CIVIL ENGINEERING (ECIV)

ECIV 101 - Introduction to Civil Engineering (3 Credits)
Fundamental concepts in each of the disciplines of civil engineering are discussed. Critical thinking skills are formally fostered by hands-on experiences and group discussions.

ECIV 111 - Introduction to Engineering Graphics and Visualization (3 Credits)
Prerequisites or Corequisites:

- Future Net Value. Analysis. Cost estimation of engineering projects including present or future net value.
- Responsibility and liabilities. Reporting of engineering designs and Regulatory permits and scheduling of construction projects. Engineering

ECIV 200 - Statics (3 Credits)

- Mechanics of Solids (3 Credits)
- Kinematics of particles and rigid bodies. Vector representation of force and motion. Free-body diagrams, application of energy and momentum methods to solve problems. Rigid body and central force motion.

- Mechanics of Solids (3 Credits)

Prerequisites: C or better in ECIV 200 or ENCP 200.

ECIV 300 - Civil Engineering Measurements (3 Credits)
Theory and application of plane surveying and mapping techniques. Lecture plus laboratory.

- System and data collection, interpretation, and analysis.

Prerequisites: MATH 241.

ECIV 303 - Civil Engineering Materials (3 Credits)
Mechanical and thermal properties of mineral aggregates, cements, concrete, timber, asphalt, metals, and plastics.

Prerequisites: C or better in ECIV 220 or ENCP 260.

ECIV 303L - Civil Engineering Materials Laboratory (1 Credit)
Experiments, exercises, and demonstrations to accompany ECIV 303. Three contact hours per week. 2020.

Prerequisites: D or better in ECIV 101; D or better in STAT 509 or STAT 511.

Prerequisite or Corequisite: D or better in ECIV 201 or ENCP 201; D or better in ECIV 303.

ECIV 307 - Professional Development for Civil Engineers (3 Credits)

Prerequisite or Corequisite: D or better in ECIV 320, ECIV 330, ECIV 340, ECIV 350, or ECIV 362.

ECIV 320 - Structural Analysis I (3 Credits)

Prerequisites: ECIV 201; MATH 242; C or better in ECIV 220.

ECIV 325 - Structural Steel Design (3 Credits)
Behavior and design of steel beams, columns, and tension members; strength and stability; design of connections using welded, bolted and riveted construction.

Prerequisites: C or better in ECIV 320.

ECIV 327 - Reinforced Concrete Design (3 Credits)
Behavior and design of reinforced concrete beams, columns, continuous beams and one way slabs, and footings.

Prerequisites: C or better in ECIV 320.

ECIV 330 - Introduction to Geotechnical Engineering (3 Credits)
Engineering properties of soil and rock; hydraulic conductivity, flow nets, drainage design; consolidation theory, shearing strength of soil.

Prerequisites: C or better in either ECIV 220 or ENCP 260.

ECIV 330L - Geotechnical Laboratory (1 Credit)
Laboratory associated with ECIV 330. Soil mechanics experiments, exercises, and demonstrations. Three contact hours per week. 2020.

Prerequisites: D or better in ECIV 101 or ENCP 101; D or better in STAT 509 or STAT 511.

Prerequisite or Corequisite: D or better in ECIV 201 or ENCP 201; D or better in ECIV 330.

ECIV 340 - Introduction to Transportation Engineering (3 Credits)
Transportation design, planning, and operational analysis, including roadway, airway, and railway systems; transportation elements, including traveled way, vehicle, control, terminals, and advanced technology; traffic data collection, interpretation, and analysis.

Prerequisites: D or better in ECIV 201 or D or better in ENCP 201 and D or better in STAT 509 or D or better in STAT 511.

Prerequisite or Corequisite: D or better in ECIV 201 or ENCP 201; D or better in ECIV 340.

ECIV 340L - Transportation Engineering Laboratory (1 Credit)
This course covers the principles of distances, elevations and angles that pertain to roadways, basic theories in engineering measurements and surveying calculations, and an introduction to mapping, for transportation engineering applications. Three contact hours per week.

Prerequisites: D or better in ECIV 101 or ENCP 101; D or better in STAT 509 or 511.

Prerequisite or Corequisite: D or better in ECIV 201 or ENCP 201; D or better in ECIV 340.

ECIV 350 - Introduction to Environmental Engineering (3 Credits)
Concepts of environmental engineering, including air and water pollution, solid and hazardous waste disposal, and noise pollution. Qualitative and quantitative development of engineering techniques for pollution control.

Prerequisites: D or better in CHEM 111 or CHEM 141; C or better in Math 142.
Graduation with Leadership Distinction: credits may be applied towards a degree. By course title. May be repeated as topic varies. A maximum of twelve courses.

ECIV 307 - Applied Hydraulics (3 Credits)
Applications of fluid mechanics to water resources engineering problems; open channel flow, hydraulic structures. Three laboratory hours per week.
Prerequisites: D or better in ECIV 101 or ENCP 101; D or better in STAT 509 or STAT 511.

ECIV 320 - Structural Design (3 Credits)
Design of steel structures including elastic and plastic design concepts. Three laboratory hours per week.
Prerequisites: D or better in ECIV 101 or ENCP 101; D or better in STAT 509 or STAT 511.

ECIV 426 - Structural Design (3 Credits)
Design of concrete structures including continuous members and long columns. Three laboratory hours per week.
Prerequisites: D or better in ECIV 101 or ENCP 101; D or better in STAT 509 or STAT 511.

ECIV 470 - Civil Engineering Design (4 Credits)
Application of hydraulic, geotechnical, and structural principles in design; project scheduling; cost estimation; ethics; environmental and social impact; design drawings; report documents. Three laboratory hours per week.
Prerequisites: D or better in ECIV 101 or ENCP 101; D or better in STAT 509 or STAT 511.

Graduation with Leadership Distinction: GLD: Research

ECIV 490 - Special Topics (0-3 Credits)
Course content varies and will be announced in the schedule of classes by course title. May be repeated as topic varies. A maximum of twelve credits may be applied towards a degree.
Graduation with Leadership Distinction: GLD: Research

ECIV 499 - Independent Study in Civil and Environmental Engineering (1-3 Credits)
Individual investigation or studies of special topics. A maximum of six credits may be applied toward a degree.
Prerequisites: approval of project proposal by instructor; USC/GPA 2.8.
Graduation with Leadership Distinction: GLD: Research

ECIV 502 - Life Cycle Assessment of Civil and Environmental Engineering Systems (3 Credits)
The steps of conducting and interpreting an environmental life cycle assessment on civil and environmental engineering systems. Fundamentals associated with conducting a life cycle assessment, including goal and scope, inventory analysis, impact assessment, and interpretation.
Prerequisites: D or better in ECIV 350 or D or better in either ECIV 303.
ECIV 325, ECIV 327, ECIV 330, ECIV 340 or ECIV 362.

ECIV 503 - Fundamentals of Engineering Preparation (1 Credit)

ECIV 504 - Fundamentals of Engineering Preparation (1 Credit)

ECIV 505 - Fundamentals of Engineering Preparation (1 Credit)

ECIV 506 - Fundamentals of Engineering Preparation (1 Credit)

ECIV 507 - Fundamentals of Engineering Preparation (1 Credit)

ECIV 508 - Fundamentals of Engineering Preparation (1 Credit)

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ECIV 510 - Fundamentals of Engineering Preparation (1 Credit)

ECIV 511 - Fundamentals of Engineering Preparation (1 Credit)

ECIV 512 - Fundamentals of Engineering Preparation (1 Credit)

ECIV 513 - Fundamentals of Engineering Preparation (1 Credit)

ECIV 514 - Fundamentals of Engineering Preparation (1 Credit)

ECIV 515 - Fundamentals of Engineering Preparation (1 Credit)

ECIV 516 - Fundamentals of Engineering Preparation (1 Credit)

ECIV 517 - Fundamentals of Engineering Preparation (1 Credit)

ECIV 518 - Fundamentals of Engineering Preparation (1 Credit)

ECIV 519 - Fundamentals of Engineering Preparation (1 Credit)

ECIV 520 - Structural Analysis II (3 Credits)
Advanced methods of structural analysis with emphasis on matrix methods. Development of the generalized matrix force and matrix displacement methods of static analysis, with applications to trusses and frames.
Prerequisites: ECIV 320.

ECIV 521 - Numerical Methods in Mechanics (3 Credits)
Prerequisites: D or better in ECIV 201 or ENCP 201.

ECIV 524 - Structural Vibrations (3 Credits)
Response of single- and multiple-degree of freedom structurally dynamic systems to impact, harmonic, wind, and seismic excitations.
Prerequisites: ECIV 320.

ECIV 526 - Timber and Masonry Design (3 Credits)
Basic engineering properties of timber and masonry materials, design methods and philosophies for timber and masonry structures. Particular attention is paid to current codes, specifications, and analysis.
Prerequisites: C or better in ECIV 320.

ECIV 530 - Foundation Analysis and Design (3 Credits)
Subsurface investigation procedures. Theoretical and practical aspects of the design of earth retaining structures, spread footings, and pile foundations.
Prerequisites: ECIV 330.

ECIV 531 - Design of Earth Structures (3 Credits)
Geotechnical engineering problems associated with the behavior of earth masses. Soil shear strength, lateral earth pressure, design of retaining stuctures, slope stability, water flow through soils.
Prerequisites: ECIV 330.
ECIV 533 - Geosynthetics and Geotechnical Design of Landfills (3 Credits)
Principles for the design, construction, and performance of waste containment systems. Characterization of barrier materials; geosynthetics; design of liner and leachate collection systems; stability and deformation analyses of landfills.
Prerequisites: ECIV 330.

ECIV 535 - Geotechnical Engineering in Transportation (3 Credits)
Remote sensing and engineering geology. Field and laboratory testing. Design and maintenance methods for flexible and rigid pavements. Topics in tunnel design and buried conduit.
Prerequisites: ECIV 330.

ECIV 539 - Experimental Methods in Geotechnical Engineering (3 Credits)
Overview of transducers, signal conditioning and data acquisition; test control methods, data analysis and measurement errors; testing systems to measure soil strength, stiffness, and hydraulic conductivity; laboratory projects and examinations.
Prerequisites: ECIV 330, ECIV 330L.

ECIV 540 - Transportation Systems Planning (3 Credits)
Fundamental interactions between supply and demand in transportation systems. Modeling transportation demand and trip-making behavior. Evaluation of alternatives for decision making.
Prerequisites: ECIV 340.

ECIV 541 - Highway Design (3 Credits)
Design of transportation facilities using relevant tools and guidelines with emphasis on physical and operational aspects of arterials, freeways, intersections, and interchanges, including geometry, capacity, control, and safety.
Prerequisites: D or better in ECIV 111 or ENCP 102 and D or better in ECIV 340.

ECIV 542 - Traffic Engineering (3 Credits)
Capacity analysis of freeways and arterials. Traffic flow characteristics and basic relationships among traffic flow parameters. Signalized and unsignalized intersection control and signal timing design.
Prerequisites: ECIV 340.

ECIV 543 - Traffic Safety Analysis (3 Credits)
Research concepts and methodologies to enable students to identify the underlying reasons and factors that contribute to traffic crashes and determine appropriate countermeasures.
Prerequisites: D or better in ECIV 340.

ECIV 551 - Elements of Water and Wastewater Treatment (3 Credits)
Unit operations and processes employed in the physical, chemical, and biological treatment of water and wastewater. Design of water and wastewater treatment systems.
Prerequisites: ECIV 350.

ECIV 555 - Principles of Municipal Solid Waste Engineering (3 Credits)
Fundamentals and engineering principles of solid waste generation, characterization, collection and transport, source reduction and recycling, and physical, chemical, and biological treatment strategies.
Prerequisites: ECIV 350.

ECIV 556 - Air Pollution Control Engineering (3 Credits)
Introduction to the sources of air pollution and the engineering principles used for control and prevention.
Prerequisites: ECIV 350.

ECIV 557 - Sustainable Construction for Engineers (3 Credits)
Instruction to sustainable engineering design alternatives and principles for construction and site development from preconstruction through design and the construction phase.
Prerequisites: ECIV 350 and ECIV 570.

ECIV 558 - Environmental Engineering Process Modeling (3 Credits)
Modeling fate and transport phenomena in environmental processes with applications in engineered unit operators and natural systems.
Prerequisites: ECIV 350 and MATH 242.

ECIV 560 - Open Channel Hydraulics (3 Credits)
Steady and unsteady flows in single or multiple-channel systems.
Prerequisites: ECIV 360.

ECIV 562 - Engineering Hydrology (3 Credits)
Applications of hydrologic techniques to design problems; stormwater simulation models; urban stormwater.
Prerequisite or Corequisite: D or better in ECIV 362.

ECIV 563 - Subsurface Hydrology (3 Credits)
Hydrologic cycle, subsurface physical properties, equations of groundwater flow, well flow, well design, groundwater resource development, design of dewatering systems, groundwater contamination.
Prerequisites: D or better in ECIV 201 or ENCP 201; D or better in ECIV 362.

ECIV 570 - Land Development for Engineers (3 Credits)
Fundamentals of designing and permitting the conversion of land to new or altered states, including environmental issues, traffic and parking, utility resources, site engineering, ADA, safety, planning, and zoning requirements.
Prerequisites: Three from ECIV 320, ECIV 330, ECIV 340, ECIV 350, and ECIV 362.

ECIV 580 - Railway Engineering I (3 Credits)
Introduction to the analysis and design of the railway infrastructure for freight and passenger systems to include track and track support systems, grade crossings, special trackwork, construction, inspection, assessment and compliance.
Prerequisites: ECIV 303, ECIV 320, ECIV 330, ECIV 340.
Corequisite: ECIV 303.

ECIV 582 - Operation and Logistics of Railway Systems (3 Credits)
Principles of rail operations; Network management; Best practices for train planning, performance management and delivery of service; technical elements of a railway from an operations perspective (train controls, signaling, communications, yards, tractive power etc).
Prerequisites: ECIV 340.

ECIV 588 - Design of Railway Bridges and Structures (3 Credits)
Introduction to railway infrastructure; Structural design considerations and criteria of railway structures; Bridge types and components; Planning and preliminary design of modern railway bridges; Loads and forces; Structural analysis and design of steel railway bridges and components.
Prerequisite or Corequisite: ECIV 330; ECIV 325 or ECIV 327.