# Civil Engineering (MS)

## Master of Science Degree Requirements

Students may choose from the specializations below to complete coursework within a focus area.

Degrees earned will be distributed as: “Master of Science in Civil Engineering” without specialization specifications.

## Computing & Systems Specialization

- Select at least five courses in the CE department

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tbody>
<tr>
<td>CE 536</td>
<td>Introduction to Numerical Methods for Civil Engineers</td>
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<tr>
<td>CE 537</td>
<td>Computer Methods and Applications</td>
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<tr>
<td>CE 591</td>
<td>Special Topics in Civil Engineering Computing</td>
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<tr>
<td>CE 737</td>
<td>Computer-Aided Engineering Systems</td>
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<tr>
<td>CE 791</td>
<td>Advanced Topics in Civil Engineering Computing (High performance computer modeling)</td>
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<tr>
<td>CE 791</td>
<td>Advanced Topics in Civil Engineering Computing (Evolutionary computation)</td>
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<tr>
<td>CE 791</td>
<td>Advanced Topics in Civil Engineering Computing (Inverse modeling)</td>
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<td>Advanced Topics in Civil Engineering Computing (Advanced methods for systems analysis)</td>
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<tr>
<td>CE 7XX</td>
<td>Complex adaptive systems analysis</td>
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**Electives 1**

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<td>CE 775</td>
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<tr>
<td>CE 776</td>
<td>Advanced Water Management Systems</td>
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<tr>
<td>CE 796</td>
<td>Advanced Topics in Water Resource and Environmental Engineering (Stochastic Methods)</td>
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<td>CE 724</td>
<td>Probabilistic Methods Of Structural Engineering</td>
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<tr>
<td>CE 721</td>
<td>Matrix and Finite Element Structural Analysis</td>
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**Electives 2**

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<tr>
<td>ISE 501</td>
<td>Introduction to Operations Research</td>
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<tr>
<td>MA/ISE 505</td>
<td>Linear Programming</td>
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<tr>
<td>ISE 708</td>
<td>Integer Programming</td>
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<tr>
<td>ISE 709</td>
<td>Dynamic Programming</td>
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<tr>
<td>ISE 712</td>
<td>Bayesian Decision Analysis For Engineers and Managers</td>
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<tr>
<td>MA 501</td>
<td>Advanced Mathematics for Engineers and Scientists I</td>
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<td>MA 502</td>
<td>Advanced Mathematics for Engineers and Scientists II</td>
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<td>MA/CSC 580</td>
<td>Numerical Analysis I</td>
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<td>MA/CSC 583</td>
<td>Introduction to Parallel Computing</td>
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<td>MA 584</td>
<td>Numerical Solution of Partial Differential Equations--Finite Difference Methods</td>
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<tr>
<td>MA 587</td>
<td>Numerical Solution of Partial Differential Equations--Finite Element Method</td>
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<td>MA/ST 706</td>
<td>Nonlinear Programming</td>
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### Thesis Research

<table>
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<tbody>
<tr>
<td>CE 695</td>
<td>Master's Thesis Research</td>
<td>3-6</td>
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</table>

Total Hours: 66-69

1. Other relevant departmental courses
2. Other recommended courses

### Construction Engineering Specialization

- Select a minimum of seven courses CON XXX 21
- Select one of the following: 3

<table>
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<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
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<tr>
<td>CON XXX</td>
<td>Introduction to Numerical Methods for Civil Engineers</td>
<td>3</td>
</tr>
<tr>
<td>CE 536</td>
<td>Computer Methods and Applications</td>
<td>3</td>
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<tr>
<td>CE 592</td>
<td>Special Topics in Construction Engineering</td>
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<tr>
<td>CE 522</td>
<td>Theory and Design Of Prestressed Concrete</td>
<td>3</td>
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<tr>
<td>CE 523</td>
<td>Theory and Behavior Of Steel Structures</td>
<td>3</td>
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<tr>
<td>CE 524</td>
<td>Analysis and Design Of Masonry Structures</td>
<td>3</td>
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<tr>
<td>CE 528</td>
<td>Structural Design In Wood</td>
<td>3</td>
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<tr>
<td>CE 548</td>
<td>Engineering Properties Of Soils I</td>
<td>3</td>
</tr>
<tr>
<td>CE 590</td>
<td>Special Topics In Civil Engineering</td>
<td>3</td>
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<tr>
<td>ISE 501</td>
<td>Introduction to Operations Research</td>
<td>3</td>
</tr>
<tr>
<td>ISE 510</td>
<td>Applied Engineering Economy</td>
<td>3</td>
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<tr>
<td>ISE 562</td>
<td>Simulation Modeling</td>
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<tr>
<td>ST 515</td>
<td>Experimental Statistics for Engineers I</td>
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<tr>
<td>ST 516</td>
<td>Experimental Statistics For Engineers II</td>
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<tr>
<td>EGR 590</td>
<td>Special Topics in Engineering</td>
<td>3</td>
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<tr>
<td>CE 675</td>
<td>Civil Engineering Projects (3 hours maximum)</td>
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<td>Master's Thesis Research</td>
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Total Hours: 33

### Environmental, Water Resources, and Coastal Engineering Specialization

- 30 graduate-level credit hours

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<tr>
<td>CE 607</td>
<td>Water Resource and Environmental Engineering Seminar</td>
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<tr>
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<td>Master's Thesis Research</td>
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Total Hours: 2-7
Geotechnical and Geoenvironmental Engineering Specialization

- 30 graduate-level credit hours

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<th>Title</th>
<th>Hours</th>
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Total Hours 6

Mechanics and Materials Specialization

- 30 graduate-level credit hours

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Total Hours 1-6

Structural Engineering and Mechanics Specialization

Core Courses

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<tbody>
<tr>
<td>CE 515</td>
<td>Advanced Strength of Materials</td>
<td>3</td>
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<tr>
<td>CE 526</td>
<td>Finite Element Method in Structural Engineering</td>
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<tr>
<td>CE 527</td>
<td>Structural Dynamics</td>
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Select one of the following SEM Behavior and Design courses: 3

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<tbody>
<tr>
<td>CE 522</td>
<td>Theory and Design Of Prestressed Concrete</td>
<td>3</td>
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<tr>
<td>CE 523</td>
<td>Theory and Behavior Of Steel Structures</td>
<td>3</td>
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<tr>
<td>CE 524</td>
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<tr>
<td>CE 528</td>
<td>Structural Design in Wood</td>
<td>3</td>
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<tr>
<td>CE 529</td>
<td>FRP Strengthening and Repair of Concrete Structures</td>
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<tr>
<td>CE 726</td>
<td>Advanced Theory Of Concrete Structures</td>
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<tr>
<td>CE 794</td>
<td>Advanced Topics in Structures and Mechanics</td>
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Select two of the following additional SEM courses: 6

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<td>CE 721</td>
<td>Matrix and Finite Element Structural Analysis</td>
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<tr>
<td>CE 530</td>
<td>Properties of Concrete and Advanced Cement-Based Composites</td>
<td>3</td>
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<tr>
<td>CE 714</td>
<td>Stress Waves</td>
<td>3</td>
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<tr>
<td>CE 718</td>
<td>Constitutive Modeling of Engineering Materials</td>
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<td>CE 723</td>
<td>Advanced Structural Dynamics</td>
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<td>Probabilistic Methods Of Structural Engineering</td>
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Electives

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Total Hours 19-24

Electives

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<td>Advanced Topics in Structures and Mechanics</td>
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</table>
**Transportation Materials and Systems Specialization**

- 30-31 graduate credit hours
- 24/30 credits at 500-level or higher

<table>
<thead>
<tr>
<th>Code</th>
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<th>Hours</th>
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<tbody>
<tr>
<td>CE 501</td>
<td>Transportation Systems Engineering</td>
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<tr>
<td>CE 502</td>
<td>Traffic Operations</td>
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<td>CE 503</td>
<td>Highway Design</td>
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<tr>
<td>CE 504</td>
<td>Airport Planning and Design</td>
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<td>CE 506</td>
<td>Transportation Engineering Data Collection and Analysis</td>
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<td>CE 509</td>
<td>Highway Safety</td>
<td>3</td>
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<tr>
<td>CE 594</td>
<td>Special Topics in Structures and Mechanics (Nondestructive Testing)</td>
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<td>CE 595</td>
<td>Special Topics in Transportation Engineering (Asphalt/Bituminous Materials)</td>
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<td>Special Topics in Transportation Engineering (Sensors and Instrumentation)</td>
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<td>Special Topics in Transportation Engineering (Railroad Engineering)</td>
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<td>Special Topics in Transportation Engineering (Unconventional Intersection and Interchange Design)</td>
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<td>CE 701</td>
<td>Urban Transportation Planning</td>
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<td>CE 706</td>
<td>Advanced Traffic Control</td>
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<td>CE 707</td>
<td>Transportation Policy and Funding</td>
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<tr>
<td>CE 755</td>
<td>Highway Pavement Design</td>
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<td>CE 757</td>
<td>Pavement Management Systems</td>
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<td>CE 759</td>
<td>Inelastic Behavior Of Construction Materials</td>
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<tr>
<td>CE 795</td>
<td>Advanced Topics in Transportation Engineering (Transportation Economics)</td>
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<tr>
<td>CE 795</td>
<td>Advanced Topics in Transportation Engineering (Transportation Logistics)</td>
<td>1-3</td>
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</tbody>
</table>

**Thesis Research**
Select up to six credit hours 1-6

**Accelerated Bachelor's/Master's Degree Requirements**

**Faculty**

**Full Professors**

Sankarasubramanian Arumugam
Morton A. Barlaz
John W. Baugh Jr.
Emily Zechman Berglund
Francis Lajara De Los Reyes III
Joel Ducoste

Henry C. Frey
Mohammed Awad Gabr
Murthy N. Guddati
Abhinav Gupta
Tasnim Hassan
Edward J. Jaselskis
Youngsoo R. Kim
Detlef R. Knappe
Mervyn J. Kowalsky
George F. List
Min Liu
Gnanamanikam Mahinthakumar
James M. Nau
Margery F. Overton
Ranji Ranjithan
William John Rasdorf
Nagui M. Rouphail
Rudolf Seracino
Akhtarhusein A. Tayebali
Billy Merle Williams Jr.

**Associate Professors**

Cassandra Alison Castorena
Joseph F. DeCarolis
Joel Casey Dietrich
Andrew P. Grieshop
Jeremiah Johnson
Brina Mortensen Montoya
Mohammad Pour-Ghaz
Benjamin Shane Underwood

**Assistant Professors**

Alex Albert
Tarek Aziz
Eleni Bardaka
Ashly Margot Cabas Mijares
Douglas Franklin Call
Fernando Garcia Menendez
Ali Hajbabaie
Kook Han
Angela Rose Harris
Jordan Kern
Daniel R. Obenour
Jason Fredrick Patrick
Giorgio Talotti Proestos

Practice/Research/Teaching Professors

Florentino Banaag De La Cruz
Billy L. Edge
Meagan Kittle Autry
James William Levis
Gregory W. Lucier
Elizabeth J. Sciandone

Emeritus Faculty

Michael Amein
William L. Bingham
Robert C. Borden
Roy H. Borden
Earl Downey Brill Jr
Allen C. Chao
John F. Ely
John S. Fisher
Ajaya K. Gupta
John M. Hanson
Kerry S. Havner
Clinton L. Heimbach
Yasuyuki Horie
David West Johnston
Narendra P. Khosla
Michael Lloyd Leming
Vernon C. Matzen

Stephens W. Nunnally
M. Shamimir Rahman
Sami Rizkalla
J. C. Smith
John R. Stone
Chi C. Tung
Harvey E. Wahls
Paul Z. Zia

Adjunct Faculty

Amin Kamal Akhnoukh
Leta Huntsinger