Courses description

CE Courses – Level 2

CE 201: Statics (credit hours: 3)

Prerequisite: PHYS 101

Basic concepts and principles of mechanics; vector algebra; equilibrium of particles in two and three dimensions; definition of moment and couples; reduction of systems of forces; equilibrium of rigid bodies; statically determinate structures including beams, trusses, frames, and machines; internal forces; shear force and bending moment diagrams in beams; friction and its applications, centroid and center of gravity of lines, areas, and volumes; moment of inertia and radius of gyration.

CE 215: Computer Graphics (credit hours: 3)

Prerequisite: ICS 103

The course focuses on the following topics: Introduction to Computer Aided Design and Drafting, (CADD), 2D Drawings with AutoCAD includes Multi-view Projection, Dimensions, Sections, Auxiliary Views, Free Hand Sketching, Metallic Members and their Connections, Bearing and Slope of Lines and Planes, Contour Map Lines, Cut and Fill, Blueprint Reading, and 3D Drawings.

CE 261: Surveying (credit hours: 2)

Prerequisite: Sophomore Standing

Introduction to measuring units, significant figures, direct distance measurement with tapes, tape corrections; electronic distance measurement; levels and leveling; longitudinal profiles and cross sections; contouring; area and volume computations; the theodolite and angular measurements; optical distance measurements; rectangular coordinates; traverse surveys and computations; mapping; introduction to GPS and GIS; Laboratory field practice.

CE 203: Structural Mechanics I (credit hours: 3)

Prerequisite: CE 201, MATH 102

Concepts of stress, strain, and constitutive relations; stress and deformation of axially loaded members; thermal stresses; pressure vessels; energy concepts; torsion of circular and thin-walled sections; shear and bending moment diagrams in beams; elastic bending and shear stresses in beams; compound stresses; stress transformation; bending moment-curvature equation; deflection of beams; singularity functions methods, analysis and design applications.

CE 230: Engineering Fluid Mechanics (credit hours: 3)

Prerequisite: CE 201, MATH 102

Properties of fluids, hydrostatics with applications to manometers, forces on plane and curved surfaces, buoyancy, equations of continuity, energy and linear momentum with applications, Bernoulli's equation and flow measuring devices, dimensional analysis, dynamic similarity, open channel flow, conduit flow.

CE Courses – Level 3

CE 303: Structural Materials (credit hours: 4)

Prerequisite: CE 203

Composition and properties of hydraulic cements; characteristics of local aggregates and water; properties of fresh concrete; production, handling and placement of cement and fresh concrete in the local environment; properties of hardened concrete; mix design; special concretes; introduction to pavement types; asphalt cement types, properties and usage; properties of aggregate for asphalt concrete mixes; asphalt concrete mix design concept; types, engineering properties, and usage of structural steel; introduction to aluminum, timber, glass, plastics and other structural materials. Laboratory sessions on tests of concrete constituents, fresh and hardened concrete, aggregate gradation and mix design, flexure behavior of reinforced concrete beams, physical properties and testing of asphalt binders, asphalt concrete mix design; hardness test, tensile and torsion tests on metals, measurement of Poisson's ratio and stress concentration, and bending tests on steel beams.

CE 305: Structural Analysis I (credit hours: 3)

Prerequisite: CE 203

Shear force and bending moment diagrams for frames; influence lines for beams, frames and 2D trusses; displacement of beams by moment area, and conjugate beam methods; displacements of beams, frames, and trusses by virtual work; analysis of statically indeterminate structures; method of consistent deformation, energy methods, slope-deflection and moment distribution; introduction to the flexibility and stiffness matrix methods and computer applications.

CE 318: Numerical & Statistical Methods in CE (credit hours: 3)

Prerequisite: ICS 103, MATH 202

Introduction to numerical methods; error analysis; solution of system of linear and nonlinear equations; numerical integration; numerical solutions of ordinary differential equations; curve fitting and interpolation; statistical methods, descriptive statistics, probability distributions, analysis of variance and regression; introduction to linear programming and optimization problems; development and application of computer programs to case studies derived from civil engineering practices.

CE 330: Environmental Engineering Principles (credit hours: 3)

Prerequisite: CHEM 130 or equivalent

Introduction to major environmental pollution issues; Analyses of water quality; Municipal solid waste management and disposal; Hazardous waste testing, management, and treatment; Air pollution characteristics, effects, measurements, control, meteorology, and dispersion; Noise pollution control; Introduction to wastewater testing, treatment, and reuse; Environment Impact Assessment.

CE 312: Introduction to CE Design (credit hours: 1)

Prerequisite: CE 305, Junior Standing

A broad introduction of basic design concepts in different civil engineering disciplines; design landscape and requirements related to data, information, specification and codes, methods and tools, design considerations and constraints; issues related to safety, economy and impact; professional ethics and responsibility; design drawings; a small-scale project work to complement student's understanding.

CE 341: Transportation Engineering (credit hours: 3)

Prerequisite: PHYS 101, Co requisite: CE 343

Planning and evaluation of transportation systems; transportation in Saudi Arabia; characteristics of transportation systems and vehicles; introduction to design principles and transportation facilities including roadways and airports; flexible pavement design; application of computer software(s) related to transportation.

CE 343: Transportation Engineering Laboratory (credit hours: 3)

Prerequisite: CE 303, Co requisite: CE 341

Field studies for speed, traffic volume counts and delays; introduction and practice incapacity analysis, traffic signal design, pavement material testing and design; intersection, channelization, and highway geometric design; introduction to transportation related software's.

CE 353: Geotechnical Engineering I (credit hours: 4)

Prerequisite: CE 203, CE 230

Soil formation and identification; index and classification properties of soils; clay minerals; soil compaction; capillarity, swelling, shrinkage and effective stresses; flow of water in soils; compressibility and consolidation; stress in soils; shear strength of cohesive and cohesion less soils; introduction to lateral earth pressure and shallow foundation; Laboratory study of soil properties and behavior.

CE 351: Continue Coop Work (credit hours: 9)

Prerequisite: CE 318, ENGL 110, and senior standing.

A continuous period of 28 weeks is spent in the industry to acquire practical experience in Civil Engineering under the supervision and guidance of the employer and the academic advisor. During this period the student gains an in-depth exposure and appreciation of the Civil Engineering profession. The student is required to write a detailed report about his training period under the regulation of the CE department.

CE 315: Reinforced Concrete I (credit hours: 3)

Prerequisite: CE 305

Review of properties of structural concrete and reinforcing steel; behavior and design of reinforced rectangular and T-section in flexure; Use of computers in beam design for flexure; behavior and design of beams for shear, bond, and development length including splices and cut-off points; design; design of one-way slab, design of continuous beams with computer application for analysis; control of deflection and cracking; design of short columns; design of single footing; design project of a simple multistory building with one-way flooring system which integrates the design of the different structural components.

CE 332: Engineering Hydrology and Hydraulic (credit hours: 3)

Prerequisite: CE 201, MATH 102

Surface water hydrology, water cycle, precipitation, evaporation, stream flow. Principles of hydrologic systems and their analysis. Hydrologic simulation, reservoir planning and water supply studies. Analysis of rainfall and floods. Examination of flow in pipelines and pipe networks, pumps and pumping stations, hydrology, flow in open channels, groundwater hydraulics, and design of hydraulic structures.

CE Courses – Level 4

CE 413: Applied Design Project (credit hours: 3)

Prerequisite: CE351

CE students undertake a civil engineering design project under the supervision of a faculty member with the aim of achieving a comprehensive design experience through a coherent study of engineering and design principles. The student chooses the project in the field with which he is most familiar through his co-op work experience. The student is required to make an oral and written presentation of the design project to an examination committee.

CE 421: Construction Methods & Management (credit hours: 3)

Prerequisite: CE 303, Senior Standing

An overview of the construction industry, contracts, contract documents and professional liabilities, issues during construction phase, business ownership, cost estimation, equipment productivity; concrete form design; planning and scheduling using critical path method, resource leveling, cost control; introduction to pert, construction management aspects; materials management, bidding, construction productivity and safety.

CE 490: CE Seminar (credit hours: 1)

Prerequisite: CE 312, Senior Standing

Weekly presentation of lectures by the instructor and the invited speakers on topical issues in civil engineering, including contemporary issues, professional responsibilities, ethical issues and advances and challenges in civil engineering profession; each student will be required to make a presentation on a selected topic and participate in classroom discussion.

CE 415: Reinforced Concrete II (credit hours: 3)

Prerequisite: CE 315

Behavior and design of columns under axial load and bending including slenderness effects; design of wall footings; design of combined footings; ACI Code provisions for serviceability requirements; deflection of flexural members; design of two-ways slabs on beams using the ACI Direct Design Method; analysis and design of frames and continuous beams; design of one-way joist floor system; design of beam column joints; design of stairs behavior and design of retaining walls; introduction to pre-stressed concrete; design project of multistory building with two-way flooring system which integrates the design of different structural components; computer application in interactive design.

CE 405: Structural Analysis II (credit hours: 3)

Prerequisite: CE 305

Review of matrix algebra and solution of simultaneous equations; flexibility (force) method analysis; stiffness (displacement) method of analysis; 2-D trusses, beams, and frames; development of computer programs using the stiffness method; use of available computer packages for applications in structural analysis; introduction to the Finite Element Method; introduction to Structural Stability.

CE 408: Steel Design (credit hours: 3)

Prerequisite: CE 305

Properties of structural steel; steel sections and introduction to load resistance factor design (LFRD), design of tension members, compression members and capacity calculations; laced columns width-thickness ratios; design of beams with and without lateral supports; design of members under combined axial and bending loads; design and details of simple bolted and welded connections, and an introduction to common building connections; use of software for design of elements and overall design of frames.

CE 455: Foundation and Earth Structures Design (credit hours: 3)

Prerequisite: CE353

Site investigation, including determination of soil properties for design; bearing capacity theory of shallow foundation; settlement of building foundations; design and analysis of retaining walls, sheet piles and braced excavations; design of pile and pier foundations.

CE 453: Geotechnical Engineering II (credit hours: 3)

Prerequisite: CE 353

Fundamental relations of elasticity and plasticity in soil masses; unsaturated soils behavior; deformation properties of cohesionless and cohesive soils; advanced strength concepts in soils and stress path; slope stability analysis; introduction to soil dynamics.

CE 441: Pavement Design (credit hours: 3)

Prerequisite: CE 341, CE 343

Pavement types and loading, behavior of pavements under dynamic loads, stresses in flexible and rigid pavements, pavement components, pavement design factors, flexible highway and airport pavement design, rigid highway, and airport pavement design; overlay design and computer applications; practical pavement design project of a road and airport.

CE 444: Traffic Engineering & Roadway Safety (credit hours: 3)

Prerequisite: CE 341, CE 343

Vehicle, roadway, and driver characteristics; traffic engineering and safety studies; traffic flow theory and highway capacity analysis, and computer applications; traffic control methods and devices; operational considerations for safety; roadway lighting and highway traffic noise.

CE 440: Highway and Airport Materials (credit hours: 3)

Prerequisite: CE 303

Material types: asphalts, cement, aggregates, and local materials; specifications: material selection and design; tests of asphalts and aggregates, mix design procedures for hot and cold mixes of flexible pavements and concrete mixes for rigid pavements; characterization techniques; modulus of resilience, fatigue, rutting and field control tests.

CE 438: Hydraulic Systems Design (credit hours: 3)

Prerequisite: CE 230

Fundamental principles and design of water supply, sanitary and storm sewer systems and their components, including pipes, pumps, storage facilities, open-channels, culverts; computer applications in the design and analysis of hydraulic systems.

CE 473: Design and Operation of Water and Wastewater Treatment Plants (credit hours: 3)

Prerequisite: CE 330

Water and wastewater characteristics, theory and practice in sanitary engineering including the concepts of processing, design, economic evaluation, and computer analysis; class projects incorporating practical considerations in the design and operation of treatment units and the combining of unit processing in water and wastewater treatment plants; field trips to visit various types of treatment plants in operation.

CE 476: Hazardous & Solid Wastes (credit hours: 3)

Prerequisite: CE 330

Hazardous and solid waste quantities, properties, and sources. Theory and design of several industrial hazardous waste management and treatment aspects including regulations, environmental audits, pollution prevention, risk assessment, chemical & biological process fundamentals, and industrial hazardous waste separation, handling, treatment, & disposal techniques.