CIVIL ENGINEERING (CE)

CE 160 Principles of Surveying 3 Hours
A study of the basic principles of surveying. Topics include: field note-taking, taping distances, differential leveling, profile leveling,angular measurements, bearings & azimuths, EDM, traversing, topographic mapping, and construction stakeout. The use and care of surveying equipment includes: automatic levels, theodolites, pocket transits, total stations and data collectors.
Prerequisite(s): (MATH 117 or MATH 118 or MATH 136 (may be taken concurrently) or MATH 137 (may be taken concurrently))
Corequisite(s): CE 161
Recent Term(s) Offered: fall 2022; fall 2023; fall 2024

CE 161 Principles of Surveying Lab 1 Hour
Field and office procedures in support of material studied in CE 160.
Corequisite(s): CE 160
Recent Term(s) Offered: fall 2022; fall 2023; fall 2024

CE 176 Civil Engineering Freshman Design 1 Hour
An introduction to civil engineering and its specialties. Topics include a brief overview of: surveying, water resources, transportation, and construction, geotechnical, and structural engineering. The design process and the importance of public safety are emphasized. Students will complete a simple design project. Note: For transfer or change of major students who have earned at least 24 semester hours of credit or have completed a course equivalent in content to the generic WKU University Experience course, or permission of instructor.
Prerequisite(s): (MATH 136 (may be taken concurrently) or MATH 137 (may be taken concurrently) or MATH 237 (may be taken concurrently) or MATH 331 (may be taken concurrently))
Recent Term(s) Offered: spring 2022; spring 2023; spring 2024

CE 300 Floodplain Management 3 Hours
Introduction to federal and local regulations governing floodplain management, the National Flood Insurance Program, and flood maps. Successful completion of the class requires passing the Certified Floodplain Manager (CFM) Exam, within a maximum of two attempts. Students will be required to pay the exam fee(s) to the Association of State Floodplain Managers.
Restriction(s): Students with a semester level of Freshman or Sophomore may **not** enroll.
Recent Term(s) Offered: fall 2022; fall 2024

CE 303 Construction Management 3 Hours
The study of planning, administration, and management of construction projects and an introduction to the methodology utilized in executing specific designs. Emphasis is placed on the organization of construction firms, development of construction documents, theory of estimating and quantity take-offs, contractual and management systems, scheduling, project administration and inspection of construction operations.
Prerequisite(s): (MATH 117 (may be taken concurrently) or MATH 118 (may be taken concurrently) or MATH 119 (may be taken concurrently) or MATH 121 (may be taken concurrently) or MATH 127 (may be taken concurrently) or MATH 136 (may be taken concurrently) or MATH 137 (may be taken concurrently) or MATH 183 (may be taken concurrently) or MATH 206 (may be taken concurrently) or MATH 302 (may be taken concurrently) or MATH 237 (may be taken concurrently) or MATH 240 (may be taken concurrently))
Restriction(s): Students with a semester level of Academy Junior, Academy Senior or Freshman may **not** enroll.
Recent Term(s) Offered: spring 2022; summer 2022; fall 2022; spring 2023; fall 2023; spring 2024; fall 2024

CE 305 Risk Analysis 3 Hours
Uncertainty and methods for risk analysis for engineering systems including engineering economics, probabilistic and statistical methods, and Monte Carlo simulation with applications to civil, electrical, and mechanical engineering.
Prerequisite(s): MATH 137
Recent Term(s) Offered: spring 2023

CE 310 Strength of Materials Laboratory 1 Hour
Implementation of fundamental principles and physical laws governing the response of structural components to external forces. Students will plan, conduct and report on experiments to measure the performance characteristics of materials and structural systems.
Prerequisite(s): (MATH 227 (may be taken concurrently) or MATH 137) and (EM 221 (may be taken concurrently) or EM 222 (may be taken concurrently))
Corequisite(s): EM 303
Recent Term(s) Offered: None

CE 316 Equipment & Methods 3 Hours
Study of construction operations as a dynamic process. Primary topics include earthmoving, optimizing equipment for best production, foundation construction, concrete, masonry and steel construction methods, concrete formwork design, construction safety, and construction productivity. Field trips will be incorporated.
Prerequisite(s): (MATH 117 or MATH 118 or MATH 119 or MATH 121 or MATH 127 or MATH 136 or MATH 137 or MATH 183 or MATH 205 or MATH 206 or MATH 225 or MATH 305 or MATH 237 or MATH 240 or MATH 275 or MATH 295)
Restriction(s): Students with a semester level of Academy Junior, Academy Senior or Freshman may **not** enroll.
Recent Term(s) Offered: spring 2022; spring 2023; spring 2024; fall 2024

CE 332 Transportation Engineering 3 Hours
An introduction to transportation engineering. Development of transportation systems in the United States. Route geometrics and design. Traffic flow characteristics and control. Planning, financing and economic analysis of transport facilities.
Prerequisite(s): CE 160 and CE 161 and EM 222 and PHYS 255
Recent Term(s) Offered: spring 2022; spring 2023; spring 2024

CE 342 Fluid Thermal Science 3 Hours
Conservation of fluid mass and momentum, forces in fluids, pipe flow, fluid measurements, pump systems, hydrodynamic drag, open channel flow, and introduction to thermodynamics. Students may not earn credit for both CE 341 and CE 342.
Prerequisite(s): MATH 237 and (EM 221 or EM 222)
Restriction(s): Enrollment is limited to students in Civil Engineering (534) or Civil Engineering-Prep (534P)
Recent Term(s) Offered: fall 2022; fall 2023; fall 2024

CE 352 Introduction to Environmental Engineering 3 Hours
Introduction to the fundamental principles of environmental engineering. Topics in water quality, water and wastewater treatment, air quality, and solid waste and landfills are discussed.
Prerequisite(s): MATH 331 and CHEM 120
Recent Term(s) Offered: None

CE 370 Materials of Construction 2 Hours
An introduction to construction materials focusing on aggregate, concrete, masonry, asphalt, timber, and construction materials inspections. Topics will include material properties, applications, production and physical characteristics. Students will have the opportunity to become Level I certified through the American Concrete Institute.
Prerequisite(s): (EM 222 with a minimum grade of C and EM 303 (may be taken concurrently)) or CM 282
Corequisite(s): CE 371
Recent Term(s) Offered: fall 2022; fall 2023; fall 2024

CE 371 Construction Materials Laboratory 1 Hour
The laboratory component of CE 370 - Construction Materials. Projects include aggregate sieve analysis and specific gravity, asphalt sample preparation and strength testing using Superpave, and concrete strength, slump, and air content.
Prerequisite(s): (EM 222 with a minimum grade of C and EM 303 (may be taken concurrently)) or CM 282
Corequisite(s): CE 370
Recent Term(s) Offered: fall 2022; fall 2023; fall 2024

CE 378 Route Surveying 3 Hours
Horizontal alignment of simple curves, compound curves, and spirals; vertical alignment using equal and unequal tangent parabolic curves in conjunction with road gradients; superelevations; slope stakes; earthwork calculations including volumes and mass diagrams.
Prerequisite(s): CE 160 and CE 161 and AS 163
Corequisite(s): CE 379
Recent Term(s) Offered: fall 2022; fall 2023; fall 2024

CE 379 Route Surveying Lab 1 Hour
Field and office procedures in support of content in CE 378.
Prerequisite(s): CE 160 and CE 161
Corequisite(s): CE 378
Recent Term(s) Offered: None

CE 380 Boundary Surveying 3 Hours
A study of the principles of land surveying. Topics include: boundary descriptions, deeds, horizontal and vertical control, traverse computations, US Public Land Surveys, metes and bounds, property law, partitioning of land, restoring lost corners, right of ways, easements, and minimum standards for boundary surveys.
Prerequisite(s): CE 160 and CE 161 and AS 163
Corequisite(s): CE 381
Recent Term(s) Offered: spring 2022; spring 2023; spring 2024

CE 381 Boundary Surveying Lab 1 Hour
Field and Office procedures in support of material covered in CE 380.
Corequisite(s): CE 380
Recent Term(s) Offered: None

CE 382 Structural Analysis 3 Hours
Modeling of real structural systems; loads and building codes; analysis of statically determinate and indeterminate planar structures including displacements, internal forces, and influence lines; exact and approximate techniques.
Prerequisite(s): (MATH 237 (may be taken concurrently) or MATH 327) and (EM 302 or EM 303)
Recent Term(s) Offered: fall 2022; fall 2023; fall 2024

CE 383 Structural Steel Design 3 Hours
Principles of the design of steel structures using the LRFD method. Design topics include axial tension and compression members, flexural members, beam-columns, connections, framing systems, and design codes. Additional topics include influence of non-technical factors such as availability, economy, and constructability.
Prerequisite(s): (CE 382 or CE 373)
Recent Term(s) Offered: spring 2022; spring 2023; spring 2024

CE 384 Reinforced Concrete Design 3 Hours
Design of reinforced concrete structures using the ACI Building Code. Design includes compression members, flexural members, foundations and one-way slabs.
Prerequisite(s): (CE 382 or CE 373)
Recent Term(s) Offered: fall 2022; fall 2023; fall 2024

CE 410 Soil Mechanics 3 Hours
A study of soils and their properties. Stress-strain analysis, horizontal and vertical stress distribution, consolidation and settlement, soil classification, compaction, static lateral earth pressure, permeability and flow nets, bearing capacity and slope stability, and foundation construction.
Prerequisite(s): (EM 303 and GEOL 113) or (CE 370 (may be taken concurrently) and CM 282) and (GEOL 111)
Corequisite(s): CE 411
Restriction(s): Enrollment is limited to students in Construction Management (533) or Civil Engineering (534)
Recent Term(s) Offered: fall 2022; fall 2023; fall 2024

CE 411 Soil Mechanics Lab 1 Hour
The laboratory component of CE 410 - Soil Mechanics. Projects include collection of soil samples in the field, observation of soil drilling and field testing equipment, classification of soils, plasticity testing, liquid limit, plastic limit, standard and modified proctor compaction test, nuclear density testing, and soil strength testing.
Corequisite(s): CE 410
Recent Term(s) Offered: fall 2022; fall 2023; fall 2024

CE 412 Foundation Engineering 3 Hours
Continuation of the material in CE 410 - Soil Mechanics focusing on the design and construction of shallow and deep foundations. Additional topics will include slope stability analysis and advanced discussions of retaining wall design and subsurface investigations.
Prerequisite(s): CE 410 and CE 411
Restriction(s): Enrollment is limited to students in Civil Engineering (534)
Recent Term(s) Offered: spring 2022; spring 2023; spring 2024

CE 426 Advanced Construction Materials 3 Hours
Continuation of CE 370. Topics focus on highway construction and include soil stabilization, bituminous materials and mixtures, general highway materials and construction of rigid and flexible pavements.
Prerequisite(s): CE 370
Recent Term(s) Offered: spring 2022; spring 2023; spring 2024

CE 432 Traffic Engineering 3 Hours
Students will work on an in-class project, where they will conduct a field data collection at a specific signalized intersection (e.g., doing traffic counts), plus data analysis and report write-up. Appropriate WKU paperwork/approvals might be needed to send students to the field and ensure their safety.
Prerequisite(s): CE 332 with a minimum grade of C
Recent Term(s) Offered: None

CE 440 Masonry Design and Construction 3 Hours
Principles in the design and construction of masonry structures in accordance with the American Concrete Institute. Current and historical properties of brick, natural block, natural stone, mortar, grout, and reinforcement. Design and constructability of masonry columns, shear walls, and unreinforced and reinforced masonry structures. Note: Consent of instructor may be required.
Prerequisite(s): (CE 382 or CE 370) and CE 371
Recent Term(s) Offered: None

CE 444 Bridge Engineering 3 Hours
A practice-based introduction to bridge engineering, exploring the design, behavior, maintenance and rehabilitation of bridges. Bridge loads, reinforced and prestressed concrete slab and T-beam bridges, steel beam bridges, composite beam bridges, bridge evaluations and ratings, and upgrade methodologies are covered based on AASHTO code requirements using the LRFD design methodology. Abutments, piers, joints, bearings, and connections are also included. Nontechnical topics such as public perception of the nation's infrastructure with respect to bridges will be discussed.
Prerequisite(s): (CE 384 or CE 482 or CE 483)
Recent Term(s) Offered: None

CE 461 Hydrology 3 Hours
A study of the physical laws affecting the occurrence, distribution, movement, storage, and contamination of water in watersheds. Qualitative analysis and quantitative modeling of precipitation, evapotranspiration, infiltration, groundwater, and stream flow. Models of contamination of rivers, lakes, soils, and groundwater. Applications to engineering design under extreme events, and environmental engineering.
Prerequisite(s): MATH 331 and CE 160 and (CE 341 or CE 342) and (CE 305 (may be taken concurrently) with a minimum grade of or STAT 301 (may be taken concurrently) with a minimum grade of)
Recent Term(s) Offered: None

CE 462 Hydraulic Engineering Systems 3 Hours
This class deals with the application of hydraulics in Civil Engineering design. The topics include flow in pipelines and open channels, design of culvert systems, flow measurement, hydraulic structures, and computational methods and models.
Prerequisite(s): MATH 331 and CE 342 and (CE 305 (may be taken concurrently) or STAT 301 (may be taken concurrently))
Recent Term(s) Offered: spring 2022; spring 2023; spring 2024

CE 474 Civil Engineering Design Project 1-3 Hours (repeatable max of 3 hrs)
An independent study course in which students complete an engineering design project of their choice under the guidance of a faculty advisor. Note: Permission of instructor required.
Recent Term(s) Offered: fall 2024

CE 475 Selected Topics in Civil Engineering 3 Hours (repeatable max of 9 hrs)
Advanced special topics delivered by WKU faculty to acquaint undergraduate students with significant problems and developments of current interest in civil engineering. Note: Permission of instructor required.
Recent Term(s) Offered: None