HASAN KALYONCU UNIVERSITY

CIVIL ENGINEERING DEPARTMENT COURSE DESCRIPTIONS

1. SEMESTER

MATH111 – Calculus I

Trigonometric, Exponential, Inverse and Logarithmic Functions. Limits. Continuity. Limits Involving Infinity. Derivative, ChainRule. Implicit Differentiation, Derivatives of Inverse Trigonometric Functions. Extreme Values, First Derivative Test. Concavity, Curve Sketching. Integrals, Fundamental Theorem of Calculus. Substitution, Areas, Integration by Parts. Trigonometric Integrals, Trigonometric Substitutions. Integral Techniques.

PHYS101 – General Physics I

Definition of accuracy and significance of results in a measurement. Expressing vector quantities using different methods. Description of motion in one and multi-dimensions and their application to various problems. Introduction of Newton's laws of motion andc onservation laws, and their applications to various problems. Description of rotational motion and their applications specifically rigid bodies in static equilibrium. Using mechanical laws to describe planetary motion and fluids mechanics.

CHEM101 – General Chemistry

Introduction; matter and measurement, atoms, molecules and ions, Stoichiometry; basic laws of stoichiometry calculation with chemical formulas and equations, theory of atoms, the basic concept of bonding, the periodic Table, and properties, chemical bonds, gases and kinetic theory, solids, liquids, Intermolecular forces, aqueous reactions and solution stoichiometry, Chemical Equilibrium, Properties of solutions, Thermochemistry

ENG101 – Technical English I

The main objective of the English I course is to provide the student with a foreign language background. In this course, students acquire basic grammar knowledge of English. In these courses, where systematic foreign language education is given, students' speaking, writing, reading and listening skills are developed. In order to improve students' knowledge of English, these courses provide the foundation of foreign language for understanding academic texts as well as the foreign language they can use in their daily lives.

TÜR101 - Turkish Language and Literature I

Language and Languages: Language and Nation Relation, Language and Culture Relation, Languages in the world and the place of Turkish language among world languages.Language Families in care of its sources, Historical Development of Turkish writing language; Old Turkish, Middle Turkish, Divanü Lügat-it Türk, Atabetü;l- Hakayık, Harezm Turkish, Old Turkey Turkish (Old Anatolian Turkish) ; New Turkish Period, Modern Turkish Period, West

and South West Turkish Batı Türkçesi , Turkey Turkish, East (North East Turkish) , Karatay Turkish, Phonetics, Sound and Formation of Sound, backness and flatness harmony, Main sound events in Turkish; Sound properties of Turkish, Syllable structure of Turkish, Sentence stress. Morphology , words in terms of morphology, radixes, Stems, afformatives (derivational affixes, endings), words in terms of expression and duties; nouns, adjectives, pronouns, verbs, verb conjugation, form and time suffixes, verbs, prepositions, verbs derived from and verbs, semantics; meaning in word, meaning frame of word, sentence knowledge; types of sentences, sentence analysis.

FE101- Social Responsibility Project

Determining the current problems of society and preparing projects to produce solutions. Volunteering in various projects within the framework of social responsibility. Participatory and democratic individuals, solidarity and cooperation to reinforce, taking responsibility and project development / implementation. Non-governmental organizations. Current discussions on youth and social responsibility projects at European level.

INT100- Introduction to University Life

Orientation training with introductory content for the students to get used to university life. The methods of how to use the tools and equipment in the university, campus tour, city tours, general information about the departments, seminars and various social activities constitute the content of the course.

2.SEMESTER

MATH112 – Calculus II

Antiderivatives, Area and estimating with finite sums, limits of finite sums, the definite integral. Fundamental theorem of calculus, indefinite integrals and substitution. Area between curves.
 Volumes using cross-sections, volumes using cylindrical shells. Inverse functions and their derivatives, natural logarithms, exponential functions. L'Hospital Rule, Integration by parts, trigonometric integrals, Improper integrals, Sequences, Infinite series, the integral test, Comparison tests, The ratio and root tests. Alternating series, Power series. Taylor and Maclaurin series, Convergence of Taylor series.

PHYS102 – General Physics II

Definition of charge and electric fields. Determination of electric field due to a point charge or to a charge distribution. Using Gauss's law for symmetric charge distributions. Definition of electric potential and capacitance. Foundation of basic circuit elements. Definition of magnetic field and source of magnetic fields. Inductance and analyses of basic direct and alternating circuits. Using Maxwell's laws to describe the light as an electromagnetic wave.

CE112 – Technical Drawing

Scale, line types, geometric drawings, projections and perspective, freehand sketch drawing, drawing of various reinforced concrete building elements, steel construction, walls, roads and

earth works, culverts and bridges. Introduction to Autocad software, Autocad commands. Single dimension drawings, drawings with coordinates, page and setting commands, drawing commands, two dimensional drawings, practice.

ENG102 – Technical English II

This course is a continuation of English I and includes pre-intermediate subjects at intermediate level. While focusing on grammatical structures, the development of all language skills in various ways is encouraged. Exercises are focused on listening, verbal communication or reading comprehension skills or a combination of these.

CE122- Statics

The course introduces the fundamentals of statics within the field of engineering mechanics and provide a background for structural analysis of civil engineering systems. This course covers: rigid body mechanics, free body diagram in equilibrium position and static equilibrium equations for rigid body systems, finding the centroids of different geometric shapes, moments of inertia, analysis of trusses and beams, and defining distributed, normal and shear forces.

TÜR102 - Turkish Language and Literature II

Spelling, punctuation and composition (punctuation marks, other signs), spelling rules (spelling of capital letters, spelling of numbers, spelling of abbreviations, spelling of quote words), Composition (purpose of composition, method of writing composition), composition, plan, introduction, development, result, narrative characteristics, clarity of expression, simplicity in expression, sincerity in expression, disorders of expression (use of synonyms in sentences), misuse of expressions, forms of expression (explanation, story, succinct expression, description, satire, portrait, proof, speech, verse expression types), oral expression types (daily and unprepared speech, prepared speech, open session, debate, panel), written expression types (letters, telegraph, greetings, invitations, literary letters), business letters, formal letters, petitions, reports, record, decision, announce, advertisement, chat, review, remembrance, travel article, interview, survey, autobiography, biography, novel, story, fairy tale, fable, theater, tragedy, drama, script).

FE102- Technology and R&D Management

Definition and importance of innovation, types of innovation, innovation strategies, new product development.Definition and importance of entrepreneurship, types of entrepreneurship, entrepreneurship strategies, business models, entrepreneurship, product portfolio management.What is the project and definition of modern project management.Estimate project time and cost, cpm method.To have general information about environmental law, to have information about patent and intellectual property rights.Product recovery options: Recycling, repair, renovation, reproduction.

CE162- Geology for Civil Engineers

Structure of the Earth, geological cycles, rock and mineral types, soil properties, geological structures, active tectonics and earthquake hazards, groundwater, dams and reservoirs, foundations, tunnels, slope stability and landslides, natural construction materials, formation and prevention of the natural disasters such as earthquake, flood, landslide, and avalanche

3. SEMESTER

MATH211 - Linear Algebra

Systems of linear equations. Matrices. Algebraic properties of matrix operations. Special types of matrices. Echelon form of a matrix. Solving linear systems by Gauss-Jordan reduction. Finding the inverse of a matrix by row reduction. Equivalent matrices. Determinants. Properties of determinants. Cofactor expansion. Inverse of a matrix (via its determinant). Other applications of determinants (Cramers rule). Vectors in the plane and in 3-space. Vector spaces. Subspaces. Span and linear independence. Basis and dimension. Row space. Null space. Nullity and rank of a matrix. Homogeneos systems. Change oF basis. Transition matrices. Orthogonalization. Linear transformations. Kernel and range of a linear transformation.

MATH213 - Probability and Statistics

Introduction to probability, permutation, combination, relative frequency concept, axioms of probability, set theory, conditional probability, Bayes theorem, independence, mutually exclusive events, discrete random variables, probability mass and distribution functions, expected value, variance, Bernoulli, Binomial, and Poisson random variables, continuous random variables, their probability density and distribution functions, expected value and variance of continuous random variables, uniform, Gauss (normal), and exponential random variables, density function of a function of a random variable, jointly distributed random variables, density function of functions of independent random variables, introduction to random processes.

CE221 – Dynamics

This course covers the motion of moving solids, and the relation between speed, momentum and force. Topics include particle dynamics, linear and curvilinear motion, combination of motions, Newton's laws, Impulse, momentum and angular momentum, solid dynamics, kinematics, Euler's laws, and work and energy calculations.

CE223 - Strength of Materials

Mechanical properties of materials, Stress, Strain, Stress-strain diagrams, Linear elasticity, Hooke's Law. Plasticity. Axial load, thermal stresses. Torsion, Bending, Transverse shear, Shear stresses, shear center. Stress transformation,, Mohr Circle. Strain transformation. Normal force with bending, Bending with shear, Bending with torsion. Study of elastic curve by various methods.

CE231 - Engineering Economy

Introduction to Engineering Economics. Supply-demand relationship, supply elasticity, demand elasticity. Break-even analysis. Simple interest, compound interest. Money and time relations. Methods of selecting a profitable project. Renewal investments. Economic life analysis. Depreciation Accounts. A general overview of the course.

CE241 - Materials Science

Introduction to materials science and classification of atomic structures of the materials. Atomic bonding and arrangement. molecular structure. Crystal structures and imperfections. Solid-state diffusion. Phase diagrams and solidification. Metals, ceramics, polymers. Composites. Corrosion and degradation of materials. Mechanical properties of materials; stress and strain, behaviour under tension and compression, toughness, fatigue, creep.

FE201 – Engineering Ethics

Engineering ethics is the field of system of moral principles that apply to the practice of engineering. The field examines and sets the obligations by engineers to society, to their clients, and to the profession. As a scholarly discipline, it is closely related to subjects such as the philosophy of science, the philosophy of engineering, and the ethics of technology.

AİTT201 - Atatürk's Principles and History of Revolution I

Internal and external reasons for the collapse of the Ottoman Empire; XIX. Innovation movements in the Ottoman Empire in the 19th century; The idea movements in the last period of the Ottoman Empire; XX. At the beginning of the century the political and military situation of the Ottoman Empire; World War I and the Armenian question; Invasion and reactions of Anatolia; Mustafa Kemal Pasha's departure to Samsun and its activities; congress period and organization; the opening of the last Ottoman Parliament and the adoption of the National Pact; Preparation for the National Struggle and the material and moral foundations of this preparation; The opening and activities of the TGNA; Treaty of sevr; The struggles on the southern and eastern fronts; the establishment of a regular army, the Greek offensive and the wars on the Western front, the signing of the Mudanya Armistice, the convening of the Lausanne Conference and the signing of the Peace Treaty.

4. SEMESTER

MATH212 - Differential Equations

Classification of differential equations, solutions, initial value and boundary value problems, existence of solutions, First-Order Equations for which exact solutions are obtainable, Solution methods of high order linear differential equations, Electric circuit problems, Laplace Transform; definitions, theorems, examples, solution of linear, constant-coefficient initial-value problems, theorems, convolution integral and theorem, Impulse function and response, system function. Systems of Linear Differential Equations, Solutions of systems of linear differential equations.

MATH214 - Numerical Analysis

Taylor Series, Approximations and Errors, Methods for finding Roots of Equations: Bisection, False Position, and Iteration Methods, Newton-Raphson and Secant Methods, System of Non-linear Equations, System of Linear Algebraic Equations: Gauss Elimination, Matrix Inversion, Gauss-Seidel Iteration, One-dimensional Unconstrained Optimization, Least Squares Regression, Polynomial Interpolation, Numerical Differentiation, Numerical Integration, Newton-Cotes Formulae, Romberg's and Gauss-Quadrature Integration, Solution of Ordinary Differential Equations, Euler, Runge-Kutta, Multi-Step Methods, Initial-Value Problems, Boundary-Value Problems

CE242 – Construction Materials

This course is an introduction to the basic building materials, components and methods of production for these materials: timber, metal, lime, gypsum, stone, polymers, hydraulic cements, aggregates, concrete. Illustration of their applications in civil engineering. Also, the course includes; physical, mechanical and durability properties of fresh and hardened concrete, steel and wood. Load-time deformation characteristics of materials. Laboratory sessions consist of experiments on cementing materials, aggregates, concrete.

CE262- Surveying

Drawing: drawing maps with tachometric measurements, enlarging and reducing maps and plans, units of measurement: introduction of angle, length, area and volume units, conversion between angle units, errors: definition of error, classification of errors, correction, error limit, accuracy criteria, simple Measuring tools: jalon, jalon stand, steel tape measure, prism etc. Introduction and use of acid measuring instruments, simple measurements: application of points and lines with simple measuring instruments, length measurements: direct measurement or indirect calculation of lengths, simple pickup methods: definition of pickup, simple pickup methods and application, area calculations.

CE272 - Fluid Mechanics

This course gives the fundamental principles of fluid mechanics and their application to engineering problems and includes the study of behavior of viscous and non-viscous fluids at rest and in motion through development and application of the principles of fluid statics, continuity, energy, momentum, similitude, and dimensional analysis. The topics covered in this course throughout the semester include fluid statics; kinematics of fluid flow: continuity equation, stream function, ir-rotational flow velocity potential; fluid dynamics: flow of viscous fluids; newtonian fluids, simple laminar flow systems, turbulence, flow in pipes as well as selected subjects from compressible flow, open channel flow, boundary layer theory.

FE202 – Occupational Health and Safety

Risk groups of employees. Occupational health, importance of occupational health outlook, occupational health basics, occupational disease, the definition of work-related diseases-causes and prevention, occupational diseases related to chemical, physical and biological risks of

accidents at work, occupational health criteria and application areas, Health the right to security, safety culture concept

AİTT202 - Atatürk's Principles and History of Revolution II

Political reforms (abolition of the Sultanate, proclamation of the Republic, abolition of the Caliphate, etc.); revolutions in the social field (hat revolutions, closure of dervish lodges and lodges, calendar, time and surname law); reforms in the field of education and culture (Tevhid-i Tedrisat Law, Letters Revolution, Turkish History and Language Revolution); revolutions in the field of law; Attempts and reactions to transition to multi-party life in the period of Atatürk (the establishment and closure of Progressive Republican Firka, Sheikh Sait rebellion and the assassination attempt to Atatürk); Transition to the multi-party political life of Atatürk period (establishment of the Free Republican Party, closure and Menemen Incident); Republican period, Turkey's economic resources and policy (İzmir Economic Congress); Turkish foreign policy during the period of Atatürk (Population Exchange, membership of the League of Nations, Balkan Entente and Sadabat Pact); Atatürk era of Turkish foreign policy (Montreux Convention Regarding the Regime of the Straits, Hatay to join the motherland, Turkey's bilateral relations with other countries); Definition, scope and principles of Atatürk's thought system; After Ataturk's Turkey, the ruling Democratic Party in the 1960s and 1970s in Turkey, Turkey's foreign policy after 1960.

5. SEMESTER

CE321 - Structural Analysis

Types of structures, Supports and loads. Idealization of structures and loads. Geometric stability and determinacy. Analysis of determinate trusses, beams, plane frames and arches; reaction computation; axial force, shear force and bending moment diagrams. Influence lines of determinate structures. Introduction to indeterminate structures.

CE351 - Reinforced Concrete I

This course gives the basic principles for reinforced concrete design of structures based on mechanical properties of structural concrete. Fundamentals and design theories based on ultimate (Limit) strength design and elastic concept. Introduction to Turkish Standard for Reinforced Concrete Design 'TS-500', Building Codes and the American Concrete Institute Code ACI. Load factors, structural safety limits. Analysis and design of reinforced concrete members subjected to flexure, shear and diagonal tension in accordance to ACI strength method. Development length of reinforcement.

CE361- Soil Mechanics I

Physical properties of soils. Soil classification, soil structure and moisture effects. Total and effective stress calculation. Soil permeability and flow. Executing some basic laboratory experiments: Sieve analysis, Atterberg Limits, and Proctor compaction.

CE371 - Engineering Hydrology

The course serves as an introduction to the field of engineering hydrology. It covers fundamentals such as the hydrological cycle, catchment, losses, hydrographs and hyetographs. Design topics covered will be selected from: flood frequency analysis, determination of design rainfall intensity and hyetographs, peak flow estimation, design hydrograph estimation, groundwater process and modelling, and drought risk analysis/yield hydrology.

CE381– Highway Engineering

Introduction and basic concepts. Properties of road users. Stopping-Visibility distance. Vehicle movements. Overtaking distance and duration. Characteristics of highway traffic. Capacity of roads. Service Level of roads. Geometric properties of the road and selection of standards. Route research. Horizontal curves. Superelevation. Transition curves. Longitudinal section. Vertical curves.

6. SEMESTER

CE332– Construction Management

Study of Construction Management functions including Project Management, Cost Management, Time Management, Quality Management, Contract Administration, and Safety Management. Emphasis is put on the application of each function throughout the project phases.

CE352- Reinforced Concrete II

Design of slabs and different floor systems, one way, two ways. Design of continuous beams. Design of columns under axial and eccentric loadings, short columns and slenderness limits. Types of footings and their structural designs. In addition to practical design project.

CE354 - Steel Structures

Mechanical behavior and material properties of structural steel, design of steel structures, allowable stress design approach, introduction to use of AISC-LRFD code. The concepts of structural steel including connections, tension members, compression members, beams and beam-columns, beams and girders as well as bolted-welted connections.

CE356 - Engineering Design

The major focus of this course is to expose students to design process, research and analysis, teamwork, communication methods, global and human impacts, engineering standards, and technical documentation. This course gives students the opportunity to develop skills and understanding of course concepts through activity, project and problem-based learning.

CE362– Soil Mechanics 2

Consolidation theory, shear strength of soils, lateral earth pressure, gravity walls, slope stability.

CE372 – Hydraulics

Fluid flow concepts and measurements; Dimensional analysis, similitude and hydraulics models; Flow of incompressible fluids in pipelines; Pipe network analysis; Pump-pipeline system analysis and design, Steady open channel flow.

7. SEMESTER

CE461 – Foundation Engineering

Stress distributions beneath foundations, settelement and bearing capacity concepts for shallow foundations, design of shallow foundation and retaining structures.

CE471 - Water Resources Engineering

Methodology for water resources development, management and conservation is introduced from the engineering viewpoint. Main topics are distribution of water resource on the earth, grasp and prediction of water demand, planning and design of water resources systems, estimation and prediction of river flow, policy and water rights, and operation of reservoirs.

CE499 – Graduation Project

The projects will demonstrate the students' ability to apply, analyze, synthesize, evaluate information, and communicate significant knowledge and comprehension. This is an opportunity to expand the student personal knowledge and apply it to real-life situations, which will serve to benefit their growth and promote lifelong learning. Students shall complete their projects under the direction and supervision of faculty members. At the end of this course, students must deliver a product or significant study with a major component that has passed through the design, analysis, implementation, testing, and evaluation stages.

FE401 – Multidisciplinary Integrated Project

This course gives students the opportunity to become exposed to engineering disciplines (Civil, Electrical, Mechanical and computer engineering) by introducing problem situations that force them to link theory to practical real-world problems involving areas outside their own engineering disciplines. A multidisciplinary team environment forces students to interact with people that do not necessarily think like themselves and value the skills that other team members provide. Every graduating student will have "a multidisciplinary experience" during his or her undergraduate career. The use of a multidisciplinary integrated project provides one appealing pathway to achieve such experience.

In this course, real world multidisciplinary design experiences are used to prepare HKU graduates to enter today's workforce.

Undergraduate students from different engineering departments may sign performance contracts (for some modest team task) in turn with faculty advisers. Such "vertical and horizontal integration" of student participants allows an early preview of design team organization, and first-hand experience in viewing both good and poor team behavior. The team

may design both the product and the company, the former as a typical engineering product or process and the latter through development of a corporate business plan.

8. SEMESTER

<u>FE400 – Cooperative Education</u>

An Internship is a supervised pre-professional learning experience that allows students to apply their skills and knowledge in a professional setting. These experiences are designed to enhance the student's preparedness for an intended career with a business, industry, or government agency.

Cooperative education is a partnership between academic institutions and the practical world of work. For students, it is a formal education and practical experience in business, industry or government agency, a blend of theory and application, new skills and knowledge, a competitive salary, and a validation of career choice. Cooperative education is different from internship. It lasts 14 weeks (one semester). A co-op student of alternate semester should work and study as a full-time study.