CIVIL AND INFRASTRUCTURE ENGINEERING, MS

Banner Code: EC-MS-CEIE

Laura Kosoglu, PhD, Associate Department Chair; Director, CEIE Graduate Program; Associate Professor
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Email: ceiegrad@gmu.edu
Website: https://civil.gmu.edu/academics/master-science

This MS is designed for students who have completed a bachelor’s degree in civil engineering, although domestic students with related undergraduate degrees may be considered for provisional admission. The MS educates students in the theory and practice of civil engineering science and design, with a technical concentration. The master’s degree is increasingly expected for high level practice in civil engineering, and prepares graduates to practice in civil engineering for: federal, state, or local government; engineering design firms; construction firms; public utilities; non-governmental organizations; and local and regional planning firms, among others. The MS degree serves as a foundation for subsequent study in a doctoral program in civil engineering, as well as for graduate studies in architecture, law, business, economics, finance, and public policy and administration.

Both part-time and full-time study is available. Full-time students typically complete the degree in one and a half, to two years.

Admissions & Policies

Admissions
To be considered for admission to the program, a candidate must:

- Satisfy general University and College of Engineering and Computing requirements for admission to a graduate program,
- Have earned a baccalaureate degree in engineering or a related science,
- Provide two letters of reference, submitted by former professors or supervisors,
- Provide a goals statement and professional résumé.

Acceptance to the degree program is based on an assessment of the applicant’s capacity to pursue graduate studies successfully. Consideration is given to the undergraduate record, any previous graduate work, professional work experience, and reference letters.

Requirements

Degree Requirements
Total credits: 30

All MS students must develop a faculty-approved plan of study with a minimum of 30 graduate credits. These credits include two core courses (CEIE 601 Infrastructure Modeling and CEIE 605 Risk and Uncertainty in Civil Engineering), specific requirements of a concentration declared by the student, and seminar requirement (CEIE 795 Civil and Infrastructure Engineering Seminar).

Plan of Study
Students are responsible for developing and receiving advisor approval on a plan of study no later than the end of their second semester of study. Courses taken without prior approval by the faculty advisor may not be accepted for credit toward the degree. No more than three courses used for credit toward the MS may be cross-listed as undergraduate courses. None may repeat material completed as part of the student’s previous studies. Most MS courses are offered on a two-semester or three-semester rotation.

Core Courses
All MS students must complete the following two core courses, preferably within the first 12 credit hours of their MS studies. These courses provide a common background for understanding the breadth and complexity of civil and infrastructure engineering and for analyzing and solving engineering problems.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEIE 601</td>
<td>Infrastructure Modeling</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 605</td>
<td>Risk and Uncertainty in Civil Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Total Credits</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

Concentration in Construction Engineering and Management (CEM)

Select at least three from the following five construction engineering and management core courses:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEIE 571</td>
<td>Construction Administration</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 572</td>
<td>Building Information Modeling</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 573</td>
<td>Legal Aspects of the Construction Process</td>
<td></td>
</tr>
<tr>
<td>CEIE 575</td>
<td>Design for Constructability</td>
<td></td>
</tr>
<tr>
<td>CEIE 576</td>
<td>Construction Cost Estimating</td>
<td>1</td>
</tr>
<tr>
<td>Total Credits</td>
<td></td>
<td>9</td>
</tr>
</tbody>
</table>

Electives
A list of approved electives for the construction engineering and management concentration is provided below. Note that the remaining construction engineering and management core courses can also be selected as electives.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEIE 501</td>
<td>Sustainable Development</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 524</td>
<td>Introduction to Bridge Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 525</td>
<td>Structural Evaluation and Rehabilitation</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 531</td>
<td>Earth Retaining Structures and Slope Stability</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 532</td>
<td>Foundation Design</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 574</td>
<td>Construction Computer Application and Informatics</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 578</td>
<td>Construction Planning and Scheduling</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 607</td>
<td>Public Infrastructure Management and Finance</td>
<td>3</td>
</tr>
</tbody>
</table>
Concentration in Environmental and Water Resources Engineering (EWRE)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEIE 557</td>
<td>Remote Monitoring Techniques for Civil Engineering Applications</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 641</td>
<td>Water Resources Engineering I: Principles and Practice</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 642</td>
<td>Flood Hazards Engineering</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 658</td>
<td>Water Quality</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 742</td>
<td>Water Resources Engineering II: Water Resource Systems</td>
<td>1</td>
</tr>
</tbody>
</table>

Total Credits: 9

Electives

A list of approved electives for the environmental and water resources engineering concentration is provided below. Note that the remaining environmental and water resources engineering core courses can also be selected as electives.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEIE 540</td>
<td>Water Supply and Distribution</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 542</td>
<td>Open Channel Flow</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 550</td>
<td>Environmental Engineering Systems</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 553</td>
<td>Water and Wastewater Treatment Processes</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 607</td>
<td>Public Infrastructure Management and Finance</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 634</td>
<td>Geoenvironmental Design</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 643</td>
<td>Coastal Flood Hazards</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 649</td>
<td>Special Topics in Water Resources Engineering</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 657</td>
<td>Environmental Engineering Microbiology</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 659</td>
<td>Hazardous Waste</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 664</td>
<td>Transportation Engineering and the Environment</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 683</td>
<td>Water and Wastewater Systems Security</td>
<td>1</td>
</tr>
<tr>
<td>COMM 637</td>
<td>Risk Communication</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 627</td>
<td>Aquatic Environmental Chemistry</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 651</td>
<td>Environmental Chemistry of Organic Substances</td>
<td>1</td>
</tr>
<tr>
<td>CSI 501</td>
<td>Introduction to Scientific Programming</td>
<td>1</td>
</tr>
<tr>
<td>CSI 690</td>
<td>Numerical Methods</td>
<td>1</td>
</tr>
<tr>
<td>CSI 720</td>
<td>Fluid Mechanics</td>
<td>1</td>
</tr>
<tr>
<td>CSI 721</td>
<td>Computational Fluid Dynamics I</td>
<td>1</td>
</tr>
</tbody>
</table>

Total Credits: 9

Concentration in Geotechnical Engineering (GEOE)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEIE 531</td>
<td>Earth Retaining Structures and Slope Stability</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 634</td>
<td>Geoenvironmental Design</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 635</td>
<td>Advanced Soil Mechanics</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 636</td>
<td>Sources of Geotechnical Data</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 638</td>
<td>Advanced Foundation Design</td>
<td>1</td>
</tr>
</tbody>
</table>

Total Credits: 9

Electives

A list of approved electives for the geotechnical engineering concentration is provided below. Note that the remaining geotechnical engineering core courses can also be selected as electives.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEIE 524</td>
<td>Introduction to Bridge Engineering</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 532</td>
<td>Foundation Design</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 535</td>
<td>Geotechnical Engineering</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 573</td>
<td>Legal Aspects of the Construction Process</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 575</td>
<td>Design for Constructability</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 607</td>
<td>Public Infrastructure Management and Finance</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 637</td>
<td>Tunneling and Ground Improvement</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 639</td>
<td>Special Topics in Geotechnical Engineering</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 659</td>
<td>Hazardous Waste</td>
<td>1</td>
</tr>
<tr>
<td>GGS 553</td>
<td>Geographic Information Systems</td>
<td>1</td>
</tr>
</tbody>
</table>

Total Credits: 9

Concentration in Structural Engineering (STRE)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEIE 526</td>
<td>Structural Steel Design II</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 527</td>
<td>Pre-stressed Concrete</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 611</td>
<td>Structural Analysis II</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 612</td>
<td>Mechanics of Materials II</td>
<td>1</td>
</tr>
<tr>
<td>CEIE 613</td>
<td>Structural Dynamics</td>
<td>1</td>
</tr>
</tbody>
</table>

Total Credits: 9
Electives
A list of approved electives for the structural engineering concentration is provided below. Note that the remaining structural engineering core courses can also be selected as electives.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEIE 512</td>
<td>Structural Steel Design ¹</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 513</td>
<td>Reinforced Concrete Design ¹</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 524</td>
<td>Introduction to Bridge Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 525</td>
<td>Structural Evaluation and Rehabilitation</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 532</td>
<td>Foundation Design ¹</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 575</td>
<td>Design for Constructability</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 607</td>
<td>Public Infrastructure Management and Finance</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 619</td>
<td>Special Topics in Structural Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 620</td>
<td>Intelligent Systems in Civil Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 623</td>
<td>Reinforced Concrete Design II</td>
<td>3</td>
</tr>
<tr>
<td>CSI 690</td>
<td>Numerical Methods</td>
<td>3</td>
</tr>
<tr>
<td>CSI 742</td>
<td>The Mathematics of the Finite Element Method</td>
<td>3</td>
</tr>
</tbody>
</table>

¹ Cross-lists with an undergraduate course

Concentration in Transportation Engineering (TRNE)
Select at least three of the following five transportation engineering core courses:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEIE 662</td>
<td>Travel Demand Modeling</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 663</td>
<td>Intelligent Transportation Systems</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 664</td>
<td>Transportation Engineering and the Environment</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 767</td>
<td>Traffic Engineering Modeling and Analysis</td>
<td>3</td>
</tr>
<tr>
<td>STAT 554</td>
<td>Applied Statistics I</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credits 9

Electives
A list of approved electives for the transportation engineering concentration is provided below. Note that the remaining transportation engineering core courses can also be selected as electives.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEIE 560</td>
<td>Public Transportation Systems</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 561</td>
<td>Traffic Engineering ¹</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 562</td>
<td>Urban Transportation Planning ¹</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 607</td>
<td>Public Infrastructure Management and Finance</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 665</td>
<td>Travel Survey Methods and Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 667</td>
<td>Multi-modal Transportation Systems</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 668</td>
<td>Transportation Economics</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 669</td>
<td>Special Topics in Transportation Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 762</td>
<td>Network Models for Transportation Planning</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 763</td>
<td>Discrete Choice Analysis in Transportation</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 504</td>
<td>Principles of Data Management and Mining</td>
<td>3</td>
</tr>
<tr>
<td>GGS 553</td>
<td>Geographic Information Systems</td>
<td>3</td>
</tr>
</tbody>
</table>

¹ Cross-lists with an undergraduate course

Note:
For all concentrations, electives outside of the chosen concentration can only be taken or substituted with the approval of the faculty advisor or the department.

Project or Thesis Option
Students, with the consent of a faculty advisor and departmental approval, may be approved to complete a project or thesis.

Research Project
Students complete CEIE 798 Research Project in Civil Engineering, during which they prepare and present a scholarly paper. The scholarly paper is a technical report on an independent study, laboratory or computer experimentation, or literature search on a current civil and infrastructure engineering topic selected with approval of a faculty advisor. CEIE 798 Research Project in Civil Engineering credits count toward elective credit hours required for the MS degree.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEIE 798</td>
<td>Research Project in Civil Engineering</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credits 3

Master's Thesis
Students complete CEIE 799 Master’s Thesis which counts toward the 30 credit hours required for the MS degree. The MS thesis should reflect a significant, independent research effort that advances engineering science, and is worthy of publication. The work is conducted with the approval of a faculty thesis advisor, and the final written thesis and oral defense are defended before a three-member faculty committee. The thesis is recommended for those students who wish to develop and document their research skills, or contemplate subsequent enrollment in a PhD program. Students are advised of the university’s continuous registration requirement for thesis and dissertation research credits. Upon first enrolling in CEIE 799 Master’s Thesis, the student must continue registration for each fall and spring semester until the thesis is successfully completed. CEIE 799 Master’s Thesis credits count toward elective credit hours required for the MS degree.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEIE 799</td>
<td>Master’s Thesis (must complete 6 credits)</td>
<td>1-6</td>
</tr>
</tbody>
</table>

Total Credits 1-6

Seminar Requirement
All degree candidates must attend a minimum of five graduate seminars approved by the CEIE Department for the degree program. Students must enroll in CEIE 795 Civil and Infrastructure Engineering Seminar and receive a satisfactory (S) grade by their final semester. This course is used to verify the seminar attendance requirement and is repeatable. Continuous enrollment every semester is encouraged for attendance tracking and for dissemination of seminar information but is not required.
Civil and Infrastructure Engineering, BS/ Civil and Infrastructure Engineering, Accelerated MS

Overview
Highly-qualified students in the Civil and Infrastructure Engineering, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/civil-environmental-infrastructure/civil-infrastructure-engineering-bs/) have the option of obtaining an accelerated Civil and Infrastructure Engineering, MS.

See AP.6.7 Bachelor's/Accelerated Master's Degrees (http://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7) for policies related to this program.

Students in an accelerated degree program must fulfill all university requirements for the master's degree. For policies governing all graduate degrees, see AP.6 Graduate Policies (http://catalog.gmu.edu/policies/academic/graduate-policies/).

Admission Requirements
Students in the Civil and Infrastructure Engineering, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/civil-environmental-infrastructure/civil-infrastructure-engineering-bs/) program may apply to this option if they have earned 60 undergraduate credits with an overall GPA of at least 3.30. All other criteria for admission are identical to criteria for admission into the Civil and Infrastructure Engineering, MS program.

Students who are accepted into the BAM Pathway will be allowed to register for graduate level courses after successful completion of a minimum of 75 undergraduate credits and course-specific pre-requisites.

Accelerated Option Requirements
Students register for up to 12 credits of overlapping graduate level courses in place of undergraduate technical elective courses.

Students are encouraged to take up to four of the following courses, based on their chosen concentration area in the master's program:

Concentration in Construction Engineering and Management (CEM)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>CEIE 751</td>
<td>Construction Administration</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 572</td>
<td>Building Information Modeling</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 573</td>
<td>Legal Aspects of the Construction Process</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 575</td>
<td>Design for Constructability</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 576</td>
<td>Construction Cost Estimating</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credits 0

Concentration in Environmental and Water Resources Engineering (EWRE)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEIE 540</td>
<td>Water Supply and Distribution</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 542</td>
<td>Open Channel Flow</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 550</td>
<td>Environmental Engineering Systems</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 553</td>
<td>Water and Wastewater Treatment</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 557</td>
<td>Remote Monitoring Techniques for Civil Engineering Applications</td>
<td>3</td>
</tr>
</tbody>
</table>

Concentration in Geotechnical Engineering (GEOE)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEIE 501</td>
<td>Sustainable Development</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 524</td>
<td>Introduction to Bridge Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 531</td>
<td>Earth Retaining Structures and Slope Stability</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 532</td>
<td>Foundation Design</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 535</td>
<td>Engineering Geology</td>
<td>3</td>
</tr>
</tbody>
</table>

Concentration in Structural Engineering (STRE)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEIE 512</td>
<td>Structural Steel Design</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 513</td>
<td>Reinforced Concrete Design</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 524</td>
<td>Introduction to Bridge Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 525</td>
<td>Structural Evaluation and Rehabilitation</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 532</td>
<td>Foundation Design</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 575</td>
<td>Design for Constructability</td>
<td>3</td>
</tr>
</tbody>
</table>

Concentration in Transportation Engineering (TRNE)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEIE 560</td>
<td>Public Transportation Systems</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 561</td>
<td>Traffic Engineering</td>
<td>3</td>
</tr>
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<td>CEIE 562</td>
<td>Urban Transportation Planning</td>
<td>3</td>
</tr>
<tr>
<td>STAT 544</td>
<td>Applied Probability</td>
<td>3</td>
</tr>
</tbody>
</table>

While still in undergraduate status, a maximum of 6 additional graduate credits may be taken as reserve graduate credit and applied to the master's program from the list below. Reserve graduate credits do not apply to the undergraduate degree.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEIE 601</td>
<td>Infrastructure Modeling</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 605</td>
<td>Risk and Uncertainty in Civil Engineering</td>
<td>3</td>
</tr>
</tbody>
</table>

Degree Requirements
Students must complete all credits that satisfy requirements for both the BS and MS programs. Up to four courses (12 credits) of approved master's level courses taken as part of the undergraduate degree may be applied to the graduate degree. The courses selected for this purpose must be approved by the academic advisors of both the BS and MS programs, and students must have satisfactory performance (grade of 'B' or better) in each of the graduate courses intended to be applied towards the MS degree.
**Degree Conferral**

Students must apply the semester before they expect to complete the BS requirements to have the BS degree conferred. In addition, at the beginning of the student’s final undergraduate semester, students must complete a Bachelor’s/Accelerated Master’s Transition Form (https://registrar.gmu.edu/wp-content/uploads/BAM-Faculties-Accelerated-Masters-June21.pdf). At the completion of MS requirements, a master’s degree is conferred.

**Mechanical Engineering, BS/Civil and Infrastructure Engineering, Accelerated MS**

**Overview**

Highly-qualified undergraduates may be admitted to the bachelor’s/accelerated master’s program and obtain a Mechanical Engineering, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/mechanical/mechanical-engineering-bs/) and a Civil and Infrastructure Engineering, MS in an accelerated time-frame after satisfactory completion of a minimum of 139 credits.

See AP6.7 Bachelor’s/Accelerated Master’s Degrees (https://catalog.gmu.edu/policies/academic/graduate-policies/#ap-6-7) for policies related to this program.

Students in an accelerated degree program must fulfill all university requirements for the master’s degree. For policies governing all graduate degrees, see AP6 Graduate Policies (http://catalog.gmu.edu/policies/academic/graduate-policies/).

**Admission Requirements**

Students in the Mechanical Engineering, BS (http://catalog.gmu.edu/colleges-schools/engineering-computing/engineering/mechanical/mechanical-engineering-bs/) program may apply to this option if they have earned 60 undergraduate credits with an overall GPA of at least 3.30. All other criteria for admission are identical to criteria for admission into the Civil and Infrastructure Engineering, MS program.

Students who are accepted into the BAM Pathway will be allowed to register for graduate level courses after successful completion of a minimum of 75 undergraduate credits and course-specific pre-requisites.

**Accelerated Option Requirements**

Students must complete all credits that satisfy requirements for both the BS and MS programs. Students register for up to 12 credits of overlapping graduate level courses in place of undergraduate technical elective courses.

Students are encouraged to take up to four of the following courses, based on their chosen concentration area in the master’s program:

**Concentration in Construction Engineering and Management (CEM)**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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</tr>
</thead>
<tbody>
<tr>
<td>CEIE 571</td>
<td>Construction Administration</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 572</td>
<td>Building Information Modeling</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 573</td>
<td>Legal Aspects of the Construction Process</td>
<td>3</td>
</tr>
</tbody>
</table>

**Concentration in Environmental and Water Resources Engineering (EWRE)**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
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</tr>
</thead>
<tbody>
<tr>
<td>CEIE 540</td>
<td>Water Supply and Distribution</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 542</td>
<td>Open Channel Flow</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 550</td>
<td>Environmental Engineering Systems</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 553</td>
<td>Water and Wastewater Treatment Processes</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 557</td>
<td>Remote Monitoring Techniques for Civil Engineering Applications</td>
<td>3</td>
</tr>
</tbody>
</table>

**Concentration in Geotechnical Engineering (GEOE)**

<table>
<thead>
<tr>
<th>Code</th>
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</tr>
</thead>
<tbody>
<tr>
<td>CEIE 501</td>
<td>Sustainable Development</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 524</td>
<td>Introduction to Bridge Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 531</td>
<td>Earth Retaining Structures and Slope Stability</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 532</td>
<td>Foundation Design</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 535</td>
<td>Engineering Geology</td>
<td>3</td>
</tr>
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**Concentration in Structural Engineering (STRE)**

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<tbody>
<tr>
<td>CEIE 512</td>
<td>Structural Steel Design</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 513</td>
<td>Reinforced Concrete Design</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 525</td>
<td>Structural Evaluation and Rehabilitation</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 532</td>
<td>Foundation Design</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 575</td>
<td>Design for Constructability</td>
<td>3</td>
</tr>
</tbody>
</table>

**Concentration in Transportation Engineering (TRNE)**

<table>
<thead>
<tr>
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</thead>
<tbody>
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<td>Public Transportation Systems</td>
<td>3</td>
</tr>
<tr>
<td>CEIE 561</td>
<td>Traffic Engineering</td>
<td>3</td>
</tr>
<tr>
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Students also have the option of taking the following one or two additional graduate-level courses for reserve that will only count for the graduate degree program:

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**Degree Conferral**

Students must apply the semester before they expect to complete the BS requirements to have the BS degree conferred. In addition, at the beginning of the student’s final undergraduate semester, students must complete a Bachelor’s/Accelerated Master’s Transition form. At the completion of MS requirements, a master’s degree is conferred.

**Advising & Plan of Study**

Each student is assigned a faculty advisor upon acceptance. Students must meet with their advisors during their first semester and design an
approved plan of study. Students are encouraged to seek out their advisor when questions arise and when their plan of study needs to be revised.

Students must have a working background in their selected concentration area. A student lacking these foundations may be required to take one or more foundation courses.