

KARABÜK ÜNİVERSİTESİ
LİSANSÜSTÜ EĞİTİM ENSTİTÜSÜ

DEPARTMENT OF CIVIL ENGINEERING					
Content of Master's Degree in Civil Engineering Sciences with Thesis					
COURSE CODE	COURSE NAME AND CONTENTS	T	A	C	ECTS
INM702	Slope Stability Analyzes	3	0	0	8
Purpose and Content	Slope stability problems encountered in rock and soil soils will be examined in depth, information will be given about analysis and design methods, and precautions to be taken against instability will be explained. Factors affecting classification and shifting; Stability analyses; Manual Solution, Stability charts; Sample applications of software used in slope stability analysis; Rock falls; Kinematic analyzes on rock slopes; Methods to increase stability in slopes; Horizontal earth pressures and retaining walls.				
INM703	Geotechnical Earthquake Engineering	3	0	0	8
Purpose and Content	Considering the effects of soil dynamic behavior in the design of soil structures Seismology and Earthquakes; Strong ground motion parameters; Seismic hazard analysis; Soil dynamic properties; Liquefaction; Seismic slope stability; Earthquake regulations related to geotechnical design				
INM706	Field Tests and Applications In Geotechnical Design	3	0	0	8
Purpose and Content	The purpose of this course is to be know and made geotechnical in-situ tests and their use in geotechnical calculations. During the course only field tests just mentioned. These tests and analyse details are explained with theory and practice. In-situ test using geotechnical works and design: standard penetration test, cone penetration test, flat dilatometer test, vane test, becker penetration test, pressuremeter tests, plate loading test, lugeon test, dynamic penetration test				
INM707	Earthquake Resistant Structure Design	3	0	0	8
Purpose and Content	To give basic information and concepts about earthquake resistant structure design. Causes of occurrence of earthquakes, earthquake-related terms, rules to be complied with in the Architectural and static project, Structure carrier system elements and arrangements, Turkey Building Earthquake Regulation design principles, Numerical applications.				

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INM708	Configuration Of Load Bearing Systems In Concrete Buildings	3	0	0	8
Purpose and Content	The last earthquakes have taken place throughout the world and the damaged buildings have shown the importance of structural system arrangement. In that class, the structural systems and important aspects in the design of high-rise structures are explained. The structural systems of industrial facilities are investigated. Introduction, predesign of structural systems and general considerations, loads, design of reinforced slabs, principals of structural system arrangement, highrise buildings, joints, superficial loadbearing systems, industrial structures.				
INM709	Design Principles Of Reinforced Concrete Retaining Walls	3	0	0	8
Purpose and Content	To introduce lateral soil pressures acting on reinforced concrete retaining walls, to introduce the types of retaining walls, have knowledge about the design of reinforced concrete retaining walls. Lateral soil pressure, Retaining wall types and pre-sizing, Principles of design of retaining walls according to the 2019 Turkey Building Earthquake Regulations.				
INM710	Design Principles Of Wooden Structures	3	0	0	8
Purpose and Content	Introduction of timber structures. Investigation of earthquake behaviors. To discuss the design principles of sizing. Timber structures introduced, giving the main advantages and disadvantages; Widely used in Turkey gives information about the timber structural systems; Evaluation of relatively performances in the recent earthquakes, that occur in our country, of aforementioned the structural systems; Giving of design principles of timber structures according to the current regulations and according to this, by determined affecting likely load to a timber structure selected as example, dimensions of according to the this loads.				
INM711	Engineering Hydrology	3	0	0	8

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Purpose and Content	The aim of the course are to inform about precipitation, evapotranspiration, infiltration, runoff and to teach measurement, calculation and use in hydrology Of engineering geology of these terms. Components of hydrologic cycle (precipitation, evapotranspiration, infiltration, runoff), measurement and calculation methods of the cycle component, drainage area, formation and properties of groundwater, relationship between precipitation and runoff, flood calculation, use of hydrologic cycle components in water resource management				
INM716	Theory Of Elasticity	3	0	0	8
Purpose and Content	Introducing the concepts and applications of engineering, learning solution techniques of boundary value problems and gaining application ability, correlating physical problem and mathematical formulation, providing fundamental knowledge for other engineering lessons and bringing engineering perspective Stress, strain, strain-stress relations, fundamental equations of elasticity, stress functions, polynomials solutions, Fourier series solution, finite difference method solution, solution in polar coordinates, Three dimensional elasticity and general equations, torsion.				
INM717	Advanced Structure Dynamics	3	0	0	8
Purpose and Content	To introduce dynamic approaches in building design and to perform dynamic analysis of structures Single degree of freedom (SDOF) systems, undamped vibration analysis of SDOF systems, damped free vibration analysis of SDOF systems, forced analysis of SDOF systems, Multiple degree of freedom (MDOF) systems, Equivalent earthquake load method and spectral analysis in MDOF systems, Mode superposition method (Modal Analysis)				
INM719	Pavement Management Systems	3	0	0	8
Purpose and Content	Learning the reasons of pavement distress, Learning the types of pavement distress, Having knowledge about the systems of pavement maintenance and rehabilitation, Having knowledge about pavement management systems The Pavement Management System; -PMS Data Needs-Evaluation of Pavement Structure Capacity-Evaluation of Pavement Distress, Evaluation of Pavement Safety-Data Base Management, Present Status of Pavement Network-Determining Present and Future Needs, Priority Programming of Rehabilitation and Maintenance-Prediction Models for Pavement Deterioration-Determining Needs, Rehabilitation and Maintenance Strategies-Priority Programming of Rehabilitation and Maintenance- Project Level Design Variability, Reliability and Risk in PMS, Generating Alternative Design Strategies-Rehabilitation Design Procedure, Selection of an Optimal Design Strategy-Implementing a PMS, Construction-Maintenance, Research Management- Working Systems.				

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INM720	Safety Principles On Highway Design	3	0	0	8
Purpose and Content	to present the importance of transportation, to describe basic highway definitions, to interpret statistical data and to present solutions, to understand active and passive safety systems, to ensure determining blackspots and carrying out accident analyses Description of transportation and its history, Basic definitions for highways, Statistics related to highway safety, Active/passive safety systems, Driver/pedestrian/vehicle/road characteristics, Blackspots and accident analyses, Horizontal and vertical traffic signs, guardrails (barriers)				
INM721	Highway Pavements and Applications	3	0	0	8
Purpose and Content	To define sort of pavements, to present the advantages/disadvantages of pavement sorts, to examine pavement materials and their characteristics, to inform about pavement design and its maintenance Flexible pavements, Aggregates, bituminous cement, flexible pavements, rigid pavements (concrete roads)				
INM722	Well Hydraulics	3	0	0	8
Purpose and Content	The aim of this course is to determine the hydraulic characteristics of aquifers using various equations and methods. Classification of aquifers, Hydraulic characteristics of aquifers (Hydraulic conductivity, transmissivity, storage coefficient). Basic concepts. Pumping Experiments and their properties. Darcy law, Dupit law. Stable and unstable regimes. Theim, Theis, Jakop methods used to determine the hydraulic characteristics of the aquifer.				
INM723	Flow Duration Curves	3	0	0	8
Purpose and Content	The purpose of this course, differences of river flows are modelled in hydrology corresponding to exceedance probabilities in order to use at different stages of projects at certain time gaps. On this point, the importance of flow duration curves are known and applications of them are learnt. Flow Duration Curves, Application Samples				
INM724	Analysis Of Hydrologic Data	3	0	0	8

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Purpose and Content	The purpose of this course is analysis of hydrological data by using regression analysis and learning the choice of independent and dependent variables with the help of statistical programs. Statistics, Regression Analysis, Simple Regression Analysis, Multiple Regression Analysis, SPSS				
INM725	Flood Hydrology	3	0	0	8
Purpose and Content	The purposes of this course are the description of the flood hydrology, defining the hydrological features which effect the magnitude of the flood, determining of the environmental impacts and the flood prediction using deterministic and statistical methods. In addition to these topics, the flood routing is examined and the necessary application examples are going to be solved in the flood routing. Flood Economy and Hazards, Studies for Flood Control, Flood Data, Flood Prediction Methods, Flood Routing, Examples from Case Studies.				
INM726	Repair and Strengthening of Reinforced Concrete Structures	3	0	0	8
Purpose and Content	To examine and teach the applications made to them earthquake resistant of existing concrete structures. Reasons and techniques of the repair and strengthening of reinforced concrete structures, materials used in reinforced concrete structures for repair and / or strengthening, and usage techniques, investigation of examples of reinforced concrete elements repair and strengthening.				
INM727	Prestressed Concrete and Prefabricated Structures	3	0	0	8
Purpose and Content	To introduce prestressed concrete technology, The course aims to examine structural behavior of prefabricated buildings, to discuss the design principles for applicability. The course teaches prefabricated structures, their advantages and disadvantages, examination of the prevalent prefabricated carrier systems in Turkey, examination of prefabricated structure types and building technologies, gaining experience about the structures that will be produced with these elements, obtaining the necessary infrastructure.				
INM728	Regression Analysis of Hydrologic Data	3	0	0	8

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Purpose and Content	The purpose of this course is analysis of hydrological data by using regression analysis and learning the choice of independent and dependent variables with the help of statistical programs. Statistics, Regression Analysis, Simple Regression Analysis, Multiple Regression Analysis, SPSS				
INM729	Plastic Analysis of Mixed Elements in Steel Structure	3	0	0	8
Purpose and Content	Describing the basic principles of the design of steel - concrete composite beams, slabs and columns. To introduce the advantages of composite structures and to expand the design of composite elements in buildings. Behavior and design of steel-concrete composite elements in buildings: composite floors, beams, columns, joints and frames; Analysis and design methods: plastic moment strength, elastic moment strength, longitudinal slip, vertical slip, deflection, vibration, crack control, transverse reinforcement, punching, complete and partial interaction; The behavior and design of slip connections: Non-ductile and non-ductile shear connections; Continuous beams and floors, lateral buckling; Connections.				
INM730	Plastic Analysis of Steel Structures	3	0	0	8
Purpose and Content	The aim of this course is to teach the students the basic principles of plastic analysis, design and ductile behavior of steel structures. Introduction; properties of structural steel; plastic behavior of cross sections; the concept of plastic analysis; plastic analysis methods; plastic analysis applications; regulations; principles of earthquake design; energy damping systems; rotational capacity of steel beams; ductile design of steel bearing systems, numerical examples.				
INM731	Advanced Concrete Technology	3	0	0	8
Purpose and Content	To learn the effects of components on concrete properties and gain problem solving ability The effects of concrete components on physical, mechanical and durability properties.				

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INM732	Sustainability of Concrete	3	0	0	8
Purpose and Content	<p>The major important subjects in concrete construction are that of provide a long service life of concrete and to provide do not need maintenance on concretes in service life duration. Moreover, required methods to produce durable construction elements should be understood. Within this scope, the aim of the course is that of determine choose and application of durable materials used in construction, defects in service life of concrete, durability test before construction, precautions and durable concrete production methods for all aggressive environment.</p> <p>Permeability and porous structure of concrete, cracks of concrete, physical causes of deterioration, chemical causes of deterioration, efflorescence and biological effects in concrete, carbonation, environmental effects and their precautions.</p>				
INM733	Theory of Elastic Stability	3	0	0	8
Purpose and Content	<p>To introduce the basic concepts and principles of elastic stability, to provide the ability to calculate buckling loads of columns and beam-columns loaded with pressure force, to gain the ability to use energy and numerical methods in stability, to gain the ability to use the gained knowledge in engineering applications and designs.</p> <p>Stability of Equilibrium, Branching, Large Displacement Theory of Columns, Columns with Primitive Curvature, Eccentric Loaded Columns, Nonelastic Buckling, General Theory of Columns, Columns Loaded with Intermediate Loads, Approximate Methods, Sequential Approach, Determination of Buckling Loads Variation Methods, Finite Element Method, Stress Stability, Dynamic Buckling of Column Beams - Columns, Buckling of Frames, Buckling of Rods, Buckling of Rods, Stress Buckling, Dynamic Buckling of Columns, Dynamic Buckling of Columns.</p>				
INM734	Matrix Methods in Structural Analysis	3	0	0	8

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Purpose and Content	<p>"Representation of equilibrium equations in matrix form in structural systems under static and dynamic loading. Internal force, deformation and displacement calculations of structural systems by matrix methods,</p> <p>Building algorithms and software development for application of matrix-displacement method for fast and economical solution of structural systems under different behavior and different loads"</p> <p>Stiffness and loading matrices in bar elements, matrix substitution method, application of the method to two and three dimensional frame systems, stiffness and loading matrices in continuous media parts, nonlinear systems in terms of material and geometry changes, application of the method to dynamic analysis of structural systems, matrix force method</p>				
INM735	Special Concretes	3	0	0	8
Purpose and Content	<p>To comprehend the necessity of special concrete manufacturing in the construction industry, to understand modern concrete production techniques, to learn special concretes, to understand the production techniques and usage purposes of special concretes.</p> <p>Modern concrete production in line with needs, special concretes, usage areas of special concretes and production techniques of special concretes</p>				
INM740	Intelligent Transportation Systems Planning	3	0	0	8
Purpose and Content	<p>The purpose of the course is to present knowledge on various topics that are necessary for Intelligent Transportation Systems (ITS) planning</p> <p>Definition of ITS and general information about current ITS applications/ITS user services/Travel and Traffic Management/ Congestion Pricing/Public Transit Operations/Electronic payment/ /Commercial vehicles operations/Emergency management/Advanced vehicle control and safety/Information management/Transportation Planning and ITS integration/ITS standards/ITS evaluation/ITS applications-challenges and benefits/ITS worldwide case studies</p>				
INM741	Traffic Management	3	0	0	8
Purpose and Content	<p>Analysis of urban traffic flows, determining problems and developing solution options at different type of intersections.</p> <p>Introduction; Traffic Flow and Components, Main Relationships of Traffic Flows; Statistical Attribute of Traffic Flows; Traffic Surveys (Counting and Observation Methods; Questionnaire and Forecast Methods); Intersections; Accident Points; Intersections Types and Capacities; Signalized Intersections and Signalization Methods; Single Point Intersection Signalization; Coordinated Signalization; Signalized Networks; Traffic Signs.</p>				
INM742	Reliability Analysis in Structural Engineering	3	0	0	8
Purpose and Content					



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INM743	Wastewater Reuse Applications Techniques	3	0	0	8
Purpose and Content	Information about the practices and techniques used for the reuse of wastewater will be conveyed to the students. Wastewater, parameters and basic concepts Domestic wastewater reuse techniques Reuse techniques of industrial process water rainwater harvesting Rainwater reservoirs and storage techniques gray water concept Classification of water to be reused				
INM744	Mineral Based Binders	3	0	0	8
Purpose and Content	To comprehend the necessity of special concrete manufacturing in the construction industry, to understand modern concrete production techniques, to learn special concretes, to understand the production techniques and usage purposes of special concretes. Modern concrete production in accordance with the needs; special concretes; usage areas of special concretes and production techniques of special concretes				
INM745	Advanced Soil Mechanics	3	0	0	8
Purpose and Content	The objective of this course is to teach the Geotechnical engineering students (Master and P.h.D degrees) the basic and advanced Geotechnical parameters affecting the soil behaviour. In other words, the soil parameters required for designing any structures related to soil are discussed in details. Based on this course, the students will learn the different behaviour of sands and clays in terms of shear strength. By and large, the main aims of this course, among others, are to evaluate the critical state soil mechanics , modulus and constitutive models for soils, and cam clay models. An overview on Geotechnical Engineering philosophy; An overview on general parameters affecting soil behaviour; An overview on advanced parameters affecting soil behaviour; Soil aggregate, plasticity, and classification; Essentials of material behaviour; Stresses and strains—elastic equilibrium; Stresses and displacements in a soil mass; Pore water pressure due to undrained loading; Consolidation; Shear strength of soils; Creep in soils; Critical state strength of soil; Peak states; Behaviour of soil before failure; Cam clay model; Stiffness of soil; Modulus and constitutive models for soils.				
INM746	Analysis of Steel Structure Elements with Finite Element Method	3	0	0	8
Purpose and Content	The aim of this course is to analyze steel structural elements by modeling with a widely used finite element program. In the finite element model of steel structures; creation of parts, definition of material properties, assignment of section properties, assembly of parts, structuring of analysis, application of boundary conditions and loads to the model, creation of mesh structure of the model and analysis of analysis results				
INM797	MSc Seminar	0	2	0	6
Purpose and Content	To have comprehensive knowledge about the subject which will be presented, to gain the ability of presentation, to consider the comprehension about the subject of thesis. A comprehensive research and presentation about a subject assigned by student and supervisor.				



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INM798	MSc Field of Specialization	4	0	0	4
Purpose and Content	Student overcomes the problems about the subject which will be studied. Basics conceptions and applications are intended for thesis work.				
INM799	MSc Thesis Research	0	1	0	26
Purpose and Content	To improve the ability of getting the scientific information, its evaluation and interpretation by conductive scientific research. MsC thesis work.				

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