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. Note: High School Algebra & Trigonometry is required.

Corequisite(s): CE 161

Recent Term(s) Offered: spring 2017; summer 2017; fall 2017; spring 2018; summer 2018; fall 2018; spring 2019; summer 2019; fall 2019

CE 161 Principles of Surveying Lab  1 Hour
Field and office procedures in support of material studied in CE 160.

Corequisite(s): CE 160

Course Fee: $100

Recent Term(s) Offered: spring 2017; summer 2017; fall 2017; spring 2018; summer 2018; fall 2018; spring 2019; summer 2019; fall 2019

CE 175 University Experience - Civil Engineering  2 Hours
Transition to university experience. Topics include study skills, critical thinking skills, library education, exploration of majors and careers, degree programs, campus resources, and personal development, with special attention given to Civil Engineering careers and design. The design process is introduced through hands-on projects. Note: For beginning college freshmen or transfer students with fewer than 24 semester hours of credit.

Recent Term(s) Offered: None

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 117 (may be taken concurrently) or MATH 118 (may be taken concurrently) or 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))

Course Fee: $50

Recent Term(s) Offered: spring 2017; fall 2017; fall 2018; spring 2019; fall 2019

CE 301 Field Experience in Floodplain Management  3 Hours (repeatable max of 6 hrs)
Field study and mitigation techniques for river flooding, karst flooding, flash flooding, alluvial fan flooding, tropical storms or a combination of these. Course involves travel.

Restriction(s): Students with a semester level of Freshman or Sophomore may not enroll.

Recent Term(s) Offered: None

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 or MATH 118 or MATH 119 (may be taken concurrently) or MATH 121 or MATH 127 or MATH 136 or MATH 137 or MATH 142 or MATH 183 or MATH 205 or MATH 206 or MATH 225 or MATH 302 or MATH 237 or MATH 240 or MATH 275 or MATH 295)

Corequisite(s): CE 304

Restriction(s): Students with a semester level of Academy Junior, Academy Senior or Freshman may not enroll.

Recent Term(s) Offered: spring 2017; summer 2017; fall 2017; spring 2018; summer 2018; fall 2018; spring 2019; summer 2019; fall 2019

CE 304 Construction Management Lab  1 Hour
Extension of CE 303 lecture course. Skills related to Construction Management will be covered in a laboratory setting including plan reading, specification reading, construction scheduling and estimating using industry standard state-of-the-practice software and hardware, and other applied tasks.

Corequisite(s): CE 303

Course Fee: $50

Recent Term(s) Offered: spring 2017; summer 2017; fall 2017

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 2017; spring 2018; spring 2019

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

Course Fee: $100

Recent Term(s) Offered: spring 2017; spring 2018; spring 2019; fall 2019
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 142 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.

Course Fee: $75
Recent Term(s) Offered: spring 2017; summer 2018; spring 2018; summer 2018; spring 2019; fall 2019

CE 326  Engineering Law  3 Hours
Introduction to law and judicial procedures as they relate to the practicing engineer. Contracts, professional liability, professional ethics, licensing, bidding procedures, intellectual property, products liability. Emphasis on development of critical thinking process, abstract problem analysis and evaluation.

Recent Term(s) Offered: None

CE 332  Transportation Engineering  3 Hours

Prerequisite(s): CE 160 and CE 161 and EM 222 and PHYS 255

Recent Term(s) Offered: spring 2017; spring 2018; spring 2019

CE 342  Fluid Thermal Science  4 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)

Recent Term(s) Offered: fall 2017; fall 2018; fall 2019

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: fall 2017; fall 2018; fall 2019

CE 360  Estimating Scheduling Bidding  3 Hours
Investigates the principles of cost estimating, scheduling, and preparing bid documents for construction projects. Topics include feasibility studies, preliminary and detailed estimating, sequencing of tasks, tracking time and cost and variance analysis. State-of-the-practice computer applications for estimating and scheduling will be stressed in the lecture as well as the corequisite laboratory.

Prerequisite(s): CE 303

Corequisite(s): CE 361

Recent Term(s) Offered: None

CE 361  Estimating Lab  3 Hours
Extension of CE 360 lecture course. Traditional and computer tools will be applied to construction estimating and scheduling. Techniques for quantity take offs and computer scheduling will be covered.

Prerequisite(s): CE 303

Corequisite(s): CE 360

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 302 or EM 303)

Corequisite(s): CE 371

Recent Term(s) Offered: fall 2017; summer 2018; fall 2018; fall 2019

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 302 or EM 303)

Corequisite(s): CE 370

Course Fee: $125

Recent Term(s) Offered: fall 2017; fall 2018; fall 2019

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 AMS 163

Corequisite(s): CE 379

Recent Term(s) Offered: fall 2017; fall 2018; fall 2019

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

Course Fee: $100

Recent Term(s) Offered: fall 2017; fall 2018; fall 2019

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 AMS 163

Corequisite(s): CE 381

Recent Term(s) Offered: spring 2017; spring 2018; spring 2019

CE 381  Boundary Surveying Lab  1 Hour
Field and Office procedures in support of material covered in CE 380.

Corequisite(s): CE 380

Course Fee: $100

Recent Term(s) Offered: spring 2017; spring 2018; spring 2019
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)
Course Fee: $50
Recent Term(s) Offered: summer 2017; fall 2017; summer 2018; fall 2018; summer 2019; fall 2019

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)
Course Fee: $50
Recent Term(s) Offered: fall 2017; fall 2018; fall 2019

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)
Course Fee: $50
Recent Term(s) Offered: spring 2017; spring 2018; summer 2018; spring 2019

CE 400  Civil Engineering Senior Design Seminar  2 Hours
Professional, ethical and decision-making issues related to the civil engineering design process. Structured small group discussions, oral presentations, and written assignments. Students will complete proposals for CE 498 during this course. Must be taken semester prior to CE 498. Note: Consent of instructor required.
Restriction(s): Students with a semester level of Academy Junior, Academy Senior, Freshman or Sophomore may not enroll.
Recent Term(s) Offered: fall 2017

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 302 or EM 303) and GEOL 111 and GEOL 113
Corequisite(s): CE 411
Recent Term(s) Offered: fall 2017; fall 2018; summer 2019; fall 2019

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
Course Fee: $125
Recent Term(s) Offered: fall 2017; fall 2018; summer 2019; fall 2019

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
Recent Term(s) Offered: spring 2017; spring 2018; summer 2018; spring 2019; summer 2019

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 2018

CE 436  Design / Construction Integration  3 Hours
The integration of the design and construction process. Using constructability concepts during the design process. Topics include value engineering, operation and maintenance, design from a construction standpoint, environmental concerns, cost analysis, alternative methods, and aesthetics.
Restriction(s): Students with a semester level of Academy Junior, Academy Senior, Freshman or Sophomore may not enroll.
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: spring 2019

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: spring 2017

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)
Corequisite(s): CE 305
Recent Term(s) Offered: spring 2017; spring 2018; spring 2019
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 461
Recent Term(s) Offered: None

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 2017

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: winter 2017; summer 2017; fall 2017; winter 2018

CE 476 Highway Construction 3 Hours
An in-depth study of certain phases of highway engineering and construction including geometric design, planning, traffic flow, highway capacity analysis, and economic analysis.
Prerequisite(s): CE 370
Recent Term(s) Offered: None

CE 482 WKU-Elementary Structural Design 3 Hours
Applications of principles of solid mechanics to the design of steel, timber and reinforced concrete members and structures. Emphasis is on basic ideas and their application to practical design of relatively simple structures according to the building code.
Prerequisite(s): (CE 382 or CE 373)
Recent Term(s) Offered: None

CE 486 Steel & Concrete Construction 3 Hours
Prerequisite(s): CE 316
Recent Term(s) Offered: None

CE 490 UK-CE Selected Topics (Fall) 3 Hours (repeatable max of 9 hrs)
Advanced special topics delivered in the fall semester by UK faculty to acquaint undergraduate students with significant problems and developments of current interest in civil engineering. Course is repeatable (with different topics) two times. Permission of instructor only. Note: Permission of instructor required.
Recent Term(s) Offered: None

CE 491 UK-CE Selected Topics (Spring) 3 Hours (repeatable max of 9 hrs)
Advanced special topics delivered in the spring semester by UK faculty to acquaint undergraduate students with significant problems and developments of current interest in Civil Engineering. Course is repeatable (with different topics) two times. Permission of instructor only. Note: Permission of instructor required.
Recent Term(s) Offered: None

CE 498 Senior Project 3 Hours
Students work on a multi-disciplinary civil engineering team to develop, design, test, and build (if applicable) a civil engineering project. Students choose their own project, normally encompassing multiple areas of civil engineering practice. Teamwork and management are stressed.
Prerequisite(s): CE 400
Restriction(s): Enrollment limited to students with a semester level of Senior.
Recent Term(s) Offered: spring 2017; spring 2018