### CIVIL ENGINEERING

#### Department of Civil and Environmental Engineering

**College of Engineering**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Description</th>
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<tr>
<td>221</td>
<td>Statics</td>
<td>Vector description of forces and moments. Two- and three-dimensional equilibrium of particles and rigid bodies. Analysis of trusses, frames, and machines. Coulomb friction.</td>
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<tr>
<td>271</td>
<td>Introduction to Civil Engineering</td>
<td>Fundamentals of open-channel flow. Rapidly and gradually varied nonuniform flow analysis. Confined flows past submerged bodies, in pipe networks, and in turbo machinery. Design applications.</td>
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<tr>
<td>280</td>
<td>Principles of Environmental Engineering and Science</td>
<td>Physical, chemical and biological processes related to environmental science and engineering. Environmental systems analysis with application to air, water, and soil. Analysis of environmental problems and development of engineering solutions.</td>
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<tr>
<td>321</td>
<td>Introduction to Fluid Mechanics</td>
<td>Hydrologic design of stormwater systems. Equilibrium hydrograph analysis, unit hydrographs, infiltration, hydrograph synthesis, and reservoir routing. Groundwater: Darcy's law, flow nets, well hydraulics, design of capture wells.</td>
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**Prerequisites:**
- Fall, Spring. 4(3-3) P: (ME 222 or concurrently) R: Open only to juniors or seniors in the Department of Civil and Environmental Engineering. Common civil engineering construction and paving materials: aggregates, inorganic cements, asphalts, concretes, wood, and steel. Composition, structure, physical and mechanical properties, tests, and production mix design.
- Transportation Engineering. Fall, Spring. 3(3-3) P: ((MTH 234 or concurrently) or (MTH 254H or concurrently) or (LB 220 or concurrently)) and ((CE 271 or concurrently) or (CE 271 or concurrently) R: Open to juniors or seniors in the Department of Civil and Environmental Engineering or in the Urban and Regional Planning major. SA: CE 346
- Applied Hydraulics. Spring. 3(2-3) Interdepartmental with Environmental Engineering. Administered by Civil Engineering. P: CE 321 or ME 332 R: Open to juniors or seniors or graduate students in the College of Engineering. Fundamentals of open-channel flow. Rapidly and gradually varied nonuniform flow analysis. Confined flows past submerged bodies, in pipe networks, and in turbo machinery. Design applications.
- Environmental Hydrology. Fall, Spring. 3(3-3) P: CE 337 R: Open to juniors or seniors or graduate students in the College of Engineering. Open only to juniors or seniors in the Department of Civil and Environmental Engineering.
- Pavement Design and Analysis I. Fall, Spring. 3(3-3) P: CE 337 R: Open to juniors or seniors or graduate students in the College of Engineering. Pavement Rehabilitation. Spring. 3(3-3) P: CE 337 RB: CE 431 R: Open to juniors or seniors or graduate students in the College of Engineering. pavement Rehabilitation. Network and project survey and evaluation: design of rigid and flexible overlays, other methods of rehabilitation, selection of rehabilitation alternatives. Initial and life cycle cost analysis of various rehabilitation alternatives.
- Principles of Traffic Engineering. Fall, Spring. 3(3-3) P: STT 351 and CE 341 R: Open to juniors or seniors or graduate students in the College of Engineering. Design of trip generation, trip distribution, modal split, and traffic assignment. Use of “quick-response” procedures. Traffic impact of new facilities.
- Highway Design. Fall, Spring. 3(3-3) P: CE 341 R: Open to juniors or seniors or graduate students in the College of Engineering. Design of highways. Operation, capacity, safety, and geometric features. Alignment, drainage and pavement design. Use of CAD systems in preparing contract plans.
Introduction to Risk and Reliability in Civil and Environmental Engineering
Fall. 1(1-0) Interdepartmental with Environmental Engineering. Administered by Civil Engineering. Not open to students with credit in CE 810.
Characterization of variability using probabilistic and statistical methods.

Reliability-Based Design in Civil Engineering
Fall of odd years. 2(2-0) Not open to students with credit in CE 810. C: CE 861 concurrently.
Probabilistic treatment of live and dead loads: earthquakes, floods, material properties, and capacity. Reliability basis of design specifications, reliability index, probability of failure, design for reliability, Reliability of engineering systems.

Applied Numerical Methods for Civil and Environmental Engineers
Spring. 1 credit. Not open to students with credit in ENE 801.
Computation, visualization and programming tasks in civil and environmental engineering.

Finite Element Method
Fall, Spring. 3(3-0) Interdepartmental with Mechanical Engineering. Administered by Mechanical Engineering. SA: AE 809, MSM 809
Theory and application of the finite element method to the solution of continuum type problems in heat transfer, fluid mechanics, and stress analysis.

Civil Engineering Seminar
Fall, Spring. 1(1-0) A student may earn a maximum of 2 credits in all enrollments for this course. RB: Graduate student or undergraduate at senior level with a GPA of 3.0 or higher.
Current research in civil engineering.

Independent Study in Civil Engineering
Fall, Spring. 1 to 4 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Open only to master's students in the Civil Engineering major. Approval of department.
Research problems of limited scope not pertaining to thesis accomplished under CE 899 or CE 999.

Selected Topics in Civil Engineering
Fall, Spring. Summer. 1 to 4 credits. A student may earn a maximum of 9 credits in all enrollments for this course.
Selected topics in new or developing areas of civil engineering.

Master's Research Project
Fall, Spring. Summer. 1 to 5 credits. A student may earn a maximum of 5 credits in all enrollments for this course. R: Open only to master's students in the Civil Engineering major. Approval of department.
Master's degree Plan B individual student research project. Original research, research replication, or survey and reporting on a research topic.

Master's Design Project
Fall, Spring. Summer. 1 to 3 credits. A student may earn a maximum of 3 credits in all enrollments for this course. R: Open only to master's students in the Civil Engineering major. Approval of department.
Master's degree Plan B individual student civil engineering design project.

Master's Thesis Research
Fall, Spring, Summer. 1 to 8 credits. A student may earn a maximum of 24 credits in all enrollments for this course.
Master's thesis research.

Independent Study in Civil Engineering
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 9 credits in all enrollments for this course. R: Open only to master's students in the Civil Engineering major.
Research problems of limited scope not pertaining to thesis accomplished under CE 899.

Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 72 credits in all enrollments for this course.
Doctoral dissertation research.