Departmental and Math Courses for Civil Engineering Graduate Students

Fall 2020

DEPARTMENTAL COURSES FOR CIVIL ENGINEERING GRADUATE STUDENTS:

CE 506	COMPUTATIONAL METHODS IN CIVIL ENGINEERING	ASST. PROF. DR. MEHMET METİN KUNT	CIVIL ENGINEERING	Introduction to basic concepts. Curve fitting. Numerical interpolation and integration. Solution of systems of algebraic equations. Finite differences. Stability, consistency and convergence. Boundary and initial conditions. Partial differential equations. Numerical solutions to parabolic, hyperbolic and elliptic equations. Method of characteristics. Applications in civil engineering.
CE 556	MEASUREMENTS OF SHEAR STRENGTH OF SOILS	PROF. DR. ZALİHE SEZAİ	CIVIL ENGINEERING	States of stress in geotechnical engineering (isotropic, K0 conditions). Shear Strength Failure Criteria. Concepts of critical state soil mechanics. Direct shear test: loose and dense sands. Triaxial equipment and testing philosophies: deformation behaviuor (isotropic and shear loading). Unconsolidated undrained triaxial test. Consolidated undrained test with pore water pressure measurement. Skempton's A and B pore water pressure parameters. Cam Clay Model: framework and theoretical basis, predicted behaviour of NC and OC clays. Vane shear test for clays.
CIVL500	MASTER THESIS		CIVIL ENGINEERING	
CIVL530	SPECIAL TOPICS IN HYDRAULIC ENGINEERING	PROF. DR. UMUT TÜRKER	CIVIL ENGINEERING	Ficks' Law and its application on groundwater flow; Equilibrium beach profiles and equilibrium subaerial zones; Settling velocity analysis for silica and calcareous sand particles; IDF curves and

				L-moments technique; Energy dissipation and Hydraulic jump length on rough surfaces. Drought analysis.
CIVL537	THEORIES OF SEDIMENT TRANSPORT	ASSOC. PROF. DR. MUSTAFA ERGİL	CIVIL ENGINEERING	Introduction; properties of sediment; incipient motion of a sediment particle; fall velocity; bed-forms mechanics and resistance laws (ripples, dunes and anti-dunes); bed load, suspended load and total load theories and calculations; regime concept and stable channel design (the design of erodable channels); settling basin types and intake structures; scour criteria, isotope techniques in sediment transport studies. Sediment transport under wave action.
CIVL543	FINITE ELEMENT METHOD	ASSOC. PROF. DR. GİRAY ÖZAY	CIVIL ENGINEERING	Fundamental concepts, Principle of Minimum Potential Energy, Rayleigh-Ritz Method. Matrix algebra, Gaussian Elimination, Cholesky and symmetric banded matrices, Skyline solution. One dimensional problems: The steps include development of shape functions, derivation of element stiffness, formation of global stiffness, treatment of boundary conditions, solution of equations and stress calculations using potential energy formulation. Trusses, two dimensional problems using constant strain triangles, beams, frames and axisymmetric solids subjected to axisymmetric loading. Computer implementation.
CIVL552	GEOTECHNICAL EARTHQUAKE ENGINEERING	ASST. PROF. DR. ERİŞ UYGAR	CIVIL ENGINEERING	Vibratory motion. Single degree-of-freedom systems. Wave propagation through soils. Dynamic soil properties. Strength and deformation characteristics of cyclically loaded soils. Earthquake site response analysis. Ground motion characterization. Liquefaction. Ground settlement. Seismic analysis and stability of slopes. Seismic analysis and design of retaining structures.

CIVL577	SEISMIC PERFORMANCE ASSESSMENT OF BUILDINGS	ASSOC. PROF. DR. MAHMOOD HOSSEINI	CIVIL ENGINEERING	Review of seismic performance objectives and code design criteria. Linear and nonlinear procedures of analysis. Procedures for evaluating existing buildings. Factors affecting vulnerability of buildings. Vulnerability assessment techniques: seismic response vs. damageability. Loss estimation.
CIVL582	CREEP AND SHRINKAGE OF CONCRETE	PROF. DR. ÖZGÜR EREN	CIVIL ENGINEERING	The course concentrates on strain-time relationships of concrete as a composite material. Factors influencing creep and shrinkage are discussed in detail. Prediction of creep of concrete is also given with solved examples. Behavior of cracks in brittle solids and features of failure are other subjects to be discussed in detail.
CIVL587	CEMENT REPLACEMENT MATERIALS	PROF. DR. KHALED MARAR	CIVIL ENGINEERING	Hydration of Portland cement. Pozzolanic reactions. Portland-Pozzolan mixes. Calcined clay, shale and other soils. Slags and slag cements. Natural pozzolans. Silica fume. Fly ash.
CIVL598	GRADUATE SEMINAR		CIVIL ENGINEERING	
CIVL600	PH.D. THESIS		CIVIL ENGINEERING	
CIVL694	PROJECT MANAGEMENT	ASSOC. PROF. DR. TOLGA ÇELİK	CIVIL ENGINEERING	The project management context; Introduction to project management, project management processes. Project management knowledge areas; project integration management, Project scope management, project time management, project cost management, project quality management, project human resources management, project communication management, project risk management,

				project procurement management, Stakeholders management.
CIVL698	SEMINER		CIVIL ENGINEERING	
CIVL699	PH.D. QUALIFYING EXAM		CIVIL ENGINEERING	

MATH COURSES FOR CIVIL ENGINEERING GRADUATE STUDENTS:

CE 506	COMPUTATIONAL METHODS IN CIVIL ENGINEERING	ASST. PROF. DR. MEHMET METİN KUNT	CIVIL ENGINEERING	Introduction to basic concepts. Curve fitting. Numerical interpolation and integration. Solution of systems of algebraic equations. Finite differences. Stability, consistency and convergence. Boundary and initial conditions. Partial differential equations. Numerical solutions to parabolic, hyperbolic and elliptic equations. Method of characteristics. Applications in civil engineering.

CIVL543	FINITE ELEMENT METHOD	ASSOC. PROF. DR. GİRAY ÖZAY	CIVIL ENGINEERING	Fundamental concepts, Principle of Minimum Potential Energy, Rayleigh-Ritz Method. Matrix algebra, Gaussian Elimination, Cholesky and symmetric banded matrices, Skyline solution. One dimensional

				problems: The steps include development of shape functions, derivation of element stiffness, formation of global stiffness, treatment of boundary conditions, solution of equations and stress calculations using potential energy formulation. Trusses, two dimensional problems using constant strain triangles, beams, frames and axisymmetric solids subjected to axisymmetric loading. Computer implementation.
MATH523	STATISTICAL DATA ANALYSIS	ASST. PROF. DR. YÜCEL TANDOĞDU	MATHEMATICS	Brief review of some important probability concepts. Sampling methods. Data description and validation. Sample statistics. Point, interval estimation of population parameters and associated errors. Hypothesis testing on population parameters. Linear regression and correlation,

				multiple linear regression
MATH566	LINEAR ALGEBRA	ASST. PROF. DR. MÜGE SAADETOĞLU	MATHEMATICS / APPLIED MATHEMATICS AND COMPUTER SCIENCE	Vector spaces. Linear transformations. Invariant direct sum decompositions, Rational and Jordan forms.
MATH572	COMPUTATIONAL METHODS IN PARTIAL DIFFERENTIAL EQUATIONS FOR SCIENCE AND ENGINEERING	ASSOC. PROF. DR. DERVİŞ SUBAŞI	MATHEMATICS	Basic linear algebra. Method for designing difference schemes. Explicit, implicit formulae, convergence and stability for parabolic equations in one space dimension. ADI and LOD methods for parabolic eqautions in two space dimensions. ADI and LOD methods, the Neumann and Robbin's problems for Laplace's equation in a square. Laplace's equation in three variables. Explicit, Implicit and LOD methods for Hyperbolic equations.

MATH576	FRACTIONAL CALCULUS	ASST. PROF. DR. ARRAN FERNANDEZ	MATHEMATICS	In this course, we give the definitions of the Riemann-Liouville fractional order integral and fractional order derivative and investigate their properties such as mapping properties, semi group property, Leibnitz rule etc. Fractional integrals and derivatives of complex order are studied. The special functions of fractional calculus are briefly investigated. Moreover, Fourier, Laplace and Mellin transforms of fractional integrals and derivatives are given.
MENG511	ADVANCED COMPUTATIONAL METHODS FOR ENGINEERS	ASSOC. PROF. DR. QASIM ZEESHAN	MECHANICAL ENGINEERING	Multidisciplinary Design Optimization (MDO) deals with the optimization of several engineering disciplines simultaneously. It provides the opportunity to find the optimal solution of a system accounting for the interactions between the different disciplines. It has

				application potential in all fields of engineering especially, Mechanical, Mechatronics, Energy, Electrical, Electronics, Aerospace, Manufacturing and Industrial Engineering. The topics covered include: Introduction to Multidisciplinary Design Optimization, MDO Architectures, Unconstrained & Constrained Optimization, KKT Conditions, Modern Meta-heuristic Optimization Methods, Multi-Objective & Hybrid Optimization, Design of Experiments, Robust Design & Meta-Modeling, FMEA, VMEA, Post Optimality Analysis.
PHYS511	MATHEMATICAL METHODS FOR ENGINEERS AND SCIENTISTS I	PROF. DR. S. HABIB MAZHARIMOUSAVI	PHYSICS	A Review of Vector Analysis, Coordinate Systems and Tensor Analysis, Functions of a Complex Variable, Differential

				Equations (Series Solutions), Gamma and Beta Functions, Bessel's Functions, Legendre Functions, Fourier Series, Integral Transforms.