

MS IN CIVIL ENGINEERING



SACRAMENTO STATE
Redefine the Possible

In Workflow

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Approval Path

1. Fri, 11 Sep 2020 15:28:07 GMT
Julie Fogarty (fogarty): Approved for CE Committee Chair
2. Fri, 11 Sep 2020 20:04:15 GMT
Benjamin Fell (fellb): Approved for CE Chair
3. Fri, 18 Sep 2020 17:45:34 GMT
Gareth Figgess (figgess): Approved for ECS College Committee Chair
4. Fri, 18 Sep 2020 18:43:29 GMT
Kevan Shafizadeh (kevan): Approved for ECS Dean

History

1. May 2, 2018 by clmig-jwehrheim
2. Oct 11, 2018 by 212408496
3. Dec 3, 2018 by Benjamin Fell (fellb)

Date Submitted: Fri, 11 Sep 2020 15:26:23 GMT

Viewing: MS in Civil Engineering

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Changes proposed by: Julie Fogarty (218645519)

Academic Group: (College)

Engineering & Computer Science

Academic Organization: (Department)

Civil Engineering

Catalog Year Effective:

2021-2022 Catalog

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

Name (First Last)	Email	Phone 999-999-9999
Benjamin Fell	fellb@csus.edu	916-278-8139

Type of Program Proposal:

Major

Program Change Type:

Non-Substantive

Title of the Program:

MS in Civil Engineering

Designation: (degree terminology)

Master of Science

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

A Graduate Writing Intensive (GWI) course is being added to the program to satisfy EO 665. Nearly all courses are being renumbered to be consistent with the undergraduate program renumbering that went through curriculum workflow in Fall 2019. Graduate courses are also having their undergraduate prerequisite numbers updated (prerequisite courses themselves are not changing - only the prerequisite course number is being updated for consistency with the new numbers in the undergraduate program).

The department has approved to discontinue the graduate certificate program and that language is being deleted from the catalog. The graduate certificate program was designed to meet the needs of professional engineers interested in sharpening their skills in their specialty area. However, there has been no enrollment in this program for at least the past 6 years possibly because students enrolled in the graduate program tend to finish their graduate degree owing to the greater benefits of a master's degree instead of the certificate.

Additional edits are made to the Admission Requirements and Admission Procedures sections to be consistent with the actual admission process (i.e. only one official transcript is needed) and clarify language that has led to confusion for students.

Objectives of the degree program:

1. Succeed in professional employment at their chosen specialty of environmental, geotechnical, structural, transportation, or water resources engineering.
2. Identify, analyze, and solve complex practical civil engineering problems in their chosen field of specialty.
3. Communicate effectively about technically complex engineering problems to peers, other professionals, decision makers, and the general public, in the conduct of their work.

University Learning Goals**Graduate (Masters) Learning Goals:**

Critical thinking/analysis
 Communication
 Information literacy
 Disciplinary knowledge
 Intercultural/Global perspectives
 Professionalism
 Research (optional)

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

Catalog Description:

Total units required for the MS: 30 - Includes research or independent study and units required in area of specialization (see Program Requirements below)

Program Description

Civil Engineering encompasses a broad range of professional activities. The four years of undergraduate preparation for the Bachelor of Science degree are devoted to fundamental analytical principles and basic design applications. For technical competence in specialized areas and continued effectiveness on the job, graduate study is becoming increasingly necessary.

The Civil Engineering Department offers a graduate program of study leading to a Master of Science degree in Civil Engineering in the following areas of specialization:

- **Environmental/Water Quality Engineering** - water quality analysis and management, water, and waste treatment;
- **Geotechnical Engineering** - properties and behavior of soil and their application to design of foundation, retaining structures, earth dams and slopes, soil improvement and ground stabilization, geosynthetics inclusions, and soil dynamics, and earthquake engineering;
- **Structural Engineering** - earthquake resistant steel and concrete design applied to buildings and bridges, structural dynamics, structural mechanics, and finite element methods;
- **Transportation Engineering** - Transportation engineering and planning, traffic flow theory, and system management applicable to all modes with emphasis on highway and multi modal transportation; interdisciplinary study with other areas of Civil Engineering as well as with non-engineering areas (e.g., Environmental Studies, Geography, Public Policy & Administration, and Business Administration) may also be arranged; and

- **Water Resources Engineering** - advanced hydraulics and modern hydrologic techniques, flood forecasting, groundwater flow modeling, water resources management, and policy formulation.

Each area of concentration consists of a set of core courses, a choice of electives, and culminating requirements; all selected by the student and approved by an advisor. Practicing engineers who do not have a degree objective may choose to enroll in selected courses as part of a continuing education program.

Graduate brochures specifically describing the program in each area are available in the Department Office. Some graduate assistantships are available to qualified students. Application forms for these can be obtained from the Department or from the Office of Graduate Studies, River Front Center 215, (916) 278-6470.

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

Admission Requirements

Admission as a classified graduate student in Civil Engineering requires:

- an undergraduate degree in Civil Engineering; and
- a minimum 2.8 GPA.

In addition, the merit of past academic endeavor, potential for future study, and professional goals may also be considered for granting admission through submission of the civil engineering department supplemental application form.

Applicants who have deficiencies in admission requirements that can be removed by specified additional preparation may be admitted with conditionally classified graduate status.

Students with a baccalaureate degree in engineering majors other than Civil Engineering (e.g., Electrical and Electronic, Industrial, Mechanical, or Surveying) or in other non-engineering scientific disciplines (e.g., Mathematics, Physics, or Geology) who wish to pursue the graduate program in Civil Engineering may be considered on an individual basis. Such students may be admitted as conditionally classified students and will be required to complete a specifically designed list of undergraduate prerequisite courses in engineering and/or mathematics, physics, and chemistry to correct undergraduate deficiencies. Such a student must have an approved study program on file with the Department while undertaking this qualifying work. Upon completion of these courses with a GPA of 2.8 or better, the student may apply for classified graduate status in Civil Engineering.

Admission Procedures

All prospective graduate students, including Sacramento State graduates, must file the following with the Office of Graduate Studies:

- an online application for admission; and
- an official transcript from all colleges and universities attended, *other than Sacramento State*.
- Civil Engineering department supplemental application form
- GRE test score if a student does not have an ABET-accredited engineering degree or meet the minimum 2.8 GPA requirement.

For more admissions information and application deadlines, please visit the Office of Graduate Studies website (<http://csus.edu/gradstudies/>).

After being admitted, students must meet with an advisor and complete a Graduate Student Advising Form (obtainable in the Civil Engineering Department). This advising form must be kept current and on file in the Department Office.

Minimum Units and Grade Requirements for the Degree

Total units Required for the MS: 30; includes research or independent study and units required in area of concentration (see Program Requirements below)

Minimum Cumulative GPA: 3.0. No course in the program of study may have a grade below 'C+'.

Advancement to Candidacy

Each student must file an application for Advancement to Candidacy, indicating a proposed program of graduate study. This procedure should begin as soon as the graduate student has:

- removed any deficiencies in admission requirements;
- obtained classified graduate status;
- completed at least 12 units in the graduate program with a minimum 3.0 GPA, including at least three courses at the 200-level;
- taken a Graduate Writing Intensive (GWI) course in their discipline within the first two semesters of coursework at California State University, Sacramento or secured approval for a WPG waiver; and
- selected and obtained approval for a culminating requirement (Plan A, B, or C).

Advancement to Candidacy form is submitted online through MySacState. The student fills out the form after planning a degree program in consultation with his or her faculty advisor. The completed form is then approved by the Graduate Coordinator of the Department and submitted to the Office of Graduate Studies.

All graduate degree programs are subject to general University requirements for graduate degrees, explained in the *Graduate Studies* section of this catalog.

As defined by policy <http://www.csus.edu/umannual/acadaff/fsm00010.htm>, a change in units constitutes a substantive change to the program. If your changes constitute a substantive change, please refer back to the 'Program Change Type' field above to ensure that 'Substantive' is selected.

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

Program Requirements

Code	Title	Units
Required Courses (21 Units)		
<i>Core Courses</i>		
15 units are required as outlined in the Core Courses section below		15
<i>Mathematics/Statistics</i>		
Select one of the following: ¹		3
ENGR 201	Engineering Analysis I	
ENGR 202	Engineering Analysis II	
ENGR 203	Engineering Statistics	
<i>Writing</i>		
CE 200	Civil Engineering Professional Writing	3
Elective Courses (6 Units)		
Select 3 or 6 units of electives ^{2,3}		3 - 6
Culminating Requirement (3 Units)		
Select one of the following CE 500 requirements: ³		3 - 6
<i>Plan A</i>		
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.		
<i>Plan B</i>		
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.		
<i>Plan C</i>		
Directed Study (3 units) and Comprehensive Examination (0 units). Approval of one faculty member is required for Directed Study. The comprehensive examination is administered by a committee of three faculty members. A public presentation is required on the directed study. The format of the comprehensive examination can be written, oral, or both.		

Total Units	30
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- ¹ 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.
- ² Elective courses (including CE 299) selected with prior approval of the student's faculty advisor in the area of interest. In addition to 200-level courses, these may also include the technical electives (but not the required courses) from the undergraduate curriculum. Not more than 3 units of CE 299 may be taken without prior approval of the Graduate Coordinator.
- ³ Totals required units for degree is 30, variable units are listed due to variable culminating requirement units.

Core 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
Environmental/Water Quality Engineering (21 Units)		
CE 234	Groundwater Hydrology	3
CE 251	Environmental Quality Processes I	3
CE 252	Environmental Quality Processes II	3
CE 253	Environmental Quality Processes III	3
CE 254	Water Quality Management	3
CE 255	Transport of Chemicals in Soil Systems	3
CE 281	Systems Analysis of Resources Development	3

Geotechnical Engineering (18 Units)

CE 270 Advanced Soil Mechanics and Foundation Engineering I	3
CE 271 Advanced Soil Mechanics and Foundation Engineering II	3
CE 272 Geotechnical Modeling	3
CE 273 Ground Modification Engineering	3
CE 274 Soil Dynamics and Earthquake Engineering	3
CE 275 Geosynthetics	3

Structural Engineering (21 Units)

CE 260 Matrix Structural Analysis	3
CE 261 Finite Element Analysis	3
CE 262 Nonlinear Structural Analysis	3
CE 263 Advanced Steel Design	3
CE 264 Advanced Design in Reinforced Concrete	3
CE 266 Dynamics and Earthquake Response of Structures	3
CE 267 Structural Systems for Buildings	3

Transportation Engineering (18 Units)

CE 241 Analysis and Control of Traffic Systems	3
CE 242 Transportation Planning	3
CE 243 Traffic Flow Theory	3
CE 244 Advanced Transportation Facility Design	3
CE 245 Pavement Design	3
CE 275 Geosynthetics	3

Water Resources Engineering (18 Units)

CE 231 Water Resource Planning	3
CE 232 Modern Hydrologic Techniques	3
CE 233 Advanced Engineering Hydraulics	3
CE 234 Groundwater Hydrology	3
CE 235 Hydrologic Modeling	3
CE 281 Systems Analysis of Resources Development	3

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

NA

Fiscal Impact to Change an Existing Program

Indicate programmatic or fiscal impact which this change will have on other academic units' programs, and describe the consultation that has occurred with affected units:

NA

Provide a fiscal analysis of the proposed changes:

NA

How will the above changes be accommodated within the department/College existing fiscal resources?

NA

Will the proposed changes require additional resources?

No

What additional space, equipment, operating expenses, library, computer, or media resources, clerical/technical support, or other resources will be needed?

NA

Estimate the cost and indicate how these resource needs will be accommodated:

NA

Please attach any additional files not requested above:

CECourseRenumberingRequest_Fell.pdf

Key: 164