

# BLENDED BS/MS IN CIVIL ENGINEERING

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**SACRAMENTO STATE**  
*Redefine the Possible*

## In Workflow

1. CE Committee Chair (j.garcia@csus.edu)
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3. ECS College Committee Chair (abadi@csus.edu)
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## Approval Path

1. Mon, 23 Oct 2023 16:02:25 GMT  
Jose Garcia (j.garcia): Approved for CE Committee Chair
2. Mon, 23 Oct 2023 19:52:40 GMT  
Ghazan Khan (khan): Approved for CE Chair
3. Fri, 27 Oct 2023 16:56:14 GMT  
Masoud Ghodrat Abadi (abadi): Approved for ECS College Committee Chair
4. Fri, 27 Oct 2023 21:06:56 GMT  
Behnam Arad (arad): Approved for ECS Dean
5. Thu, 02 Nov 2023 22:54:06 GMT  
Katie Hawke (katiedickson): Approved for Academic Services

## New Program Proposal

Date Submitted: Mon, 23 Oct 2023 06:15:29 GMT

**Viewing: Blended BS/MS in Civil Engineering**

**Last edit: Fri, 27 Oct 2023 16:55:56 GMT**

Changes proposed by: Julie Fogarty (218645519)

**Academic Group: (College)**

Engineering & Computer Science

**Academic Organization: (Department)**

Civil Engineering

**Catalog Year Effective:**

2024-2025 Catalog

NOTE: This degree major program will be subject to program review evaluation within six years after implementation.

**Individual(s) primarily responsible for drafting the proposed degree major program:**

Name (First Last)	Email	Phone 999-999-9999
Jose Garcia	j.garcia@csus.edu	916-278-4504

**Type of Program Proposal:**

Major

**Is this a pilot program?**

No

**Delivery Format:**

Fully Face to Face

**Does this major plan to include any formal options, concentrations, or special emphases?**

No

**Title of the Program:**

Blended BS/MS in Civil Engineering

**Designation: (degree terminology)**

Blended BS/MS

**Abstract of the proposal:**

The program enables students to complete both their BS and MS in civil engineering through a blended 5 year curriculum to increase their knowledge and skills to make them more competitive for career prospects.

**Briefly describe the program proposal (new or change) and provide a justification:**

This program proposal combines the existing BS and MS programs in Civil Engineering by allowing undergrads to double-count 9 units towards both degrees.

**University Learning Goals****Undergraduate Learning Goals:**

Competence in the disciplines  
 Knowledge of human cultures and the physical and natural world  
 Intellectual and practical skills  
 Personal and social responsibility  
 Integrative learning

**Graduate (Masters) Learning Goals:**

Disciplinary knowledge  
 Communication  
 Critical thinking/analysis  
 Information literacy  
 Professionalism  
 Intercultural/Global perspectives

**Program Learning Outcomes****Program Learning Outcomes****Learning Outcome**

BS 1) Ethically apply their hands-on, practice-oriented civil engineering education to succeed professionally

BS 2) Engage in lifelong learning through graduate education, professional development, and/or active involvement in professional organizations

BS 3) Communicate effectively on multi-disciplinary teams to address diverse challenges, creating solutions that serve the general public.

MS 1) Succeed in professional employment at their chosen specialty of environmental, geotechnical, structural, transportation, or water resources engineering.

MS 2) Identify, analyze, and solve complex practical civil engineering problems in their chosen field of specialty.

MS 3) Communicate effectively about technically complex engineering problems to peers, other professionals, decision makers, and the general public, in the conduct of their work.

**Will this program be required as part of a teaching credential program, a single subject, or multiple subject waiver program (e.g., Liberal Studies, Biology) or other school personnel preparation program (e.g., School of Nursing)?**

No

**Please attach a Comprehensive Program Assessment Plan (required)**

Grad LOs and Assessment.pdf  
BS Assessment & Map.pdf

**Please attach a Curriculum Map Matrix (required)**

Grad LOs and Assessment.pdf  
BS Assessment & Map.pdf

**Please attach a five-year budget projection (required)**

Blended Five Year Budget Projection.pdf

**Catalog Description:**

**Total units required for Blended BS/MS: 145**

## Program Description

The Blended BS/MS program in Civil Engineering provides an accelerated route to a graduate professional degree, with simultaneous conferring of both Bachelor's and Master's degrees. Students in the blended program can progress from undergraduate to graduate status without applying for admission through the Office of Graduate Studies. Students are required to complete all requirements for both degrees, including senior project for the Bachelor's degree.

**Admission Requirements: Course prerequisites and other criteria for admission of students to the degree major program, and for their continuation in it.**

## Admission Requirements

Students majoring in Civil Engineering will be eligible to apply to the program if they meet the following criteria:

- Have completed all lower-division work (including lower-division general education courses and American Institutions courses)
- Have a minimum GPA of 3.0.

## Application Procedures

Students interested in applying to the Blended BS/MS Program should follow the following procedure:

- Students must complete the department application while in undergraduate status.
- Applicants do not need to pay the graduate program application fee.
- Electronic applications will be submitted to the CE Graduate Coordinator for review.
- Upon acceptance to the program, the department will notify the Registrar's Office and the Office of Graduate Studies.
- Upon completion of 120 units that count toward satisfying either the bachelor's or master's requirements in the blended program, the student will need to apply to change to graduate status.

**Program Requirements: (If new courses are being created as part of a new program, it will be useful to propose courses first.)**

## Program of Study

The blended program allows students to double count up to 9 units of graduate level specialization courses both as electives for the B.S. degree (<https://catalog.csus.edu/colleges/engineering-computer-science/engineering-civil/bs-in-civil-engineering/>) and core courses for the M.S. degree (<https://catalog.csus.edu/colleges/engineering-computer-science/engineering-civil/ms-in-civil-engineering/>), effectively decreasing the summed unit requirements for both degrees.

Students in the blended program are required to select their two M.S. elective courses from the Civil Engineering Department with the approval of an advisor from their area of specialization or the graduate coordinator prior to enrolling in the courses.

## Program Requirements

Total number of required units for the Blended BS/MS program in Civil Engineering is 145. Variable units are listed due to variable culminating requirement units.

Code	Title	Units
<b>REQUIRED LOWER DIVISION COURSES (65 Units)</b>		
<i>First Semester First Year</i>		
CE 1	Civil Engineering Seminar	1
CE 4	Engineering Graphics and CAD <sup>1</sup>	2

CHEM 1E	General Chemistry for Engineering <sup>1</sup>	4
MATH 30	Calculus I <sup>1</sup>	4
Select two General Education courses		6
<i>Second Semester First Year</i>		
CE 9	Plane and Topographic Surveying	2
CE 9L	Plane and Topographic Surveying Laboratory	1
MATH 31	Calculus II <sup>1</sup>	4
PHYS 11A	General Physics: Mechanics <sup>1</sup>	4
Select two General Education courses		6
<i>First Semester Second Year</i>		
ENGR 45	Engineering Materials	3
MATH 45	Differential Equations for Science and Engineering	3
PHYS 11C	General Physics: Electricity and Magnetism <sup>1</sup>	4
Select two General Education courses		6
<i>Second Semester Second Year</i>		
ENGL 20	College Composition II	3
ENGR 30	Analytic Mechanics: Statics	3
MATH 35	Introduction to Linear Algebra	3
or MATH 100	Applied Linear Algebra	
Select two General Education courses		6
<b>Required Upper Division and Graduate Level Courses (80 Units) <sup>2</sup></b>		
<i>First Semester Third Year</i>		
CE 101	Computer Applications in Civil Engineering	3
ENGR 110	Analytic Mechanics - Dynamics	3
ENGR 112	Mechanics Of Materials	3
ENGR 115	Statistics For Engineers	3
ENGR 132	Fluid Mechanics	3
<i>Second Semester Third Year</i>		
CE 100	Engineering Geology	2
CE 130	Water Resources Engineering	3
CE 130L	Hydraulics Laboratory	1
CE 150	Principles of Environmental Engineering	2
CE 150L	Environmental Engineering Laboratory	1
CE 160	Introduction to Structural Analysis <sup>1</sup>	3
Select one General Education Course		3
<i>First Semester Fourth Year</i>		
CE 140	Transportation Engineering	3
CE 140L	Transportation Engineering Laboratory	1
CE 151	Environmental Engineering Practice	2
CE 170	Soil Mechanics	3
CE 170L	Soil Mechanics Laboratory	1
CE 190	Civil Engineering Project Skills	3
Select one MS Specialization Course <sup>3</sup>		3
<i>Second Semester Fourth Year</i>		
CE 160L	Structural Laboratory <sup>1</sup>	1
CE 191	Senior Project	3
Select one Civil Engineering Elective <sup>3,4</sup>		3
Select two MS Specialization Course <sup>3</sup>		6
Select one MS Elective <sup>4</sup>		3
<i>First Semester Year Five</i>		
CE 200	Civil Engineering Professional Writing 	3
Select one MS Specialization Course <sup>3</sup>		3
Select one of the following: <sup>5</sup>		3
ENGR 201	Engineering Analysis I	
ENGR 202	Engineering Analysis II	
ENGR 203	Engineering Statistics	

**Second Semester Year Five**

Select one MS Specialization courses	3
Select up to one MS Elective course <sup>4,6</sup>	0 - 3
Select one of the following CE 500 requirements: <sup>6</sup>	3 - 6

**Plan A**

Master's Thesis (3 or 6 units) Approval by the faculty thesis advisor and by a second faculty or an expert in the area of study is required. The thesis must comply with University standards for format and is filed in the University Library. The Master's Thesis should be the written product of a systematic study of a significant problem. It identifies the problem, states the major assumptions, explains the significance of the undertaking, sets forth the sources for and methods of gathering information, analyze the data, and offers a conclusion or recommendation. The finished product evidences originality, critical and independent thinking, appropriate organization and format, and thorough documentation. The work should be associated with engineering research or innovation. No more than 3 units may be awarded for a topic directly related to a topic studied of CE 299. A public presentation is required.

**Plan B**

Master's Project (3 or 6 units) Approval by the faculty thesis advisor and by a second faculty or an expert in the area of study is required. A Master's Project should be a significant undertaking appropriate to the engineering profession. It evidences originality and independent thinking, appropriate form and organization, and rationale. It is described and summarized in a written report that includes a discussion of the project's significance, objectives, methodology and a conclusion or recommendation. The work should be associated with practical engineering applications. The report must comply with University standards for format and will be filed in the University Library. No more than 3 units may be awarded for a topic directly related to a topic studied for CE 299. A public presentation is required.

**Plan C**

Directed Study with Comprehensive Exam (3 units). Approval of one faculty member is required for Directed Study. The comprehensive examination is administered by a committee of three faculty members. A written report and a public presentation are required on the directed study. The format of the comprehensive examination can be written, oral, or both.

**Total Units****145**

- <sup>1</sup> Course also satisfies General Education (GE)/Graduation Requirement.
- <sup>2</sup> Students must complete all lower division preparation before applying for the Blended BS/MS in Civil Engineering
- <sup>3</sup> At least two of the four courses with this superscript must be design electives.
- <sup>4</sup> Electives should be chosen from the list of courses in consultation with a faculty advisor from the MS Specialization area.
- <sup>5</sup> With advisor approval. Students pursuing an emphasis in Environmental Engineering, Water Resource Engineering or Transportation Engineering must take ENGR 203. Students pursuing an emphasis in Structural Engineering must take ENGR 201 or ENGR 202.
- <sup>6</sup> Total required units for the MS degree is 30. Variable units are listed due to variable culminating requirement units. If 3 units of culminating requirement (CE 500) are selected, 6 units of MS electives are required, and vice versa.

**Specialization Courses**

Units required: 15 -- a minimum of 12 units must be taken from one of the following five areas of specialization. Up to 3 units can be satisfied by 200 level coursework (not including CE 299) outside the chosen area of specialization.

Code	Title	Units
<b>Environmental Engineering</b>		
CE 232	Groundwater Hydrology	
CE 251	Environmental Quality Processes I	
CE 252	Environmental Quality Processes II	
CE 253	Environmental Quality Processes III	
CE 254	Water Quality Management	
CE 255	Transport of Chemicals in Soil Systems	
CE 281	Systems Analysis of Resources Development	
<b>Geotechnical Engineering</b>		
CE 270	Advanced Soil Mechanics and Foundation Engineering I	
CE 271	Advanced Soil Mechanics and Foundation Engineering II	
CE 272	Geotechnical Modeling	
CE 273	Ground Modification Engineering	
CE 274	Soil Dynamics and Earthquake Engineering	
CE 275	Geosynthetics	
<b>Structural Engineering</b>		
CE 260	Matrix Structural Analysis	
CE 261	Finite Element Analysis	
CE 262	Nonlinear Structural Analysis	

CE 263	Advanced Steel Design
CE 264	Advanced Design in Reinforced Concrete
CE 266	Dynamics and Earthquake Response of Structures
CE 267	Structural Systems for Buildings
CE 268	Pre-stressed Concrete Bridge Design

**Transportation Engineering**

CE 241	Analysis and Control of Traffic Systems
CE 242	Transportation Planning
CE 243	Traffic Flow Theory
CE 244	Advanced Transportation Facility Design
CE 245	Pavement Design
CE 275	Geosynthetics

**Water Resources Engineering**

CE 230	Water Resources Planning
CE 231	Hydrometeorology
CE 232	Groundwater Hydrology
CE 234	Advanced Engineering Hydraulics
CE 235	Hydrologic Modeling
CE 281	Systems Analysis of Resources Development

**Civil Engineering Electives**

Code	Title	Units
<i>Design Electives</i>		
CE 133	Design of Urban Water and Sewer Systems	
CE 141	Traffic Analysis and Design	
CE 144	Geometric Design of Highways	
CE 134	Open Channel Hydraulics	
CE 152	Stormwater Management	
CE 153	Design of Water Quality Control Processes	
CE 163	Structural Steel Design	
CE 164	Reinforced Concrete Design	
CE 165	Masonry Design	
CE 168	Prestressed Concrete Design	
CE 169	Timber Design	
CE 171	Soil Mechanics and Foundation Engineering	
CE 175	Geotechnical Earthquake Engineering	
<i>Technical Electives</i>		
CE 131	Hydrology	
CE 132	Groundwater Engineering	
CE 142	Transportation Systems	
CE 156	Geoenvironmental Engineering	
CE 166	Seismic Behavior of Structures	
CE 182	Introduction to GIS in Civil Engineering	
CE 183	Concrete Technology	
ENGR 124	Thermodynamics	

**MS Electives**

Code	Title	Units
<b>Environmental Engineering</b>		
CE 133	Design of Urban Water and Sewer Systems	
CE 152	Stormwater Management	
CE 153	Design of Water Quality Control Processes	
CE 156	Geoenvironmental Engineering	
Any Environmental Engineering Specialization Course		
<b>Geotechnical Engineering</b>		
CE 171	Soil Mechanics and Foundation Engineering	
CE 175	Geotechnical Earthquake Engineering	
Any 200 level Civil Engineering Course		

**Structural Engineering**

CE 163	Structural Steel Design
CE 164	Reinforced Concrete Design
CE 165	Masonry Design
CE 169	Timber Design
Any Structural Engineering Specialization Course	

**Transportation Engineering**

CE 141	Traffic Analysis and Design
CE 142	Transportation Systems
CE 144	Geometric Design of Highways
CE 182	Introduction to GIS in Civil Engineering
Any Transportation Engineering Specialization Course	

**Water Resources Engineering**

CE 131	Hydrology
CE 132	Groundwater Engineering
CE 133	Design of Urban Water and Sewer Systems
CE 134	Open Channel Hydraulics
Any Water Resources Engineering Specialization Course	

**Opt-Out Option**

Students who wish to opt out after completing all other B.S. major requirements except their CE electives may do so and the graduate specialization courses will count as the electives required in the regular undergraduate program. The total number of units required (124) for the B.S. degree will be the same as for students who are not in the blended program.

**Explanation of special characteristics of the proposed degree major program; e.g., in terminology, units of credit required, types of course work, etc.:**

124 units are currently required for the BS in Civil Engineering and that limit remains in place for students who opt out of this blended program.

**For undergraduate programs, provisions for articulation of the proposed major with community college programs:**

Courses for the Blended program that are required in the BS in Civil Engineering program already have established articulation agreements with community college programs.

**Will this program require specialized accreditation?**

Establishment of a master's degree program should be preceded by a national professional accreditation of the corresponding bachelor's degree major program.

**Will this program require accreditation?**

No

**Need for the Proposed Degree Major Program****Is the proposed degree program offered at any California State University campus or any neighboring institutions?**

Yes

**List of other California State University campuses currently offering or projecting the proposed degree major program; list of neighboring institutions, public and private, current offering the proposed degree major program:**

San Francisco State University (SFSU)  
 Cal Polytechnic State University (Cal Poly SLO)  
 University of the Pacific (UoP)

**Differences between the proposed program and the programs listed above:**

SFSU blended program has only one concentration (specialization) in structural/earthquake engineering.

Cal Poly blended program has only three areas (concentrations) in geotechnical, transportation, and water resources.

UoP blended program is only Engineering (general).

The proposed Sacramento State blended program is the only CSU blended program in five areas of Civil Engineering (environmental, geotechnical, structural, transportation, and water resources).

**List of other curricula currently offered by Sac State which are closely related to the proposed program:**

The proposal blends together the existing curriculum for the BS and MS in Civil Engineering.

**Attach the results of a formal survey in the geographical area to be served indicating demand for individuals who have earned the proposed degree and evidence of serious student interest in majoring in the proposed program:**

Industry Survey Response.pdf

Civil Engineering BS\_MS Blended Program\_Student\_Survey.pdf

**For graduate programs, the number of declared undergraduate major and the degree production over the preceding years of the corresponding baccalaureate program:**

2022-2023 CE BS - 144 graduating students, 762 majors

2021-2022 CE BS - 142 graduating students, 774 majors

2020-2021 CE BS - 169 graduating students, 762 majors

2019-2020 CE BS - 162 graduating students, 781 majors

2018-2019 CE BS - 148 graduating students, 673 majors

**Professional uses of the proposed degree major program:**

Students who complete the blended program will be well prepared to enter the workforce as a practicing civil engineer. With numerous state agencies (Caltrans, Department of Water Resources, etc.) and private engineering firms within the Sacramento region, there is increasing demand for upcoming engineering talent. One hallmark of the profession is obtaining a Professional Engineer license. The BS degree enables students to take the Fundamentals of Engineering (FE) exam. Students must complete the FE exam if they want to sit for the Professional Engineer (PE) exam. The MS degree provides a year of credit towards the experience requirements needed to apply for the PE license. The PE license enhances employability and job prospects for students as it commands respect and boosts one's reputation as a competent engineer.

**The expected number of majors in:****1st Year Enrollment:**

15

**3rd Year Enrollment:**

15

**5th Year Enrollment:**

15

**1st Year Graduates:**

0

**3rd Year Graduates:**

15

**5th Year Graduates:**

30

**Existing Support Resources for the Proposed Degree Major Program**

List faculty members, with rank, appointment status, highest degree earned, date and field of highest degree, and professional experience (including publications if the proposal is for a graduate degree), who would teach in the proposed program:

Name	Rank	Appointment Status	Highest Degree Earned	Year of Highest Degree Earned (YYYY)	Publications/Professional Experience
Masoud Ghodrat Abadi	Assistant Professor	Full Time	Doctorate	2018	<a href="https://www.linkedin.com/in/masoud-ghodrat-abadi-077640ab/">https://www.linkedin.com/in/masoud-ghodrat-abadi-077640ab/</a>
Richard Armstrong	Associate Professor	Full Time	Doctorate	2010	<a href="https://www.linkedin.com/in/richard-armstrong-6201a465/">https://www.linkedin.com/in/richard-armstrong-6201a465/</a>
Cyrus Aryani	Professor	Full Time	Doctorate	1988	<a href="https://www.linkedin.com/in/cyrus-aryani-ph-d-p-e-g-e-267835120/">https://www.linkedin.com/in/cyrus-aryani-ph-d-p-e-g-e-267835120/</a>
Zoi Dokou	Assistant Professor	Full Time	Doctorate	2008	<a href="https://www.linkedin.com/in/zoi-dokou-44a33150/">https://www.linkedin.com/in/zoi-dokou-44a33150/</a>

Julie Fogarty	Associate Professor	Full Time	Doctorate	2015	<a href="https://www.linkedin.com/in/julie-fogarty-baa24528/">https://www.linkedin.com/in/julie-fogarty-baa24528/</a>
Jose Garcia	Assistant Professor	Full Time	Doctorate	2018	<a href="https://www.linkedin.com/in/jose-e-garcia/">https://www.linkedin.com/in/jose-e-garcia/</a>
Eric Matsumoto	Professor	Full Time	Doctorate	2000	<a href="https://www.linkedin.com/in/eric-matsumoto-phd-pe-aa00282b/">https://www.linkedin.com/in/eric-matsumoto-phd-pe-aa00282b/</a>
Ghazan Khan	Professor	Full Time	Doctorate	2012	<a href="https://www.linkedin.com/in/ghazankhan/">https://www.linkedin.com/in/ghazankhan/</a>
Saad Merayyan	Professor	Full Time	Doctorate	2001	<a href="https://www.linkedin.com/in/saad-merayyan-91117213/">https://www.linkedin.com/in/saad-merayyan-91117213/</a>
Amir Motlagh	Associate Professor	Full Time	Doctorate	2016	<a href="https://www.linkedin.com/in/amir-motlagh/">https://www.linkedin.com/in/amir-motlagh/</a>
Kimberly Scott-Hallet	Lecturer	Full Time	Masters	1998	<a href="https://www.linkedin.com/in/kim-scott-hallet-85229118/">https://www.linkedin.com/in/kim-scott-hallet-85229118/</a>

**Space and facilities that would be used in support of the proposed program: Show how this space is currently used and what alternate arrangements, if any, will be made for the current occupants.**

No additional space/facilities would be needed.

**Library resources to support the program, specified by subject areas, volume count, periodical holdings, etc.:**

No additional library resources would be needed.

**Equipment and other specialized materials currently available:**

No additional equipment would be needed.

Key: 571