# M.S. in Civil Engineering

## Degree Requirements

Students who do not have a bachelor's degree in civil engineering, but who want to obtain a master's degree in civil engineering must complete a bridge program for their chosen area of specialization. These courses are not counted for degree credit. See the areas of specialization in this section for specific bridge programs. Please note that prerequisites for bridge courses also must be met. See the undergraduate catalog for descriptions of 100- to 400-level courses. Some of the bridge courses may be waived depending on the student’s background.

The program as shown below offers numerous areas of specialization, each with its own list of required and elective courses and bridge program. Once the choice of specialization is made, the student consults his/her specialization advisor to plan and develop an individualized and cohesive sequence of courses that will meet the program requirements of at least 30 degree credits.

Other suitable electives may be taken subject to approval of program advisor.

Students receiving financial aid at any point in their studies must complete 6 credits of CE 701 Masters Thesis. Any students are able to substitute Master’s thesis in their program.

## M.S. in Civil Engineering, Construction Engineering and Management

### Bridge Program

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 210</td>
<td>Construction Materials and Procedures</td>
<td>3</td>
</tr>
<tr>
<td>CE 501</td>
<td>Introduction to Soil Behavior</td>
<td>3</td>
</tr>
<tr>
<td>MECH 320</td>
<td>Statics and Strength of Materials</td>
<td>3</td>
</tr>
<tr>
<td>CS 101</td>
<td>Computer Programming and Problem Solving</td>
<td>3</td>
</tr>
<tr>
<td>MATH 225</td>
<td>Survey of Probability and Statistics</td>
<td>1</td>
</tr>
<tr>
<td>MATH 112</td>
<td>Calculus II</td>
<td>4</td>
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</tbody>
</table>

**Total Credits: 17**

### Core Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 610</td>
<td>Construction Management</td>
<td>3</td>
</tr>
<tr>
<td>CE 611</td>
<td>Project Planning and Control</td>
<td>3</td>
</tr>
</tbody>
</table>

### Specialty Electives

Select four to six of the following: 12-18

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 614</td>
<td>Underground Construction</td>
</tr>
<tr>
<td>CE 615</td>
<td>Infrastructure and Facilities Remediation</td>
</tr>
<tr>
<td>CE 616</td>
<td>Construction Cost Estimating</td>
</tr>
<tr>
<td>CE 617</td>
<td>Historic Preservation</td>
</tr>
<tr>
<td>CE 644</td>
<td>Geology in Engineering</td>
</tr>
<tr>
<td>CE 700</td>
<td>Master's Project</td>
</tr>
<tr>
<td>CE 671</td>
<td>Performance and Risk Analysis of Infrastructure Systems</td>
</tr>
</tbody>
</table>

### General Electives

Select zero to two from the List of Department General Electives: 0-6

### Management/Leadership Electives

Select one to two of the following: 3-6

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 711</td>
<td>Methods Improvement in Construction</td>
</tr>
<tr>
<td>EM 632</td>
<td>Legal Aspects in Construction</td>
</tr>
<tr>
<td>HRM 601</td>
<td>Organizational Behavior</td>
</tr>
</tbody>
</table>

**Total Credits: 30**

1. Students receiving departmental awards are required to write a thesis.
2. All students who receive departmental or research-based awards must enroll in the seminar each semester.

## M.S. in Civil Engineering, Environmental Engineering, Water Quality Program

### Water Quality Bridge Program

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 320</td>
<td>Fluid Mechanics</td>
<td>4</td>
</tr>
</tbody>
</table>
M.S. in Civil Engineering

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 321</td>
<td>Water Resources Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 126</td>
<td>General Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Total Credits</strong></td>
<td><strong>10</strong></td>
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Core Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ENE 663</td>
<td>Water Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>ENE 661</td>
<td>Environmental Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>or EVSC 627</td>
<td>Environmental Microbiology</td>
<td></td>
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</tbody>
</table>

Specialty Electives

Select four to six of the following: 12-18

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENE 664</td>
<td>Physical and Chemical Treatment</td>
<td></td>
</tr>
<tr>
<td>ENE 665</td>
<td>Biological Treatment</td>
<td></td>
</tr>
<tr>
<td>ENE 672</td>
<td>Stormwater Management</td>
<td></td>
</tr>
<tr>
<td>CE 671</td>
<td>Performance and Risk Analysis of Infrastructure Systems</td>
<td></td>
</tr>
</tbody>
</table>

General Electives

Select zero to two from the List of Department General Electives 0-6

Management/Leadership Electives

Select one to two of the following: 3-6

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 610</td>
<td>Construction Management</td>
<td></td>
</tr>
<tr>
<td>CE 711</td>
<td>Methods Improvement in Construction</td>
<td></td>
</tr>
<tr>
<td>EM 631</td>
<td>Legal Aspects in Environmental Engineering</td>
<td></td>
</tr>
<tr>
<td>HRM 601</td>
<td>Organizational Behavior</td>
<td></td>
</tr>
</tbody>
</table>

Total Credits 30

M.S. in Civil Engineering, Environmental Engineering Integrated Site Remediation

Integrated Site Remediation Bridge Program

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 126</td>
<td>General Chemistry II</td>
<td>3</td>
</tr>
<tr>
<td>CE 321</td>
<td>Water Resources Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CE 501</td>
<td>Introduction to Soil Behavior</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Total Credits</strong></td>
<td><strong>9</strong></td>
</tr>
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Core Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENE 663</td>
<td>Water Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>ENE 661</td>
<td>Environmental Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>or EVSC 627</td>
<td>Environmental Microbiology</td>
<td></td>
</tr>
</tbody>
</table>

Specialty Electives

Select four to six of the following: 12-18

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ENE 660</td>
<td>Introduction to Solid and Hazardous Waste Problems</td>
<td></td>
</tr>
<tr>
<td>ENE 662</td>
<td>Site Remediation</td>
<td></td>
</tr>
<tr>
<td>ENE 671</td>
<td>Environmental Impact Analysis</td>
<td></td>
</tr>
<tr>
<td>CE 602</td>
<td>Geographic Information System</td>
<td></td>
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</tbody>
</table>

General Electives

Select zero to two from the List of Department General Electives 0-6

Management/Leadership Electives

Select one to two of the following: 3-6

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 610</td>
<td>Construction Management</td>
<td></td>
</tr>
<tr>
<td>CE 711</td>
<td>Methods Improvement in Construction</td>
<td></td>
</tr>
<tr>
<td>EM 631</td>
<td>Legal Aspects in Environmental Engineering</td>
<td></td>
</tr>
<tr>
<td>HRM 601</td>
<td>Organizational Behavior</td>
<td></td>
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</tbody>
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Total Credits 30
### M.S. in Civil Engineering, Geotechnical Engineering

**Bridge Program**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 320</td>
<td>Fluid Mechanics</td>
<td>4</td>
</tr>
<tr>
<td>CE 332</td>
<td>Structural Analysis</td>
<td>3</td>
</tr>
<tr>
<td>CE 333</td>
<td>Reinforced Concrete Design</td>
<td>3</td>
</tr>
<tr>
<td>CE 341</td>
<td>Soil Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>CE 341A</td>
<td>Soil Mechanics Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>CS 101</td>
<td>Computer Programming and Problem Solving</td>
<td></td>
</tr>
<tr>
<td>MATH 222</td>
<td>Differential Equations</td>
<td>4</td>
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**Total Credits** 24

**Core Courses**

<table>
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<th>Credits</th>
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<tbody>
<tr>
<td>CE 641</td>
<td>Engineering Properties of Soils</td>
<td>3</td>
</tr>
<tr>
<td>CE 642</td>
<td>Foundation Engineering</td>
<td>3</td>
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**Specialty Electives**

Select four to six of the following: 12-18

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>CE 545</td>
<td>Rock Mechanics I</td>
</tr>
<tr>
<td>CE 602</td>
<td>Geographic Information System</td>
</tr>
<tr>
<td>CE 643</td>
<td>Advanced Foundation Engineering</td>
</tr>
<tr>
<td>CE 644</td>
<td>Geology in Engineering</td>
</tr>
<tr>
<td>CE 645</td>
<td>Rock Mechanics II</td>
</tr>
<tr>
<td>CE 606</td>
<td>Geospatial Data Applications</td>
</tr>
<tr>
<td>CE 647</td>
<td>Geotechnical Aspects of Solid Waste</td>
</tr>
<tr>
<td>CE 648</td>
<td>Flow Through Soils</td>
</tr>
<tr>
<td>CE 700</td>
<td>Master's Project</td>
</tr>
<tr>
<td>CE 742</td>
<td>Geotechnology of Earthquake Engineering</td>
</tr>
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</table>

**General Electives**

Select zero to two from the List of Department General Electives 0-6

**Management/Leadership Electives**

Select one to two of the following: 3-6

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>CE 610</td>
<td>Construction Management</td>
</tr>
<tr>
<td>CE 711</td>
<td>Methods Improvement in Construction</td>
</tr>
<tr>
<td>EM 632</td>
<td>Legal Aspects in Construction</td>
</tr>
<tr>
<td>HRM 601</td>
<td>Organizational Behavior</td>
</tr>
</tbody>
</table>

**Total Credits** 30

### M.S. in Civil Engineering, Structural Engineering

**Bridge Program**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 333</td>
<td>Reinforced Concrete Design</td>
<td>3</td>
</tr>
<tr>
<td>CE 341</td>
<td>Soil Mechanics</td>
<td>3</td>
</tr>
<tr>
<td>CE 341A</td>
<td>Soil Mechanics Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>CE 432</td>
<td>Steel Design</td>
<td>3</td>
</tr>
<tr>
<td>CS 101</td>
<td>Computer Programming and Problem Solving</td>
<td>3</td>
</tr>
<tr>
<td>MATH 222</td>
<td>Differential Equations</td>
<td>4</td>
</tr>
<tr>
<td>MECH 236</td>
<td>Dynamics</td>
<td>2</td>
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**Total Credits** 19

**Core Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 639</td>
<td>Applied Finite Element Methods</td>
<td>3</td>
</tr>
<tr>
<td>CE 636</td>
<td>Stability of Structures</td>
<td>3</td>
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**Specialty Electives**
Select four to six of the following:  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 531</td>
<td>Design of Masonry and Timber Structures</td>
</tr>
<tr>
<td>CE 631</td>
<td>Advanced Reinforced Concrete Design</td>
</tr>
<tr>
<td>CE 632</td>
<td>Prestressed Concrete Design</td>
</tr>
<tr>
<td>CE 634</td>
<td>Structural Dynamics</td>
</tr>
<tr>
<td>CE 635</td>
<td>Fracture Mechanics of Engineering Materials</td>
</tr>
<tr>
<td>CE 637</td>
<td>Short Span Bridge Design</td>
</tr>
<tr>
<td>CE 638</td>
<td>Nondestructive Testing Methods in Civil Engineering</td>
</tr>
<tr>
<td>CE 700</td>
<td>Master's Project</td>
</tr>
<tr>
<td>CE 702</td>
<td>Special Topics in Civil Engineering</td>
</tr>
<tr>
<td>CE 730</td>
<td>Plastic Analysis and Design</td>
</tr>
<tr>
<td>CE 733</td>
<td>Design of Metal Structures</td>
</tr>
<tr>
<td>CE 734</td>
<td>Design of Tall Buildings and Space Structures</td>
</tr>
<tr>
<td>CE 736</td>
<td>Finite Element Methods in Structural and Continuum Mechanics</td>
</tr>
<tr>
<td>CE 737</td>
<td>Earthquake Engineering</td>
</tr>
<tr>
<td>CE 739</td>
<td>Structural Optimization</td>
</tr>
<tr>
<td>MECH 630</td>
<td>Theory of Elasticity</td>
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**General Electives**
Select zero to two from the List of Department General Electives

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td></td>
<td>0-6</td>
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**Management/Leadership Electives**
Select one to two of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 610</td>
<td>Construction Management</td>
</tr>
<tr>
<td>CE 711</td>
<td>Methods Improvement in Construction</td>
</tr>
<tr>
<td>EM 632</td>
<td>Legal Aspects in Construction</td>
</tr>
<tr>
<td>HRM 601</td>
<td>Organizational Behavior</td>
</tr>
</tbody>
</table>

**Total Credits** 30

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**M.S. in Civil Engineering, Transportation Engineering**

**Bridge Program**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 350</td>
<td>Transportation Engineering</td>
</tr>
<tr>
<td>CS 101</td>
<td>Computer Programming and Problem Solving</td>
</tr>
<tr>
<td>ECON 265</td>
<td>Microeconomics</td>
</tr>
<tr>
<td>MATH 105</td>
<td>Elementary Probability and Statistics</td>
</tr>
<tr>
<td>MATH 309</td>
<td>Mathematical Analysis for Technology</td>
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</table>

**Total Credits** 16

**Core Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>TRAN 650</td>
<td>Urban Systems Engineering</td>
</tr>
<tr>
<td>TRAN 615</td>
<td>Traffic Studies and Capacity</td>
</tr>
</tbody>
</table>

**Specialty Electives**
Select four to six of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 659</td>
<td>Flexible and Rigid Pavements</td>
</tr>
<tr>
<td>TRAN 552</td>
<td>Geometric Design of Transportation Facilities</td>
</tr>
<tr>
<td>TRAN 603</td>
<td>Introduction to Urban Transportation Planning</td>
</tr>
<tr>
<td>TRAN 625</td>
<td>Public Transportation Operations and Technology</td>
</tr>
<tr>
<td>TRAN 653</td>
<td>Traffic Safety</td>
</tr>
<tr>
<td>TRAN 655</td>
<td>Land Use Planning</td>
</tr>
<tr>
<td>TRAN 700</td>
<td>Master's Project</td>
</tr>
<tr>
<td>TRAN 752</td>
<td>Traffic Control</td>
</tr>
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</table>

**Management/Leadership Electives**
Select two of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 711</td>
<td>Methods Improvement in Construction</td>
</tr>
</tbody>
</table>

**Total Credits** 6
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>EM 632</td>
<td>Legal Aspects in Construction</td>
</tr>
<tr>
<td>HRM 601</td>
<td>Organizational Behavior</td>
</tr>
</tbody>
</table>

Total Credits 24-30