CIVIL ENGINEERING, M.S.

Degree Requirements (30 Hours)

For the M.S. degree, 30 credit hours, of which 6 credit hours must be ECIV 799, are required. At least 12 hours of course work must be 700-level or higher. Up to 12 credit hours of course work may be taken outside of the department for degree credit with the approval of the student’s advisor and the graduate director. Prescribed core courses are required for each area of study (see “Core Courses” below). A maximum of 6 credits of ECIV 797 may be used toward the student’s program of study.

Credits earned in ECIV 798 do not count toward a student’s program of study.

Core Courses

Each area of specialization has specific graduate core course requirements that are presented in the tables below. These requirements are designed to provide opportunities for cross-disciplinary programs of study that require breadth and flexibility beyond classical courses offered for a given area of specialization, and that may better reflect the student’s personal research and career interests. This can be achieved by allowing to substitute one additional core course with any USC graduate (500-level or higher) course, subject to the approval of the student’s advisor and ECIV graduate director through the program of study (MPOS) form.

Environmental Engineering (12 hours)

Course | Title | Credits
--- | --- | ---
ECIV 750 | Principles of Environmental Engineering Process | 3
Select three of the following: | | 9
ECIV 502 | Life Cycle Assessment of Engineered Systems | 
ECIV 555 | Principles of Municipal Solid Waste Engineering | 
ECIV 556 | Air Pollution Control Engineering | 
ECIV 558 | Environmental Engineering Process Modeling | 
ECIV 590 | Intermediate Special Topics | 
ECIV 751 | Water and Wastewater Treatment Theory I | 
ECIV 752 | Water and Wastewater Treatment Theory II | 
ECIV 753 | Unit Operations Laboratory for Water and Wastewater Treatment | 
ECIV 755 | Industrial Wastewater Treatment | 
ECIV 790 | Selected Topics in Civil Engineering | 
Select one USC graduate (500-level or higher) course | | 6
Total Credit Hours | | 12

* To be approved by student’s advisor and ECIV graduate director through program of study (MPOS) form.

Structural Engineering (12 hours)

Course | Title | Credits
--- | --- | ---
ECIV 730 | Advanced Soil Mechanics | 3
Select three of the following: | | 9
ECIV 590 | Intermediate Special Topics | 
ECIV 731 | Slope Stability, Retaining Systems and Lateral Earth Pressure | 
ECIV 732 | Theoretical and Numerical Methods in Geomechanics | 
ECIV 733 | Physico-chemical Properties of Soils | 

Total Credit Hours | | 12

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Railway Engineering (12 hours)

Course | Title | Credits
--- | --- | ---
Select two of the following "Fundamental" core courses: | | 6
ECIV 580 | Railway Engineering I | 
ECIV 582 | Operation and Logistics of Railway Systems | 
ECIV 588 | Design of Railway Bridges and Structures | 
ECIV 590 | Intermediate Special Topics | 
Select one "Advanced" core course | | 3
Select one of the following "Cross-Disciplinary" core courses: | | 3
ECIV 707 | Management of Engineering Projects | 
ECIV 724 | Dynamics of Structures | 
ECIV 734 | Soil Dynamics and Geotechnical Earthquake Engineering | 
ECIV 784 | Dynamic Analysis of Railway Systems | 
ECIV 789 | Design Project in Railway Engineering | 
ECIV 790 | Selected Topics in Civil Engineering | 
Select one of the following "Advanced" core courses: | | 3
Select one Geotechnical Engineering core course | | 3
Select one Environmental Engineering core course | | 3
Select one Structural Engineering core course | | 3
Select one Transportation Engineering core course | | 3
Select one Water Resources Engineering core course | | 3
Select one USC graduate (500-level or higher) course | | 6
Total Credit Hours | | 12

** Applies to PhD students with MS/ME degree only. May be taken for either "Fundamental" core course credit, or "Advanced" or "Cross-Disciplinary" core course credit, not both.

Geotechnical Engineering (12 hours)

Course | Title | Credits
--- | --- | ---
ECIV 734 | Soil Dynamics and Geotechnical Earthquake Engineering | 
ECIV 736 | Ground Improvement Techniques | 
ECIV 737 | Advanced Foundation Design | 
ECIV 790 | Selected Topics in Civil Engineering | 
Select one USC graduate (500-level or higher) course | | 6
Total Credit Hours | | 12

* To be approved by student’s advisor and ECIV graduate director through program of study (MPOS) form.

Intermediate Special Topics

**


**Civil Engineering, M.S.**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECIV 728</td>
<td>Prestressed Concrete Analysis and Design</td>
<td></td>
</tr>
<tr>
<td>ECIV 737</td>
<td>Advanced Foundation Design</td>
<td></td>
</tr>
<tr>
<td>ECIV 790</td>
<td>Selected Topics in Civil Engineering *</td>
<td></td>
</tr>
</tbody>
</table>

Select one USC graduate (500-level or higher) course *

**Total Credit Hours** 12

* To be approved by student's advisor and ECIV graduate director through program of study (MPOS) form.

**Transportation Engineering (12 hours)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select one of the following:</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>ECIV 535</td>
<td>Geotechnical Engineering in Transportation</td>
<td></td>
</tr>
<tr>
<td>ECIV 540</td>
<td>Transportation Systems Planning</td>
<td></td>
</tr>
<tr>
<td>ECIV 541</td>
<td>Highway Design</td>
<td></td>
</tr>
</tbody>
</table>

Select one of the following: 3

| ECIV 542 | Traffic Engineering                          |         |
| ECIV 748 | Traffic Flow Theory                          |         |

Select one of the following: 3

| ECIV 705 | Deterministic Civil and Environmental Systems Engineering |         |
| ECIV 706 | Probabilistic Civil and Environmental Systems Engineering |         |

Select one of the following: 3

| ECIV 590 | Intermediate Special Topics *                |         |
| ECIV 790 | Selected Topics in Civil Engineering *       |         |

Select one USC graduate (500-level or higher) course *

**Total Credit Hours** 12

* To be approved by student's advisor and ECIV graduate director through program of study (MPOS) form.

**Water Resources Engineering (12 hours)**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select up to one of the following:</td>
<td>0-3</td>
<td></td>
</tr>
<tr>
<td>ECIV 560</td>
<td>Open Channel Hydraulics</td>
<td></td>
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<tr>
<td>ECIV 562</td>
<td>Engineering Hydrology</td>
<td></td>
</tr>
<tr>
<td>ECIV 563</td>
<td>Subsurface Hydrology</td>
<td></td>
</tr>
<tr>
<td>ECIV 590</td>
<td>Intermediate Special Topics *</td>
<td></td>
</tr>
</tbody>
</table>

Select at least two of the following: 6-12

| ECIV 760 | Computational Hydraulics                      |         |
| ECIV 761 | Numerical Methods in Subsurface Hydrology     |         |
| ECIV 762 | Advanced Hydrology                            |         |
| ECIV 763 | Unsaturated Flow Theory                       |         |
| ECIV 764 | Contaminant Transport                         |         |
| ECIV 765 | Erosion and Sediment Control                  |         |
| ECIV 766 | Fluid Transients                              |         |
| ECIV 767 | Sediment Transport and River Mechanics        |         |
| ECIV 790 | Selected Topics in Civil Engineering *        |         |

Select up to one of the following: 0-3

Select one USC graduate (500-level or higher) course *

**Total Credit Hours** 12

* To be approved by student's advisor and ECIV graduate director through program of study (MPOS) form.