ÇANKAYA UNIVERSITY
DEPARTMENT OF CIVIL ENGINEERING
COURSE DESCRIPTIONS

FIRST YEAR

CE115 COMPUTER AIDED DRAWING FOR CIVIL ENGINEERS

The course mainly consists two parts. While the first part provides introduction and general information on AutoCAD, the second part is related with the basics of engineering drawing in civil engineering applications.

CE102 INTRODUCTION TO CIVIL ENGINEERING

This course is an introduction to the principles, practice, concepts, applications, and terminology involved in Civil Engineering. Engineering in general and Civil Engineering in particular are discussed including the history and evolution of the profession, the specialty areas under Civil Engineering, and modern applications. Students are informed about the civil engineering undergraduate program curriculum and policies. Engineering accuracy, presentation of simple calculations for engineering use, graphical communication are emphasized.

CE104 ENGINEERING GEOLOGY

The course gives an insight into the Science of Geology and its use in engineering designs. The main procedure in formation of Soil and Rock and their types are studied. Groundwater, erosion and weathering concepts are learned. Landslide mechanism and earthquake phenomenon with related engineering problems and their remediation including engineering support systems are studied.

SECOND YEAR

CE221 ENGINEERING MECHANICS: STATICS

The course covers the following topics; statics of particles: forces in plane; forces in space; equilibrium; moment of a force, moment of a couple, equivalent systems of forces on rigid bodies; equilibrium in two dimensions, equilibrium in three dimensions; distributed forces: centroids and center of gravity, analysis of structures: trusses and beams; Shear force and bending moment diagrams by method of sections and by method of integration, Area moment and centroid; moments and product of inertia; principal directions; method of virtual work.

CE209 GEOGRAPHIC INFORMATION SYSTEMS

Definition of the GIS, Components of a GIS, Maps and Their Influence on the GIS, Map Projection Systems, Spatial Data Models, Spatial Data Structures, Sources of Spatial Data, Spatial Database Models, Creation of a Spatial Database, GIS Database Applications, GIS Software and Hardware, Spatial Data Visualization, Symbolization of Spatial Data, Spatial Queries and Analysis, Civil Engineering Applications, Spatial Programming.

CE224 MECHANICS OF MATERIALS

The course covers the following topics; stress and strain concepts, axial load, statically indeterminate axially loaded members, thermal stress, torsion, angle of twist, statically indeterminate torque-loaded members, bending, eccentric axial loading of beams, transverse shear, shear flow in build-up members, combined loadings, stress and strain transformation, deflection of beams, statically indeterminate beams. This course is the foundation stone for much of engineering sciences.

CE222 ENGINEERING MECHANICS: DYNAMICS

The course covers the following topics; kinematics of particles, velocity and acceleration in rectangular, cylindrical, spherical and normal and tangential coordinates, rectilinear motion, relative motion, kinetics of particles; Newton's law of motion, equation of motion, work, impulse, momentum, principle of work and energy, principle of impulse and momentum, angular momentum, angular impulse and momentum principle, kinetics of systems of particles, planar kinematics of rigid bodies, instantaneous center of rotation, planar kinetics of rigid bodies, three dimensional kinematics of rigid bodies, three dimensional kinetics of rigid bodies.

CE242 MATERIALS OF CONSTRUCTION

The course covers the following topics; Production, types, uses in construction, properties and tests for these materials: lime, gypsum, hydraulic cements, mineral aggregates, concrete, clay products, ferrous metals, polymers, bituminous materials, timber. Constituents, theories of mix design, principal steps in production, physical and mechanical properties of concrete.

CE270 FLUID MECHANICS

The course covers the following topics; fluid properties, description of fluid statics, buoyancy and stability, basics of fluid motion, ideal flow mathematics, Bernoulli energy equation, conservation of momentum principle, laminar and turbulent flows, flow in pipes, pipelines, flow measurements, pumps and turbines.

THIRD YEAR

CE371 HYDRAULICS

The course covers the following topics; open-channel flow, hydraulic similitude and model studies, energy and momentum principles, critical flow: its computations and applications, flow resistance, development of uniform flow and its formulas, flow measurement in open channels and weirs, boundary layer, forces on immersed bodies, gradually varied flow, rapidly varied flow, and hydraulic energy dissipaters.

CE381 STRUCTURAL ANALYSIS

The course covers the following topics; Introduction, Review of Statically Determinate Structural Systems, Calculation of structural deformations using energy methods, Analysis of Statically Indeterminate Structures with the Force Method, Slope-Deflection Method, Moment Distribution Method, Matrix Displacement Method (Stiffness Method). It serves as an introduction to more advanced stress analysis procedures.

CE361 GEOTECHNICAL ENGINEERING

This course covers the following basic concepts: Overview of geotechnical engineering, Phase relationships; index properties and classification of soils, Compaction of soils, Seepage through soil Concept of effective stress and shear strength of soils, Stresses from elastic theory, Consolidation and settlement of soils

CE301 NUMERICAL METHODS FOR ENGINEERS

The course provides an integrated introduction to basic mathematical models in civil engineering so as to acquaint the students with the relevance and practical significance of the computing and algorithmic techniques in the field. Students are encouraged to write programs or to use available software platforms, where applications will be drawn from different fields of civil engineering so as to motivate individual interests of students and to equip them with basic computing tools for civil engineering applications.

CE331 CONSTRUCTION MANAGEMENT

This course covers following topics; Profile of the construction sector; company and site organization and types of contracts. Construction projects; estimating, tendering, planning and execution. Professional responsibility and engineering ethics. Productivity, quality, health and safety issues. Construction equipment; selection criteria, hourly cost determination and output analysis of excavators.

CE200 SUMMER PRACTICE I

Subjects that are acceptable for summer practice: Surveying, time-keeping, checking and testing construction materials, assisting resident engineers. Preparing quantity and cost estimates, unit price estimates, civil engineering drawings and graphs. Use of computers in elementary civil engineering operations, taking part in construction work. The department may organize a compulsory, collective Summer Practice Program where feasible. (20 working days).

CE372 WATER RESOURCES ENGINEERING

Introduction to hydrology and water resources engineering. Basin and hydrologic processes: precipitation, stream flow, infiltration. Hydrograph analysis. Hydrologic flood routing. Groundwater. Dams and spillways. Municipal water supply systems. Hydropower. Flood-Damage Mitigation. Planning for Water Resources Development.

CE382 REINFORCED CONCRETE STRUCTURES

The course covers the following fundamental topics for reinforced concrete theory: Mechanical behavior of concrete in uni-axial and multi-axial states of stress. Time dependent behavior of concrete. Mechanical behavior of reinforcing steel. Behavior and strength of uniaxially loaded members; confinement. Behavior and strength of members in pure bending. Behavior and strength of members under combined bending and axial load. Behavior and strength of members under combined shear and bending.

CE362 FOUNDATION ENGINEERING

This course covers the following basic concepts: General Principles of Foundation Design, Site Exploration & Soil Testing (In-situ & Lab), Shallow Foundations, Deep Foundations, Earth Retaining Structures & Lateral Earth Pressures, Analysis of Slope Stability & Methods

CE352 TRANSPORTATION ENGINEERING

This course covers the following topics: Introduction to transportation systems. Planning and management techniques. Vehicles, network and terminals as components of transportation systems engineering. Geometric Design of transportation facilities emphasizing land transportation. Introduction to models of traffic flow. Traffic analysis at intersections. Basic definitions and computations of level of service.

FOURTH YEAR

CE411 CIVIL ENGINEERING DESIGN I

This is structured to serve as a capstone design course for civil engineering students, with emphasis on reinforced concrete structural systems. It includes elements of foundation engineering and design.

CE481 STEEL STRUCTURES

Types and mechanical properties of structural steel, structural systems, failure criteria. Design approaches and design codes, load combinations. Design of tension members. Local buckling of columns and the design of compression members. Design of beams under combined stresses, plate girders, and beam columns. Bolted and welded connections.

CE300 SUMMER PRACTICE II

Subjects that are acceptable for summer practice: Surveying, time-keeping, checking and testing construction materials, assisting resident engineers. Preparing quantity and cost estimates, unit price estimates, civil engineering drawings and graphs. Use of computers in elementary civil engineering operations, taking part in construction work. The department may organize a compulsory, collective Summer Practice Program where feasible. (20 working days).

CE412 CIVIL ENGINEERING DESIGN II

This is structured to serve as a capstone design course for civil engineering students, with emphasis on steel structural systems. It includes elements of geotechnical and foundation engineering and design. Quantity take-offs, cost estimates, design of appurtenant infrastructure elements, complementary transportation facilities.

ELECTIVE COURSES

CE302 COMPUTER APPLICATIONS IN CIVIL ENGINEERING

This course covers following topics; Introduction to computer applications in civil and environmental engineering. Integration of design, data management, computer programming and problem-solving skills with computer tools and techniques. Topics include systems analysis, database management, computer programming and data structures.

CE332 PROJECT MANAGEMENT IN CIVIL ENGINEERING

This course covers following topics; definition of a construction project, the construction project life-cycle, contracting, contract management, human resources; project management organization, role of information and communications in project management, project finance and feasibility, planning and scheduling techniques for a construction project, project monitoring and control, procurement management, site management, quality management, uncertainty and risk management.

CE421 ADVANCED MECHANICS OF MATERIALS

Introduction to stress and strain relations in 3 dimensions. Principal stresses in 3 dimensions. Generalized Hooke's Law for isotropic materials. Failure theories. Finite difference method. Applications in cylindrical shells and rectangular plates. Torsion of prismatic bars. Beams on elastic foundations. Applications of energy methods. Impact loading on structures. Stability of columns.

CE426 FINITE ELEMENTS IN STRUCTURAL MECHANICS

This course covers the following topics; a review of matrix algebra, beam theory and governing equations; work, potential and kinetic energy, finite element formulations of beams, Timoshenko beam theory, bending and frame member, elastic stability, finite element solutions of beams on elastic foundations, eigenvalue problem in finite element and applications of variation and energy methods by finite element method.

CE468 INTRODUCTION TO GROUND IMPROVEMENT TECHNIQUES

This course is an introductory course on ground improvement techniques for problematic soils. The course content includes site investigation techniques, laboratory and in-situ soil testing techniques and ground improvement techniques. The improvement techniques covered in this course are surface and deep compaction; soil stabilization with admixtures; deep mixing method; preloading and vertical drains, dewatering; in-situ densification; geotextiles and reinforced earth

CE471 APPLIED HYDRAULICS

The course covers the following topics; basic hydraulics, hydraulic models, reservoir hydraulics, natural channels, regime canals, canals and conduits, hydraulic transients, river diversion, spillways and streambed protection works, environmental aspects and fish facilities, hydroelectric plants, pumped storage.

CE472 SEDIMENT TRANSPORT AND SCOUR

The course covers the following topics; river morphology and river response, basic concepts of hydraulics of open channels, properties of sediment, forms of bed roughness, resistance to flow, beginning of motion and design of stable channels, hydrologic analysis and sediment yield, analysis of the transport of sediments in open channels, application of sediment transport formulas, measurement of the sediment discharge of streams, scour mechanism, local scour at piers and abutments, protection of structures from local scour.

CE483 STRUCTURAL ANALYSIS II

Review of basic concepts of structural analysis, direct stiffness analysis of 2D and 3D frame structures, special techniques in stiffness analysis of structures, virtual work principles based on virtual displacements, introduction to finite element method, non-linear analysis of frame structures for large deflections.