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. Any students are able to substitute Master's thesis in their program.

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tr>
<td></td>
<td><strong>Bridge Program</strong></td>
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<tr>
<td>CE 210</td>
<td>Construction Materials and Procedures</td>
<td>3</td>
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<tr>
<td>CE 501</td>
<td>Introduction to Soil Behavior</td>
<td>3</td>
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<tr>
<td>MECH 320</td>
<td>Statics and Strength of Materials</td>
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<td>CS 101</td>
<td>Computer Programming and Problem Solving</td>
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<td>MATH 225</td>
<td>Survey of Probability and Statistics</td>
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<td>Calculus II</td>
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<td>CE 610</td>
<td>Construction Management</td>
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<td>CE 611</td>
<td>Project Planning and Control</td>
<td>3</td>
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<td>Select four to six of the following:</td>
<td>12-18</td>
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<tr>
<td>CE 614</td>
<td>Underground Construction</td>
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<tr>
<td>CE 615</td>
<td>Infrastructure and Facilities Remediation</td>
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<tr>
<td>CE 616</td>
<td>Construction Cost Estimating</td>
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<td>CE 617</td>
<td>Historic Preservation</td>
<td></td>
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<tr>
<td>CE 644</td>
<td>Geology in Engineering</td>
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<tr>
<td>CE 700</td>
<td>Performance and Risk Analysis of Infrastructure Systems</td>
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<td>CE 671</td>
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<td>0-6</td>
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<tr>
<td></td>
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<td>3-6</td>
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<tr>
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<tr>
<td>CE 711</td>
<td>Methods Improvement in Construction</td>
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<tr>
<td>EM 632</td>
<td>Legal Aspects in Construction</td>
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<tr>
<td>HRM 601</td>
<td>Organizational Behavior</td>
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</tr>
<tr>
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<td><strong>Total Credits</strong></td>
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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

<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td>CE 320</td>
<td>Fluid Mechanics</td>
<td>3</td>
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<tr>
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<td>Water Resources Engineering</td>
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<td>CHEM 126</td>
<td>General Chemistry II</td>
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<tbody>
<tr>
<td>ENE 663</td>
<td>Water Chemistry</td>
<td>3</td>
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<tr>
<td>ENE 661</td>
<td>Environmental Microbiology</td>
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<tr>
<td>or EVSC 627</td>
<td>Environmental Microbiology</td>
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**Specialty Electives**

Select four to six of the following:

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<tr>
<td>ENE 664</td>
<td>Physical and Chemical Treatment</td>
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<tr>
<td>ENE 665</td>
<td>Biological Treatment</td>
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<td>ENE 672</td>
<td>Stormwater Management</td>
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<tr>
<td>CE 671</td>
<td>Performance and Risk Analysis of Infrastructure Systems</td>
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**General Electives**

Select zero to two from the List of Department General Electives

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

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<tr>
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<tbody>
<tr>
<td>CHEM 126</td>
<td>General Chemistry II</td>
<td>3</td>
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<tr>
<td>CE 321</td>
<td>Water Resources Engineering</td>
<td>3</td>
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<tr>
<td>CE 501</td>
<td>Introduction to Soil Behavior</td>
<td>3</td>
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<tbody>
<tr>
<td>ENE 663</td>
<td>Water Chemistry</td>
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</tr>
<tr>
<td>ENE 661</td>
<td>Environmental Microbiology</td>
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<tr>
<td>or EVSC 627</td>
<td>Environmental Microbiology</td>
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**Specialty Electives**

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<td>ENE 660</td>
<td>Introduction to Solid and Hazardous Waste Problems</td>
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<tr>
<td>ENE 662</td>
<td>Site Remediation</td>
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<tr>
<td>ENE 671</td>
<td>Environmental Impact Analysis</td>
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<tr>
<td>CE 602</td>
<td>Geographic Information System</td>
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**General Electives**

Select zero to two from the List of Department General Electives

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**Management/Leadership Electives**

Select one to two of the following:

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<th>Code</th>
<th>Title</th>
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<tr>
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<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>
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<table>
<thead>
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<th>Credits</th>
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<tr>
<td>Code</td>
<td>Title</td>
<td>Credits</td>
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<tr>
<td>CE 641</td>
<td>Engineering Properties of Soils</td>
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<tr>
<td>CE 643</td>
<td>Advanced Foundation Engineering</td>
<td>3</td>
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<tr>
<td>CE 648</td>
<td>Flow Through Soils</td>
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**Advanced Geotechnical Design Courses**

Select 2-3 courses from the following:

- CE 642  Foundation Engineering
- CE 647  Geotechnical Aspects of Solid Waste
- CE 742  Geotechnology of Earthquake Engineering
- CE 646  Geosynthetics & Soil Imp

**Geology/Rock Mechanics Courses**

Select 1-2 courses from the following: 0-6

- CE 644  Geology in Engineering
- CE 614  Underground Construction
- CE 602  Geographic Information System
- or MIP 652 Geographic Information Systems

**Pending Extraction and Storage of Energy Resources**

**General Electives**

Select 0-4 courses from the following:

- CE 553  Design and Construction of Asphalt Pavements
- CE 649  Design & Construction of Concr
- CE 659  Flexible and Rigid Pavements
- CE 702  Special Topics in Civil Engineering

**Pending Management of Infrastructure Assets**

**Structural**

- CE 615  Infrastructure and Facilities Remediation
- CE 631  Advanced Reinforced Concrete Design
- CE 638  Nondestructive Testing Methods in Civil Engineering

**Numerical Methods**
M.S. in Civil Engineering

Management/Leadership Electives
Select 3-6 credits from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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<tbody>
<tr>
<td>CE 610</td>
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<td>CE 611</td>
<td>Project Planning and Control</td>
</tr>
<tr>
<td>CE 616</td>
<td>Construction Cost Estimating</td>
</tr>
<tr>
<td>CE 711</td>
<td>Methods Improvement in Construction</td>
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<tr>
<td>EM 632</td>
<td>Legal Aspects in Construction</td>
</tr>
<tr>
<td>HRM 601</td>
<td>Organizational Behavior</td>
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</table>

Students pursuing a thesis option or receiving financial aid at any point in their studies must complete a minimum of 6 credits of CE 701 Master's Thesis in place of 3 credits reduction from the Advanced Geotechnical Design Courses Requirements and 3 Credits reduction from the Management/Leadership

M.S. in Civil Engineering, Structural Engineering

<table>
<thead>
<tr>
<th>Code</th>
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<tbody>
<tr>
<td>CE 333</td>
<td>Reinforced Concrete Design</td>
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<tr>
<td>CE 341</td>
<td>Soil Mechanics</td>
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<tr>
<td>CE 341A</td>
<td>Soil Mechanics Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>CE 432</td>
<td>Steel Design</td>
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<tr>
<td>CS 101</td>
<td>Computer Programming and Problem Solving</td>
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<tr>
<td>MATH 222</td>
<td>Differential Equations</td>
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<tr>
<td>MECH 236</td>
<td>Dynamics</td>
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<table>
<thead>
<tr>
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<tr>
<td>CE 639</td>
<td>Applied Finite Element Methods</td>
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<tr>
<td>CE 636</td>
<td>Mechanics and Stability of Structures</td>
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Specialty Electives
Select four to six of the following:

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<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CE 531</td>
<td>Design of Masonry and Timber Structures</td>
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<tr>
<td>CE 631</td>
<td>Advanced Reinforced Concrete Design</td>
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<tr>
<td>CE 632</td>
<td>Prestressed Concrete Design</td>
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<tr>
<td>CE 634</td>
<td>Structural Dynamics</td>
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<tr>
<td>CE 635</td>
<td>Fracture Mechanics of Engineering Materials</td>
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<td>CE 637</td>
<td>Short Span Bridge Design</td>
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<td>CE 638</td>
<td>Nondestructive Testing Methods in Civil Engineering</td>
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<td>CE 700</td>
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<tr>
<td>CE 702</td>
<td>Special Topics in Civil Engineering</td>
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<tr>
<td>CE 730</td>
<td>Plastic Analysis and Design</td>
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<td>CE 733</td>
<td>Design of Metal Structures</td>
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<td>CE 734</td>
<td>Design of Tall Buildings and Space Structures</td>
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<td>CE 736</td>
<td>Finite Element Methods in Structural and Continuum Mechanics</td>
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<td>CE 737</td>
<td>Earthquake Engineering</td>
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<tr>
<td>CE 739</td>
<td>Structural Optimization</td>
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<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

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Management/Leadership Electives
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### M.S. in Civil Engineering

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<th>Title</th>
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<tbody>
<tr>
<td>CE 610</td>
<td>Construction Management</td>
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</tr>
<tr>
<td>CE 711</td>
<td>Methods Improvement in Construction</td>
<td></td>
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<tr>
<td>EM 632</td>
<td>Legal Aspects in Construction</td>
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<tr>
<td>HRM 601</td>
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Total Credits: 30

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

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<tbody>
<tr>
<td>CE 659</td>
<td>Flexible and Rigid Pavements</td>
<td></td>
</tr>
<tr>
<td>TRAN 552</td>
<td>Geometric Design of Transportation Facilities</td>
<td></td>
</tr>
<tr>
<td>TRAN 603</td>
<td>Introduction to Urban Transportation Planning</td>
<td></td>
</tr>
<tr>
<td>TRAN 625</td>
<td>Public Transportation Operations and Technology</td>
<td></td>
</tr>
<tr>
<td>TRAN 653</td>
<td>Traffic Safety</td>
<td></td>
</tr>
<tr>
<td>TRAN 655</td>
<td>Land Use Planning</td>
<td></td>
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<tr>
<td>TRAN 700</td>
<td>Traffic Control</td>
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<tr>
<td>TRAN 752</td>
<td>Traffic Control</td>
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Total Credits: 16

### Bridge Program

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<td>ECON 265</td>
<td>Microeconomics</td>
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<tr>
<td>MATH 105</td>
<td>Elementary Probability and Statistics</td>
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<tr>
<td>MATH 309</td>
<td>Mathematical Analysis for Technology</td>
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Total Credits: 16

### Core Courses

<table>
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<tr>
<th>Code</th>
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<tbody>
<tr>
<td>TRAN 650</td>
<td>Urban Systems Engineering</td>
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<tr>
<td>TRAN 615</td>
<td>Traffic Studies and Capacity</td>
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### Specialty Electives

Select four to six of the following: 12-18

<table>
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<tbody>
<tr>
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<td>TRAN 700</td>
<td>Traffic Control</td>
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### Management/Leadership Electives

Select two of the following: 6

<table>
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<tbody>
<tr>
<td>CE 711</td>
<td>Methods Improvement in Construction</td>
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<td>Legal Aspects in Construction</td>
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<tr>
<td>HRM 601</td>
<td>Organizational Behavior</td>
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Total Credits: 24-30