# MS Degree Course Requirement

## Department of Civil and Environmental Engineering

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Course Number</th>
<th># Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MANDATORY COURSEWORK</strong></td>
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<tr>
<td><strong>Graduate Core Courses:</strong></td>
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<tr>
<td>• Minimum Core Course requirements are determined by the Technical Area.</td>
<td>1.</td>
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<td>• See page 2 for a list of core courses by Technical Area</td>
<td>2.</td>
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<td>3.</td>
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<td>4.</td>
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<td>5.</td>
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<td><strong>Total Core Credits:</strong></td>
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<tr>
<td><strong>Graduate Technical Elective Courses:</strong></td>
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<td>• Students may select other courses from their Technical Area or ENCE as Technical Electives with advisor approval.</td>
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<td>• Courses outside of ENCE must be pre-approved by their advisor.</td>
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<td>6.</td>
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<td><strong>Total Technical Credits:</strong></td>
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<tr>
<td><strong>Additional Course Requirements and Electives</strong></td>
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<td><strong>400-level Courses:</strong></td>
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<tr>
<td>• No more than 6 credits at the 400-level may be included.</td>
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<td>• Transfer courses count as 400-level.</td>
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<td>• Maximum 6 credits transferred graduate coursework.</td>
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<td><strong>Total 400 Credits (no more than 6):</strong></td>
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<tr>
<td><strong>Graduate Master’s Thesis:</strong></td>
<td>ENCE799</td>
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<td>• MS Thesis students must take a minimum of 6 credits of ENCE799: Master’s Thesis Research</td>
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<td><strong>Total Credits (minimum of 6):</strong></td>
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<td></td>
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<tr>
<td><strong>Total MS credits:</strong></td>
<td>30</td>
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</table>

### Additional Requirements:

- All **MS Non-Thesis** students must complete a Scholarly Paper and Comprehensive Exam.
- All **MS Thesis** students must successfully defend their thesis and complete a Comprehensive Exam.
- A minimum overall GPA of 3.0 must be maintained.
- Courses taken at UMD must be no more than 5 years old at the time of graduation and transfer courses no more than 7 years old.
Required Courses by Technical Area

**Civil Systems Required Core Courses**

All Civil Systems students must take one course in each of the following areas:

1. **Systems**: ENSE 621: Systems Modeling and Design or ENSE 622: Systems Requirements, Design and Tradeoff Analysis
2. **Operations Research/Optimization**: ENCE 603: Management Science Applications in Project Management or ENCE 677: OR Models for Transportation Systems Analysis
3. **Sensing and Control**: ENCE 688A: Sensing and Control Systems

**Environmental Required Core Courses**

1. ENCE 650: Process Dynamics of Environmental Systems
2. ENCE 651: Chemistry of Natural Waves
3. ENCE 637: Biological Principles of Environmental Engineering

**Geotechnical Required Core Courses**

Geotechnical Students must select from Geotechnical course offerings in consultation with their advisor.

**Project Management Required Core Courses**

1. ENCE 627: Project Risk Management
2. ENCE 661: Project Cost Accounting and Finance
3. ENCE 662: Introduction to Project Management
4. ENCE 664: Legal Aspects of Engineering Design and Construction
5. ENCE 665: Management of Project Teams

**Structures Required Core Courses**

Structures students must select from Structures course offerings in consultation with their advisor.

**Transportation Required Core Courses**

Transportation students must select from Transportation course offerings in consultation with their advisor.

**Water Resources Required Core Courses**

1. ENCE 431: Hydrologic Engineering
2. ENCE 630: Environmental and Water Resources Systems I