ECIV - Civil Engineering

ECIV 101. Intro To Civil Engineering. 1 Credit. (1 Lec) F
PREREQUISITE: Must be taken within your freshman year. This course is optional for students entering civil engineering but is encouraged for freshmen wanting to learn about the breadth of the discipline. Students choosing to take the course will be introduced to civil engineering, including department programs and areas of specialty, civil engineering career options, professionalism, history, and ethics.

ECIV 202. Applied Analysis. 1 Credit. (1 Lab) F,S
PREREQUISITE: M 165Q or M 171Q or M 181Q; Civil Engineering & CE/Bio-Resources Engineering majors only. Computer applications in civil engineering using a M-based software and a programming language.

ECIV 220CS. Civil Engineering and Construction - from the Ancient to the Modern. 3 Credits. (3 Lec) Su On Demand
Through the lenses of civil engineering and construction, follow the advancement of civilizations. Assess and evaluate decisions that we must make as a society with respect to protecting the health of the public and the environment with our finite resources.

ECIV 290R. Undergraduate Research. 1-6 Credits. (1-6 bid; max unlimited) F,S
Directed undergraduate research which may culminate in a written work or other creative project. Course will address responsible conduct of research. May be repeated.

ECIV 291. Special Topics. 1-4 Credits. (1-4 Lec; 12 cr max) On Demand
PREREQUISITE: None required but some may be determined necessary by each offering department. 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 307. Construction Estimating and Bidding. 3 Credits. (2 Lec, 1 Lab) F,S
PREREQUISITE: ECIV 202 or ETCC 204, and ECIV 308. Preparation of cost estimates and bids for construction projects. Introduction of computer estimating software and procedures.

ECIV 308. Construction Practice. 3 Credits. (2 Lec, 1 Lab) F,S
PREREQUISITE: BMGT 205 and EGEN 116 or DDSN 101 or DDSN 131. Contract documents, insurance, bonding, specifications, drawings, labor and labor law, estimating, bidding and scheduling, business organizations, leadership, and ethics. Significant technical and business writing required.

ECIV 309. Building Information Modeling in Construction. 3 Credits. (2 Lec, 1 Lab) F,S
PREREQUISITE: EGEN 115, DDSN 101 or EGEN 116 or DDSN 131. ARCH 241. CO-REQUISITE: ECIV 308. Introduction to the use of Building Information Modeling (BIM) in the Construction Industry. Instruction in BIM basics using contemporary software, with hands-on exercises in typical construction applications.

ECIV 311. Construction Project Documentation. 3 Credits. (3 Lec) F
PREREQUISITE: ECIV 308. Review and development of various administrative instruments required for project management, including plans and specifications, business communications, submittals, contracts, financial reports, contract risk and pass through clauses, labor issues and legislation, submittals, claims and disputes, change orders, quality control plans and reports, project close outs and productivity analyses.

ECIV 312. Structures I. 3 Credits. (3 Lec) F,S

ECIV 315. Structures II. 3 Credits. (2 Lec, 1 Lab) F,S

ECIV 320. Geotechnical Engineering. 3 Credits. (2 Lec, 1 Lab) F,S

ECIV 331. Engineering Hydrology. 2 Credits. (2 Lec) F,S
PREREQUISITE: EGEN 350 or STAT 332. Descriptive and quantitative hydrology with applications in water resources engineering.

ECIV 332. Engineering Hydraulics. 2 Credits. (1 Lec, 1 Lab) F,S
PREREQUISITE: EGEN 335. Pipe flow, open channel flow, and hydraulic machines with applications in water resources engineering.

ECIV 350. Transportation Engineering. 3 Credits. (2 Lec, 1 Lab) F,S
PREREQUISITE: Junior standing. Introduction to vehicle operating characteristics, geometric and pavement design, traffic flow theory, signal design and analysis, capacity analysis and planning. Laboratory work will introduce various in-practice software packages.

ECIV 401. Civil Eng Practice and Ethics. 1 Credit. (1 Rct) F,S
PREREQUISITE: Concurrent registration with ECIV 489R required. Professional ethics, social responsibility, public policy, and leadership.

ECIV 404. Heavy Const Equip and Methods. 3 Credits. (2 Lec, 1 Lab) F,S
PREREQUISITE: STAT 216Q, EGEN 325 or EGEN 330, and ETCC 302 or ECV 320. COREQUISITE: ECIV 307. 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. (2 Lec, 1 Lab) F,S
PREREQUISITE: ECIV 307. Project planning and scheduling procedures involving both network (CPM) and non-network techniques. Introduction to computer scheduling software.

ECIV 406. Sustainability Issues in Construction. 3 Credits. (3 Lec) S
PREREQUISITE: ECIV 308. Review sustainability issues in the construction industry, including LEED; green practices; energy systems and renewable energy; water resources; storm and waste water; life cycle assessment; building health issues.

ECIV 414. Steel Design. 3 Credits. (3 Lec) F alternate years to be offered odd years PREREQUISITE: ECV 315. Design of structural steel members and systems.

ECIV 415. Design of Masonry Structures. 3 Credits. (3 Lec) S alternate years, to be offered even years.
PREREQUISITE: ECV 315. Design of structural steel members and systems.

ECIV 416. Design of Wood and Timber Structures. 3 Credits. (3 Lec) S alternate years, to be offered odd years.

ECIV 420. Earth and Foundation Engr. 3 Credits. (3 Lec) S
PREREQUISITE: ECIV 320. Application of soil mechanics principles to the analysis and design of conventional shallow foundations, mat foundations, and deep foundation systems.

ECIV 425. Geotechnical Structures. 3 Credits. (3 Lec) F

ECIV 431. Open Channel Hydraulics. 3 Credits. (3 Lec) F
PREREQUISITE: ECIV 332. Principles of open channel flow; hydraulic design of open channel structures.

ECIV 435. Closed-Conduit Hydraulics. 3 Credits. (3 Lec) S
PREREQUISITE: ECIV 332. Advanced topics in hydraulic engineering, with emphasis on analysis and design of pipe transmission lines, pumps, and pipe distribution networks.

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 years, to be offered even years.
PREREQUISITE: ECIV 350. 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 years.
to be offered odd years. PREREQUISITE: ECIV 350, EGEN 350 or STAT 332. 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 years,
to be offered 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
TransCADtm software.

ECIV 455. Survey Data Collection & Analysis for Transportation Engineering. 3 Credits.
(2 Lec, 1 Lab) S PREREQUISITES: EGEN 350 or EIDN 354 or consent of instructor. Course
introduces students to the principles and practice of survey and data 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 w/
ECIV 355.

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) S
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 Rct, 1 Lab) F,S,Su
Directed undergraduate research/creative activity which may culminate in a
research paper, journal article, or undergraduate thesis. Course will address
responsible conduct of research. May be repeated.

ECIV 491. Special Topics. 1-4 Credits. (1 Lec; 12 cr max) F,S,Su,F
Special topics. Prerequisites and approval by Department Head.

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

ECIV 498. Internship. 2 Credits. (2 Ind; 12 cr max) F,S,Su
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 Rct, 1 Lab) F,S
PREREQUISITE: ECIV 489R. Senior capstone course. Design of an engineering
project. Evaluation of design alternatives and design recommendations.

ECIV 504. Construction Productivity. 3 Credits. (3 Lec) On Demand
PREREQUISITE: Two years of construction field experience required. PMSEM-
CEM option requirement. ONLINE ONLY. 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/Risk Management. 3 Credits. (3 Lec) On Demand
PREREQUISITE: Either EGEN 350, EIDN 354 or STAT 332 and ECIV 308 or
equivalent plus one year of industrial experience or one internship (ECIV 498 or
ETCC 498). PMSEM-CEM option requirement. ONLINE ONLY. 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. PMSEM-CEM option
requirement. ONLINE ONLY. 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
PREREQUISITE: BGEN 361. PMSEM-CEM option requirement. ONLINE ONLY.
PREREQUISITE: senior standing. Develops structural systems for a variety of
building types and codes. Topics include the design of steel and reinforced concrete
structures.

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.
PREREQUISITE: ECIV 484. Behavior of reinforced concrete members, frames, and
shear wall systems. Significance of behavior in design of
reinforced concrete structures.

ECIV 514. Behavior of Steel Structures. 3 Credits. (3 Lec) S
Alternate even years.
PREREQUISITE: ECIV 414 and EGEN 415. 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 common finite 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 one
element structural engineering software in an informed manner.

ECIV 519. Bridge and Prestressed Concrete Design. 3 Credits. (3 Lec) F
Alternate odd years.
PREREQUISITE: ECIV 315. Design of concrete structures utilizing pre-
and post-tensioned concrete elements. Introduction to bridge analysis
and design.

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 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
PREREQUISITES: EGEN 350 or EIDN 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, queuing
analysis, shockwave analysis, and traffic simulation. Topics covered are essential in
understanding the behavior of vehicular traffic as a complex system.

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. 1-9 Credits. (1-9 Ind; 9 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 Leepfrog for a draft with the correct fonts in place.