportunities, the Career Center (<https://www.csuchico.edu/careers/>) is an excellent resource for locating companies interested in hiring interns. Additional information is available at the Civil Engineering Department website.

## Grading Requirement

All courses taken to fulfill program course requirements must be taken for a letter grade except those courses specified by the department as credit/no credit grading only.

## Course Requirements for the Major: 103-107 units

Completion of the following courses, or their approved transfer equivalents, is required of all candidates for this degree. Courses in this program may complete more than one graduation requirement.

Enrollment in any mathematics course requires a grade of C- or higher in all prerequisite courses or their transfer equivalents.

Course	Title	Units
<b>Lower-Division Core</b>		
CHEM 111	General Chemistry I	4
CIVL 101	Introduction to Civil Engineering	1
CIVL 130	Surveying	3
CIVL 140	Transportation Planning, Surveying, and Graphics	3
CIVL 175	Biological Processes in Environmental Engineering	3
CIVL 205	Civil Engineering Computing	2
CIVL 211	Statics	3
CIVL 231	Introduction to Environmental Engineering	3
MATH 120	Analytic Geometry and Calculus	4
MATH 121	Analytic Geometry and Calculus	4
MATH 260	Elementary Differential Equations	4
PHYS 204A	Physics for Students of Science and Engineering: Mechanics	4
PHYS 204B	Physics for Students of Science and Engineering: Electricity and Magnetism	4
Select one of the following:		3-4
BIOL 211	Allied Health Microbiology	
CHEM 112	General Chemistry II	
ERTH 102	Physical Geology	
PHYS 204C	Physics for Students of Science and Engineering: Heat, Wave Motion, Sound, Light, and Modern Topics	
Select one of the following:		3
CIVL 212	Civil Engineering Materials	
MECH 210	Materials Science and Engineering	
<b>Upper-Division Core</b>		
CIVL 302W	Engineering Sustainability and Economic Analysis (W)	3
CIVL 311	Strength of Materials	4
CIVL 313	Structural Mechanics	3
CIVL 321	Fluid Mechanics	4
CIVL 411	Soil Mechanics and Foundations	4
CIVL 441	Transportation Engineering	4
CIVL 461	Water Resources Engineering	3
CIVL 495	Professional Issues in Engineering	3
CIVL 595W	Capstone Design Project (W)	3
Select one of the following:		3-4
MATH 314	Probability and Statistics for Science and Technology	
MATH 350	Introduction to Probability and Statistics	
Select one of the following:		3
MECH 320	Dynamics	
MECH 332	Thermodynamics	
Select three units from the following:		3
CIVL 551	Foundations Engineering	
CIVL 554	Steel Design	
CIVL 556	Timber Design	
CIVL 556H	Timber Design - Honors	
CIVL 558	Earthquake and Wind Engineering <sup>1</sup>	
CIVL 558H	Earthquake and Wind Engineering - Honors <sup>1</sup>	
CIVL 561	Hydrology and Open Channels Hydraulics <sup>1</sup>	

CIVL 562	Groundwater Hydrology <sup>1</sup>	
CIVL 564	Spatial Hydrology <sup>1</sup>	
CIVL 567	Pipeline Hydraulics and Design	
CIVL 571	Natural Systems for Wastewater Treatment <sup>1</sup>	
CIVL 573	Water Quality and Contaminant Transport	
CIVL 575	Solid and Hazardous Waste Management <sup>1</sup>	
CIVL 586	Advanced Transportation Engineering Design <sup>1</sup>	
CIVL 592	Construction Engineering and Management	
CIVL 598	Advanced Special Topics	
CIVL 599	Special Problems	
Select three units from other technical courses chosen from a list approved by the department		3
<b>Major Option</b>		
Select one of the following options:		12-14
General Civil Engineering (p. 2)		
Environmental and Water Resources Engineering (p. 3)		
Structural Engineering (p. 3)		
<b>Total Units</b>		<b>103-107</b>

<sup>1</sup> Students who take the capstone version of a course cannot also receive credit for the non-capstone version of the course.

## Major Option Course Requirements

Students must select one of the following options for completion of the major course requirements.

### The Option in General Civil Engineering: 12-14 units

Course	Title	Units
Select two of the following:		6-8
CIVL 331	Environmental Engineering Chemistry	
CIVL 413	Advanced Structures	
CIVL 415	Reinforced Concrete Design	
CIVL 431	Water and Wastewater Engineering	
CIVL 554	Steel Design	
CIVL 556	Timber Design	
Select one of the following:		3
CIVL 558C	Earthquake and Wind Engineering - Capstone <sup>1</sup>	
CIVL 561C	Hydrology and Open Channel Hydraulics Capstone <sup>1</sup>	
CIVL 562C	Groundwater Hydrology - Capstone <sup>1</sup>	
CIVL 564C	Spatial Hydrology - Capstone <sup>1</sup>	
CIVL 571C	Natural Systems for Wastewater Treatment - Capstone <sup>1</sup>	
CIVL 575C	Solid and Hazardous Waste Management - Capstone <sup>1</sup>	
CIVL 586C	Advanced Transportation Engineering Design - Capstone <sup>1</sup>	
Select three units from the following:		3
CIVL 551	Foundations Engineering	
CIVL 554	Steel Design	
CIVL 556	Timber Design	
CIVL 556H	Timber Design - Honors	
CIVL 558	Earthquake and Wind Engineering <sup>1</sup>	

CIVL 558H	Earthquake and Wind Engineering - Honors <sup>1</sup>
CIVL 561	Hydrology and Open Channels Hydraulics <sup>1</sup>
CIVL 562	Groundwater Hydrology <sup>1</sup>
CIVL 564	Spatial Hydrology
CIVL 567	Pipeline Hydraulics and Design
CIVL 571	Natural Systems for Wastewater Treatment <sup>1</sup>
CIVL 573	Water Quality and Contaminant Transport
CIVL 575	Solid and Hazardous Waste Management <sup>1</sup>
CIVL 586	Advanced Transportation Engineering Design <sup>1</sup>
CIVL 592	Construction Engineering and Management
CIVL 598	Advanced Special Topics
CIVL 599	Special Problems

**Total Units** 12-14

<sup>1</sup> Students who take the capstone version of a course cannot also receive credit for the non-capstone version of the course.

### The Option in Environmental and Water Resources Engineering: 13 units

Course	Title	Units
CIVL 331	Environmental Engineering Chemistry	3
CIVL 431	Water and Wastewater Engineering	4
Select one of the following;		3
CIVL 561C	Hydrology and Open Channel Hydraulics Capstone <sup>1</sup>	
CIVL 562C	Groundwater Hydrology - Capstone <sup>1</sup>	
CIVL 564C	Spatial Hydrology - Capstone <sup>1</sup>	
CIVL 571C	Natural Systems for Wastewater Treatment - Capstone <sup>1</sup>	
CIVL 575C	Solid and Hazardous Waste Management - Capstone <sup>1</sup>	
Select three units from the following:		3
CIVL 561	Hydrology and Open Channels Hydraulics <sup>1</sup>	
CIVL 562	Groundwater Hydrology <sup>1</sup>	
CIVL 564	Spatial Hydrology <sup>1</sup>	
CIVL 567	Pipeline Hydraulics and Design	
CIVL 571	Natural Systems for Wastewater Treatment <sup>1</sup>	
CIVL 573	Water Quality and Contaminant Transport	
CIVL 575	Solid and Hazardous Waste Management <sup>1</sup>	
<b>Total Units</b>		<b>13</b>

<sup>1</sup> Students who take the capstone version of a course cannot also receive credit for the non-capstone version of the course.

### The Option in Structural Engineering: 13 units

Course	Title	Units
CIVL 415	Reinforced Concrete Design	4
CIVL 558C	Earthquake and Wind Engineering - Capstone <sup>1</sup>	3
Select one of the following:		3
CIVL 413	Advanced Structures	
CIVL 554	Steel Design	
CIVL 556	Timber Design	
Select three units from the following:		3

CIVL 551	Foundations Engineering
CIVL 554	Steel Design
CIVL 556	Timber Design
CIVL 556H	Timber Design - Honors

**Total Units** 13

<sup>1</sup> Students who take the capstone version of a course cannot also receive credit for the non-capstone version of the course.

## Honors in the Major

Honors in the Major is a program of independent work in your major. It requires 6 units of honors course work completed over two semesters.

The Honors in the Major program allows you to work closely with a faculty mentor in your area of interest on an original performance or research project. This year-long collaboration allows you to work in your field at a professional level and culminates in a public presentation of your work. Students sometimes take their projects beyond the University for submission in professional journals, presentation at conferences, or academic competition. Such experience is valuable for graduate school and professional life. Your honors work will be recognized at your graduation, on your permanent transcripts, and on your diploma. It is often accompanied by letters of commendation from your mentor in the department or the department chair.

Some common features of Honors in the Major program are:

- You must take 6 units of Honors in the Major course work. All 6 units are honors classes (marked by a suffix of H), and at least 3 of these units are independent study (399H, 499H, 599H) as specified by your department. You must complete each class with a minimum grade of B.
- You must have completed 9 units of upper-division course work or 21 overall units in your major before you can be admitted to Honors in the Major. Check the requirements for your major carefully, as there may be specific courses that must be included in these units.
- Your cumulative GPA should be at least 3.5 or within the top 5% of majors in your department.
- Your GPA in your major should be at least 3.5 or within the top 5% of majors in your department.
- Most students apply for or are invited to participate in Honors in the Major during the second semester of their junior year. Then they complete the 6 units of course work over the two semesters of their senior year.
- Your honors work culminates with a public presentation of your honors project.

While Honors in the Major is part of the Honors Program, each department administers its own program. Please contact your major department or major advisor to apply.

The common elements of the Honors in the Major program listed above apply to Honors in Civil Engineering. Specific information for this program includes:

1. In addition to meeting the GPA requirements, you must be recommended by a faculty member.
2. Students who are admitted into the department's Honors in the Major program may elect to take any two upper-division civil engineering

electives for honors credit. The honors section will be identified on your transcript. The courses are usually spread over two semesters. You must complete them with a minimum grade of B and maintain a minimum GPA of 3.0 overall.

- Each Honors in the Major class will require completion of the course plus an additional honors project and culminates with a public presentation of your honors project.

See Bachelor's Degree Requirements (<https://catalog.csuchico.edu/undergraduate-requirements/bachelors-degree-requirements/>) for complete details on general degree requirements. A minimum of 39 units, including those required for the major, must be upper division.

## General Education Requirements: 48 units

See General Education (<https://catalog.csuchico.edu/colleges-departments/undergraduate-education/general-education/>) and the Class Schedule (<http://www.csuchico.edu/schedule/>) for the most current information on General Education Requirements and course offerings.

This major has approved GE modification(s). See below for information on how to apply these modification(s).

- Take CMST 131 for Oral Communication (A1).
- Critical Thinking (A3) is waived. (<https://www.calstate.edu/attend/student-services/casper/Pages/high-unit-majors.aspx>)
- Take only one course in either Arts (C1) or Humanities (C2). The other is waived.
- CIVL 302W fulfills Social Sciences (D).
- CIVL 495 fulfills Lifelong Learning and Self-Development (E).
- CIVL 461 is an approved major course substitution for Upper-Division Scientific Inquiry and Quantitative Reasoning (UD-B).

## Diversity Course Requirements: 6 units

You must complete a minimum of two courses that focus primarily on cultural diversity. At least one course must be in U.S. Diversity (USD) and at least one in Global Cultures (GC). See Diversity Requirements (<https://catalog.csuchico.edu/undergraduate-requirements/diversity-requirements/>) for a full list of courses. Most courses taken to satisfy these requirements may also apply to General Education (<https://catalog.csuchico.edu/colleges-departments/undergraduate-education/general-education/>).

## Upper-Division Writing Requirement

Writing Across the Curriculum (EM 17-009 (<http://www.csuchico.edu/prs/EMs/2017/17-009.shtml/>)) is a graduation requirement and may be demonstrated through satisfactory completion of four Writing (W) courses, two of which are designated by the major department. See Mathematics/Quantitative Reasoning and Writing Requirements (<https://catalog.csuchico.edu/undergraduate-requirements/mathematicsquantitative-reasoning-writing-requirements/>) for more details on the four courses. The first of the major designated Writing (W) courses is listed below.

- CIVL 302W Engineering Sustainability and Economic Analysis (W)

The second major-designated Writing course is the Graduation Writing Assessment Requirement (GW) (EO 665 (<https://calstate.policystat.com/policy/9585618/latest/>)). Students must earn a C- or higher to receive GW credit. The GE Written Communication (A2) (<https://catalog.csuchico.edu/colleges-departments/undergraduate-education/>)

general-education/#A2) requirement must be completed before a student is permitted to register for a GW course.