ECIV - Civil Engineering

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisites/CO-REQUISITES</th>
<th>Description</th>
</tr>
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<tr>
<td>ECIV 101</td>
<td>Intro To Civil Engineering</td>
<td>1</td>
<td></td>
<td>Study of loading on structures. Study of structural systems and systems modeling. Analysis of determinate and indeterminate structures. Introduction to matrix methods. Introduction to structural analysis software. Introduction to design approaches and philosophies.</td>
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<tr>
<td>ECIV 102</td>
<td>Applied Analysis</td>
<td>1</td>
<td></td>
<td>Study of civil engineering, including department programs and areas of specialty, civil engineering career options, professionalism, history, and ethics.</td>
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<tr>
<td>ECIV 202</td>
<td>Structural Analysis</td>
<td>1</td>
<td></td>
<td>Study of loading on structures. Study of structural systems and systems modeling. Analysis of determinate and indeterminate structures. Introduction to matrix methods. Introduction to structural analysis software. Introduction to design approaches and philosophies.</td>
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<tr>
<td>ECIV 290R</td>
<td>Undergraduate Research</td>
<td>1-6</td>
<td></td>
<td>Study of loading on structures. Study of structural systems and systems modeling. Analysis of determinate and indeterminate structures. Introduction to matrix methods. Introduction to structural analysis software. Introduction to design approaches and philosophies.</td>
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<tr>
<td>ECIV 311</td>
<td>Transportation Engineering</td>
<td>3</td>
<td></td>
<td>Study of loading on structures. Study of structural systems and systems modeling. Analysis of determinate and indeterminate structures. Introduction to matrix methods. Introduction to structural analysis software. Introduction to design approaches and philosophies.</td>
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<tr>
<td>ECIV 312</td>
<td>Transportation Engineering</td>
<td>3</td>
<td></td>
<td>Study of loading on structures. Study of structural systems and systems modeling. Analysis of determinate and indeterminate structures. Introduction to matrix methods. Introduction to structural analysis software. Introduction to design approaches and philosophies.</td>
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<tr>
<td>ECIV 320</td>
<td>Geotechnical Engineering</td>
<td>3</td>
<td></td>
<td>Study of loading on structures. Study of structural systems and systems modeling. Analysis of determinate and indeterminate structures. Introduction to matrix methods. Introduction to structural analysis software. Introduction to design approaches and philosophies.</td>
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**ECIV 332. Engineering Hydraulics. 2 Credits.** On Demand. PREREQUISITE: EGEN 350 or STAT 332. Descriptive and quantitative hydraulics with applications in water resources engineering.

**ECIV 333. Water Resources Engineering. 4 Credits.** PREREQUISITES: EGEN 350 or STAT 332. Descriptive and quantitative hydraulics with applications in water resources engineering. Pipe flow, open channel flow, and hydraulic machines with applications in water resources engineering.

**ECIV 350. Transportation Engineering. 3 Credits.** PREREQUISITE: EGEN 350 or STAT 332. Descriptive and quantitative hydraulics with applications in water resources engineering. Pipe flow, open channel flow, and hydraulic machines with applications in water resources engineering.

**ECIV 401. Civil Eng Practice and Ethics. 1 Credit.** PREREQUISITE: Concurrent registration with ECIV 480R required. Professional ethics, social responsibility, public policy, and leadership.

**ECIV 404. Heavy Civil Equip and Methods. 3 Credits.** PREREQUISITE: EGEN 325 or EGEN 330, and ETCC 302 or ECIV 320. Construction equipment operating characteristics, economics, and production rate estimation. Heavy construction methods associated with tunneling, aggregate production, and mass earthwork operations.

**ECIV 405. Construction Project Planning and Scheduling. 3 Credits.** PREREQUISITE: EGEN 350 or STAT 332. Descriptive and quantitative hydraulics with applications in water resources engineering.
ECIV 450. Public Transit System Design. 3 Credits. (3 Lec) On Demand
PREREQUISITE: ECIV 350, and EGEN 350 or STAT 332. Design, implementation and management of public transit systems including paratransit, bus and light rail; including an overview of funding sources, legislation, public relations and other issues with coverage or route optimization strategies and demand estimation techniques.

ECIV 451. Highway Pavements, 3 Credits. (2 Lec, 1 Lab) S
Alternate Even Years. PREREQUISITE: ECIV 350 and ECIV 320. Design of highway pavements including drainage and base/subbase/subgrade preparation. Laboratory in bituminous materials.

ECIV 452. Traffic Engineering and ITS, 3 Credits. (2 Lec, 1 Lab) F
Alternate Odd Years. PREREQUISITE: ECIV 350. Application of driver, vehicle, and roadway characteristics to principles of traffic control, operations, and safety. Traditional and advanced technology solutions will be explored.

ECIV 454. Transportation Planning, 3 Credits. (2 Lec, 1 Lab) S
Alternate Odd Years. PREREQUISITE: ECIV 350 and EGEN 350 or STAT 332. Transportation planning process and travel demand forecasting including trip generation, trip distribution, mode split and traffic assignment. Laboratory work will introduce TransCADm software.

ECIV 455. Survey Data Collection & Analysis for Transportation Engineering. 3 Credits. (2 Lec, 1 Lab) S
Alternate Even Years. PREREQUISITES: EGEN 350 or EIND 354 or consent of instructor. Course introduces students to the principles and practice of survey and data analysis for transportation engineering and evaluates students’ ability to design and apply scalable approaches to analyze transportation-related data. Transportation survey design, implementation and analysis are covered. Methods and techniques for anticipating traffic events (crashes, congestion, etc.) are studied. Co-convened w/ECIV 555.

ECIV 456. Highway Geometric Design, 3 Credits. (3 Lec) F
PREREQUISITE: ECIV 350. Advanced geometric design of highway systems including two-lane, interstate roadways, roundabouts, and intersection design elements.

ECIV 461. Cold Regions Infrastructure Engineering, 3 Credits. (3 Lec) On Demand
PREREQUISITES: ECIV 320 or ETCC 302, EGEN 331 or EGEN 335.
COREQUISITE: ECIV 308. This course explores the challenges of cold regions infrastructure engineering. Design, construction and performance issues specific to cold climates are identified, and methods to overcome them are developed and demonstrated.

ECIV 484. Reinforced Concrete Design, 3 Credits. (3 Lec) F alternate years, to be offered even years.
PREREQUISITE: ECIV 315. Design of reinforced concrete members and systems.

ECIV 489R. Civil Engineering Design I. 2 Credits. (1 Lec, 1 Lab) F,S
PREREQUISITE: Upper division courses and others as determined for each offering. Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ECIV 492. Independent Study. 1-3 Credits. (1-3 Ind; 4 cr max) S
PREREQUISITE: Junior standing, consent of instructor, and approval of Department Head. Directed research and study on an individual basis.

ECIV 498. Internship. 3 Credits. (3 Ind; 12 cr max) F
PREREQUISITE: Junior standing, consent of instructor and approval of Department Head. An individualized assignment arranged with an agency, business, or other organization to provide guided experience in the field. Students may not take this course the semester they graduate.

ECIV 499R. Capstone: Civil Eng Design II. 2 Credits. (1 Lec, 1 Lab) F,S

ECIV 504. Construction Productivity. 3 Credits. (3 Lec) On Demand
PREREQUISITE: Two years of construction field experience required.
Management concepts will include human factors as well as enlightened leadership and advanced management concepts. Productivity improvement data collection, analysis, and solutions to include the construction work force and cost.

ECIV 505. Quality Assurance and Risk Management. 3 Credits. (3 Lec) On Demand
PREREQUISITE: Either EGEN 350, EIND 354 or STAT 332 and ECIV 308 or equivalent plus one year of industrial experience or one internship (ECIV 498 or ETCC 498). Analysis of quality assurance and control concepts to include utilization of statistical analysis. Application of risk analysis principles to the construction process to minimize liability and project costs.

ECIV 506. Ad Construction Management. 3 Credits. (3 Lec) On Demand
PREREQUISITE: One year of industrial experience or one internship (ECIV 498 or ETCC 498). COREQUISITE: ETCC 499 or equivalent. Broad issues of construction sustainability (LEED, Lean Construction, Environmental requirements, etc.) and how the construction industry needs to manage this process.

ECIV 507. Law of the Construction Industry. 3 Credits. (3 Lec) On Demand
PREREQUISITE: BGEN 361. PMSEM-CEM option requirement. ONLINE ONLY.
This class exposes engineers to the effect of law, rules and regulations on their work both from a practical perspective, for example, what engineers should know about basic concepts of contract law, to more abstract concepts like whether, and in what manner, government should mandate green construction practices. It is about understanding how the construction industry works within a framework of rules and regulations, critically considering whether the rules help or hinder the construction process and most importantly, how you as future leaders in the engineering profession are going to make the process better.

ECIV 511. Building Structural Systems. 2 Credits. (2 Lec) F
alternate even years PREREQUISITE: ECIV 484 or ECIV 414 or ECIV 415 or ECIV 416. COREQUISITE: ECIV 512. Analysis of multi-story structural systems. Emphasis on lateral force resisting systems in steel framed buildings.

ECIV 512. Structural Dynamics. 2 Credits. (2 Lec) F
alternate even years. PREREQUISITE: ECIV 312. Response of structures to dynamic loads, including seismic loads.

ECIV 513. Behavior of Concrete Structure. 3 Credits. (3 Lec) S alternate odd years.

ECIV 514. Behavior of Steel Structures. 3 Credits. (3 Lec) S
alternate even years. PREREQUISITE: ECIV 414. Behavior of steel members and frames. Significance of behavior in design of steel structures.

ECIV 515. Adv Structural Analysis. 2 Credits. (2 Lec) S
alternate odd years. PREREQUISITE: EGEN 415. This course presents the theoretical background behind commonly used elements used by structural engineers. Elasticity, energy methods, dynamics, buckling, nonlinear materials and large rotation topics are addressed. These topics will allow students to utilize finite element structural engineering software in an informed manner.

ECIV 519. Bridge and Prestressed Concrete Design. 3 Credits. (3 Lec) F
alternate odd years.

ECIV 521. Applied Geotechnical Engin. 3 Credits. (2 Lec, 1 Lab) F
alternate even years PREREQUISITE: ECIV 320. Principles of geotechnical site investigations and advanced laboratory testing for the purpose of characterizing soils and the determination of engineering soil properties used in the design of soil structures.

ECIV 524. Advanced Soil Mechanics, 3 Credits. (3 Lec) F
alternate odd years.
PREREQUISITE: ECIV 320. Topics leading to an advanced understanding of the engineering behavior of soils with an emphasis on settlement and shear strength.

ECIV 526. Geotechnical Aspects of Earthquake Engineering. 3 Credits. (3 Lec) F
PREREQUISITES: ECIV 320. Principles of engineering seismology and geotechnical earthquake engineering. Focus is on advanced principles, evaluation procedures, and design methods.
ECIV 529. Groundwater Contamination. 3 Credits. (3 Lec)
S. PREREQUISITE: EGEN 335. Contemporary groundwater topics including water supply, contaminant transport, and remediation technologies. Subsurface mass transport and microbial processes and their effect on fate and transport of organic and inorganic contaminants in the context of bioremediation and other remediation technologies will be emphasized.

ECIV 530. Adv Hydraulic Investigations. 3 Credits. (3 Lec) S
alternate even years. Advanced topics in hydraulics and fluid mechanics.

ECIV 554. Transportation Safety. 3 Credits. (3 Lec) S
alternate odd years. PREREQUISITE: ECIV 350. This course addresses safety of the highway system as related to design, construction, and operations. The course provides an overview of the various elements of the highway system namely, road users, vehicles, roadways, and environment as related to safety. Apart from the introduction, the course is structured in three distinct components that represent the sequential stages in highway life; i.e. design, construction, and operations.

ECIV 555. Survey Data Collection & Analysis. 3 Credits. (2 Lec, 1 Lab) S
Alternate Even Year PREREQUISITES: EGEN 350 or EIND 354. This course introduces students to the principles and practice of survey data collection and analysis for transportation engineering and elevates students’ ability to design and apply scalable approaches to analyze transportation-related data. Transportation survey design, implementation and analysis are covered. Methods and techniques for anticipating traffic events (crashes, congestion, etc.) are studied. Co-convened with ECIV 455.

ECIV 556. Traffic Flow Fundamentals. 3 Credits. (3 Lec) S
alternate even years. PREREQUISITE: ECIV 350, EGEN 350 or STAT 332. This course covers traffic stream parameters, their relationships, and important analytical techniques in traffic engineering such as capacity analysis, queueing analysis, shockwave analysis, and traffic simulation. Topics covered are essential in understanding the behavior of vehicular traffic as a complex system.

ECIV 562. Snow and Avalanche Physics for Teachers. 3 Credits. (1 Lec, 1 Lab, 1 Rec) S
PREREQUISITES: A minimum of 2 years science teaching experience. Snow and Avalanche Engineering for Teachers provides student with the knowledge necessary to implement snow and avalanche related lessons into their respective math and science lessons.

ECIV 575. Research or Prof Paper/Project. 1-4 Credits. (1-4 Ind; 6 cr max) F,S,Su
PREREQUISITE: Graduate standing. A research or professional paper or project dealing with a topic in the field. The topic must have been mutually agreed upon by the student and his or her major adviser and graduate committee.

ECIV 589. Graduate Consultation. 1-3 Credits. (3 Ind; 3 cr max) F,S,Su
PREREQUISITE: Master's standing and approval of the Dean of Graduate Studies. This course may be used only by students who have completed all of their course work (and thesis, if on a thesis plan) but who need additional faculty or staff time or help.

ECIV 590. Master’s Thesis. 1-10 Credits. (1-10 Ind; max unlimited) F,S,Su
PREREQUISITE: Master's standing.

ECIV 591. Special Topics. 1-4 Credits. (1-4 Lec; 12 cr max) On Demand
PREREQUISITE: Upper division courses and others as determined for each offering. Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number.

ECIV 592. Independent Study. 1-6 Credits. (1-6 Ind; 6 cr max) F,S,Su
PREREQUISITE: Graduate standing, consent of instructor, approval of Department Head and Dean of Graduate Studies. Directed research and study on an individual basis.

ECIV 594. Seminar. 1 Credit. (1 Sem) F
S PREREQUISITE: Final semester of MS program. Students participate in preparing and presenting discussion material.

ECIV 598. Internship. 2 Credits. (2 Ind; 12 cr max) On Demand
Graduate standing, consent of instructor and approval of Department Head. An individual assignment arranged with an agency, business or other organizations to provide guided experience in the field.

ECIV 690. Doctoral Thesis. 1-10 Credits. (1-10 Ind; max unlimited) F,S,Su
PREREQUISITE: Doctoral standing.
Font Notice

This document should contain certain fonts with restrictive licenses. For this draft, substitutions were made using less legally restrictive fonts. Specifically:

Times was used instead of Adobe Garamond Pro.

The editor may contact Leefrog for a draft with the correct fonts in place.