REPUBLIC OF TURKEY
KONYA TECHNICAL UNIVERSITY
Graduate Course Information Form

Institute	**Graduate Education Institute**
Department	**Civil Engineering**
Division/Program	**Geotechnic**

PhD					
Course Code	**Course Name**	**Semester (X)**	**Credit**		
			T	P	ECTS
8122041021	Geotechnical Earthquake Engineering	…. Fall X Spring	3	0	5

Instructor (Title, Name Surname)	Language of Instruction (X)	Course Type (X)		Mode of Course (X)	
		Must	Elective	Face to face	Online
Prof. Dr. Murat OLGUN	X Turkish … English		**X**	**X**	

Assessment and Evaluation Methods			
	Evaluation Method	**Number**	**Percentage** (%)
	Laboratory		
	Quiz		
	Assignment	6	30
	Project	1	20
	Midterm Exam		
	Final Exam	1	50

Course Objectives and Goals	This course aims to introduce students to the problems that may arise due to earthquake effects in Geotechnical Engineering, to explain how the earthquake effect is used in the solution and calculations of geotechnical problems, and to define soil improvement methods under the influence of earthquakes. Course objectives; - Introduction of basic earthquake principles and terms - Introduction of Geotechnical Earthquake Engineering terms - Explaining the solutions to the bearing capacity and settlement problems of soils under the influence of an earthquake. - Explaining the problem of liquefaction under the effect of an earthquake - Explanation of soil improvement methods under earthquake effect
Course Content	1- Introduction to Geotechnical Earthquake Engineering 2- Basic principles of earthquake 3- Common effects of earthquake 4- Earthquake structural damage 5- Soil investigation in geotechnical earthquake engineering 6- Liquefaction of soils 7- The settlements of earthquake origin 8- The Bearing capacity analysis for earthquakes 9- The Slope stability analysis for earthquakes 10- The retaining wall analysis for earthquakes 11- The other analysis for geotechnical earthquake engineering 12- The leveling and other soil improvement methods 13- The foundation options to reduce the effects of earthquakes

	14- Earthquake conditions in the Building Codes. 15-Final exam
Course Learning Outcomes	1. Basic earthquake terms, structural and geotechnical problems caused by earthquakes are learned. 2. It is discussed and learned how to carry out soil bearing capacity examinations under the influence of earthquakes. 3. Calculation methods for settlements that will occur in the soil environment under the influence of an earthquake are learned. 4. Liquefaction conditions and calculation methods that will occur on the soil under the effect of an earthquake are learned. 5. Calculation methods of slope stability problems under the influence of earthquakes are learned. 6. Stability of retaining walls under earthquake effects and calculation principles are learned. 7. Soil improvement methods under earthquake effects are discussed and learned.
Recommended Resources	Geotechnical Earthquake Engineering Handbookı (Translating: Murat Mollamahmutoglu ve Kamil Bayabalı) Earthquakes and Tsunamis, A. Tugrul Tankut Foundation Analysis and Design, Joseph E. BOWLES

Edited by : Prof. Dr. Murat OLGUN
Date : 30/10/2025

REPUBLIC OF TURKEY
KONYA TECHNICAL UNIVERSITY
Graduate Course Information Form

Institute	Graduate Education Institute
Department	Civil Engineering
Division/Program	Geotechnic

PhD					
Course Code	Course Name	Semester (X)	Credit		
8122041023	Geotechnical Applications in Road Engineering	…. Fall X Spring	T 3	P 0	ECTS 5

Instructor (Title, Name Surname)	Language of Instruction (X)	Course Type (X)		Mode of Course (X)	
Prof. Dr. Murat OLGUN	X Turkish … English	Must	Elective	Face to face	Online
			X	X	

Assessment and Evaluation Methods

	Evaluation Method	Number	Percentage (%)
	Laboratory		
	Quiz		
	Assignment	6	30
	Project	1	20
	Midterm Exam		
	Final Exam	1	50

Course Objectives and Goals	The aim is to identify geotechnical problems encountered in road construction, a key area of Civil Engineering, interpret the details of these problems, examine proposed solutions, and demonstrate the application of these solutions using field examples. Course objectives: - Identify geotechnical applications encountered in road engineering - Identify the soil investigation studies required for road engineering applications - Explain geotechnical designs used in road engineering applications - Evaluate and discuss the suitability of geotechnical solutions applied in the field in road engineering
Course Content	1-Introduction: Geotechnical Investigations in Road Engineering 2- Compaction of Soils 3- Compaction Applications in Road Engineering 4- Stabilization of Soils 5- Drainage in Road Engineering 6- Consolidation in Road Engineering 7- Slope Stability 8- Retaining Walls 9- The Use of Geosynhetics Materials in Road Engineering 10- Anchoring Applications in Road Engineering 11- Ground nail and micro piles in Road Engineering soils 12- Soil Protection Structures in Road Engineering 13- Rock Mechanic Applications in Road Engineering

	14- The Examples of Stone Column, Piles and Jet Grouting Applications in Road Engineering 15-Final exam
Course Learning Outcomes	1- Geotechnical problems encountered in Road Engineering Practices are identified. 2- The ground investigation studies necessary for geotechnical design are detailed. 3- Design principles for geotechnical practices in Road Engineering are learned, and safety factors are evaluated. 4- Geotechnical studies conducted in the field within the scope of Road Engineering are evaluated and discussed using examples.
Recommended Resources	Geotechnic and its Applications in Road Engineering (Argun Tunç) Geotechnical Information II, The Slope Engineering (Akın Onalp) Congress Booklets of Soil Mechanics and Foundation Engineering

Edited by : Prof. Dr. Murat OLGUN
Date : 30/10/2025

Institute	Graduate Education Institute
Department	Civil Engineering
Division/Program	Hydraulic

M. Sc.			Ph.D. X		
Course Code	Course Name		Semester (X)	Credit	
8022031003	Flood Control		… Fall **X** Spring	T 3	P 0	ECTS 5

Instructor(s) (Title, Name Surname)	Language(s) of Instruction (X)	Course Type (X)		Mode of Course (X)	
Assist. Prof. Mustafa ONÜÇYILDIZ	**X** Turkish … English	Must	Elective	Face to face	Online
			X	**X**	

Assessment and Evaluation Methods

Evaluation Method	Number	Percentage (%)
Laboratory		
Quiz		
Assignment	**5**	**40**
Project		
Midterm Exam		
Final Exam	**1**	**60**

Course Objectives and Goals	In the course, floods will be introduced, flood protection methods and flood damage mitigation efforts will be presented.
Course Content	1- History of the Floods. The Classification of Floods. Important Floods in Turkey and in the World. 2- Flood Hydrology, Flood Hydraulics 3- Deterministic Streamflow 4- Simulation Stochasting Streamflow Simulation. 5- Flood Hydrographs 6- Flood Damage 7- Periods of Floods 8- Flood Forecasting 9- The Ways of Flood Protection 10- Upstream and Downstream Programs for Flood Control 11- Problems Connected With Flood Plains 12- Environmental Impact of Floods 13- The Plannning of Structures Under Flood Control 14- Mathematical Models. Measurement of Floods.
Course Learning Outcomes	1- Information will be obtained about floods. 2- Information will be obtained about the damage caused by floods and their prevention. 3- Information will be obtained about flood warning and safety measures. 4- Information will be obtained about flood protection structures, reclamation, and measurements.
Recommended Resources	- Leopold, L. B., T. M. Jr., The Flood Control Controversy, The Ronald Press Comp. New York. - Singh, V. P., Flood Hydrology, D. Reidel Publiching Company

Institute	Graduate Education Institute
Department	Civil Engineering
Division/Program	Hydraulic

M. Sc.			Ph.D. X		
Course Code	Course Name		Semester (X)	Credit	
8122031007	Basin Hydrology		**X** Fall	T	P	ECTS
			… Spring	3	0	5

Instructor(s) (Title, Name Surname)	Language(s) of Instruction (X)	Course Type (X)		Mode of Course (X)	
Assist. Prof. Mustafa ONÜÇYILDIZ	**X** Turkish … English	Must	Elective	Face to face	Online
			X	**X**	

Assessment and Evaluation Methods

Evaluation Method	Number	Percentage (%)
Laboratory		
Quiz		
Assignment	5	40
Project		
Midterm Exam		
Final Exam	1	60

Course Objectives and Goals	It is aimed to provide information about the basin, stream and its characteristics, as well as the processes of transition from precipitation to runoff and calculation methods.
Course Content	1- Definitions 2- Basin Characteristics 3- River Network Characteristics 4- Topology and River Networks 5- Lumped and Distributed Models (General). Examples of Lumped and Distributed Models as Nash Model etc 6- Unit Hydrograph 7- Flood Routing 8- Linear Channel, Linear Reservoir 9- Instantaneous Unit Hydrographs 10- Unit Hydrographs. Synthetic. 11- Unit Hydrographs. Synthetic 12- Unit Hydrographs. Geomorphologic 13- Generalized Rodrigues 14- Valdes Approach
Course Learning Outcomes	1- Participants will learn about basins and their characteristics. 2- They will learn about river networks and flow. 3- They will learn about floods and routing. 4- They will learn about Unit Hydrographs and their use.
Recommended Resources	- Singh, V.P.,Elementary Hydrology, Prentice Hall, 1992. - Clarke, R.T.,Statistical Modelling in Hydrology,John Wiley and Sons,1994. - Bedient, P.B., Wayne, C.H., Hydrology and Floodplain Analysis, Addison-Wesley Publishing Company,1992.

Institute	Graduate Education Institute
Department	Civil Engineering
Division/Program	Hydraulic

		Ph.D. …			
Course Code	**Course Name**	**Semester (X)**	**Credit**		
8122031018	Hydrology of Floods and Droughts	X Fall … Spring	T 3	P 0	ECTS 5

Instructor(s) (Title, Name Surname)	Language(s) of Instruction (X)	Course Type (X)		Mode of Course (X)	
		Must	Elective	Face to face	Online
Prof. Dr. Meral BÜYÜKYILDIZ	X Turkish … English		X	X	

Assessment and Evaluation Methods

	Evaluation Method	Number	Percentage (%)
	Laboratory		
	Quiz		
	Assignment	13	50
	Project	1	50
	Midterm Exam		
	Final Exam		

Course Objectives and Goals	1. Definition of flood, importance, identification methods of analysis and risk analysis 2. Definition of statistical methods used in flood estimation and application on various samples. 3. Drought and definition of low flow, identification methods of analysis and application on various samples. 4. To provide knowledge and skills in flood and drought management
Course Content	1- Introduction to flood hydrology 2- Factors affecting floods 3- Flood forecasting methods 4- Flood forecasting methods 5- Flood forecasting methods 6- Regional flood frequency analysis 7- Flood routing 8- Flood routing 9- Flood routing 10- Flood Management 11- Introduction to Drought Hydrology 12- Analysis of Low Flows 13- Analysis of Low Flows 14- Analysis of Dry Periods 15- Drought Management

Course Learning Outcomes	1. To learn analysis of extreme events, methods of risk analysis and flood analysis. 2. To learn basic knowledge level to calculate flood forecasts with statistical methods and gain the ability to use these methods. 3. To learn flood management in scope of sustainable use of water resources management. 4. To learn drought and calculation methods for low flows and gain the ability to use these methods. 5. To learn drought management in scope of integrated river basin management
Recommended Resources	1- Bayazıt, M., (2013), Hidroloji, Birsen Yayınları, İstanbul. 2- Usul, N. (2008). Mühendislik Hidrolojisi, ODTÜ Yayıncılık 3- Bayazıt, M., Önöz, B. (2008). Taşkın ve Kuraklık Hidrolojisi, 1. Basım. İTÜ, Nobel Yayın. 4- Şen, Z., Bayazıt, M., Avcı, İ. (2012). Hidroloji Uygulamaları. Birsen Yayınevi 5- Su Yönetimi Genel Müdürlüğü (2017). Taşkın Yönetimi. Ankara 6- Bayazıt, M. (1998). Hidrolojik Modeller. 1. Baskı. İTÜ 7- Şen, Z. (2009). Taşkın Afet ve Modern Hesaplama. Su Vakfı Yayınları 8- Lecture notes (pdf or ppt)

Institute	Graduate Education Institute
Department	Civil Engineering
Division/Program	Hydraulics

M. Sc. …			Ph.D. (X)			
Course Code	**Course Name**		**Semester (X)**	**Credit**		
8122031020	COASTAL STRUCTURES		…. Fall (X) Spring	T 3	P 0	ECTS 5

Instructor(s) (Title, Name Surname)	Language(s) of Instruction (X)	Course Type (X)		Mode of Course (X)	
Assist.Prof.Dr. Ali İhsan MARTI	(X) Turkish …. English	Must	Elective	Face to face	Online
			(X)	(X)	

Assessment and Evaluation Methods

Evaluation Method	Number	Percentage (%)
Laboratory		
Quiz		
Assignment		
Project		
Midterm Exam	1	40
Final Exam	1	60

Course Objectives and Goals	To teach students about the design, operation, and practical applications of coastal structures.
Course Content	1- Wind Waves 2- Wave Estimation Methods 3- Water Level Changes 4- Coastal Currents 5- Coastal Sediment Transport 6- Harbors 7- Shipyards 8- Breakwaters 9- Dock Structures 10- Floating Piers 11- Coastal Protection Structures 12- Submarine Pipeline Design 13- Mooring Buoys 14- Materials Used in Coastal Structures
Course Learning Outcomes	To instruct students about the subject of "The Design and Operation of Coastal Structures" among the Coastal Engineering sub-branch of Hydraulic Engineering.
Recommended Resources	"Kıyı Mühendisliği", Prof.Dr. Yalçın Yüksel, Prof.Dr. Esin Özkan Çevik, Beta Basım Yayım, 2009.

Institute	Graduate Education Institute
Department	Civil Engineering
Division/Program	

M. Sc. …			Ph.D. X		
Course Code	**Course Name**	**Semester (X)**	**Credit**		
8122041026	Scientific Research Techniques and Publication Ethics	… Fall X Spring	T 3	P 0	ECTS 5

Instructor(s) (Title, Name Surname)	Language(s) of Instruction (X)	Course Type (X)		Mode of Course (X)	
Prof. Dr. Ülkü Sultan KESKİN	X Turkish … English	Must	Elective	Face to face	Online
		X		X	

Assessment and Evaluation Methods

Evaluation Method	Number	Percentage (%)
Laboratory		
Quiz		
Assignment		
Project		
Midterm Exam		
Final Exam	1	100

Course Objectives and Goals	The aim of the course is to examine the stages involved in the scientific research process (problem identification, data collection, data analysis, and interpretation of results), review key scientific research methods (experimental methods, theoretical methods, etc.), and to enable students to identify a research topic and conduct research on a specific topic by teaching them the techniques of finding a research question, forming a hypothesis, conceptualizing, measuring, collecting data, analyzing data, evaluating/interpreting data, and writing reports. This course will emphasize the concept of ethics and ethical theories, research ethics and publication ethics, and what constitutes unethical behavior. It aims to provide information and awareness about the most common research and publication ethics violations, methods to prevent them, and the steps to follow if a violation is detected.
Course Content	1- Scientific research and scientific research processes 2- Scientific research methods (Qualitative Research), Scientific research methods (Quantitative Research) 3- Data collection processes and analysis methods, Concepts of validity and reliability 4- Steps followed to determine the research problem and hypotheses 5- Essential characteristics of a scientific study 6- Points to consider when writing scientific studies 7- Institutions and organizations that provide financial support for scientific studies, preparation of scientific research projects

	8- The concept of ethics and profession 9- Ethical theories 10- The concept of research ethics and its basic principles 11- Unethical behavior and ethical violations in the research process 12- Publication ethics and its basic principles 13- Unethical behavior and ethical violations in the publication process 14- Evaluation and discussion of legal regulations related to research and publication ethics
Course Learning Outcomes	Transfers scientific research techniques. Understands and analyzes the ethical aspects of science and technology-related topics. Can design a scientific research project and present it in a report in accordance with ethical rules.
Recommended Resources	Research Articles, Theses, and Final Theses Scientific Research Methods (Şener Büyüköztürk), Scientific Research Method (Niyazi Karasar)

REPUBLIC OF TURKEY
KONYA TECHNICAL UNIVERSITY
Graduate Course Information Form

Institute	Graduate Education Institute
Department	Civil Engineering
Division/Program	Mechanics

M. Sc. …			Ph.D. X		
Course Code	Course Name		Semester (X)	Credit	
8122001002	Ansys Applications in Structural Engineering		… Fall X Spring	T 3	P 0	ECTS 5

Instructor(s) (Title, Name Surname)	Language(s) of Instruction (X)	Course Type (X)		Mode of Course (X)	
Assoc. Prof. Dr. Alptuğ ÜNAL	X Turkish … English	Must	Elective	Face to face	Online
			X	X	

Assessment and Evaluation Methods

Evaluation Method	Number	Percentage (%)
Laboratory		
Quiz		
Assignment		
Project		
Midterm Exam		
Final Exam	1	100

Course Objectives and Goals	Teaching the modeling, design and evaluation of the results of structural elements with the ANSYS program.
Course Content	1- Introducing the Ansys Program and providing information about its content 2- Isostatic System solution 3- Hyperstatic System solution 4- Modal Analysis solution 5- Structural Minaret Solution 6- Historic Arch Bridge Solution 7- Buckling Application 8- Linear Dynamic Analysis 9- Nonlinear Dynamic Analysis 10- Spectrum Analysis 11- Monotonic Loading on Reinforced Concrete Beams 12- Fatigue Analysis 13- Prestressed Precast Beam 14- Monotonic and Reversible Repetitive Loading
Course Learning Outcomes	Research on nonlinear solution methods. Modeling of structures. Examination of analysis results.
Recommended Resources	İnşaat Mühendisliğinde Ansys Uygulamaları- Ahmet Can Altunışık

REPUBLIC OF TURKEY
KONYA TECHNICAL UNIVERSITY
Graduate Course Information Form

Institute	Graduate Education Institute
Department	Civil Engineering
Division/Program	Mechanics

M. Sc. …		Ph.D. X	
Course Code	**Course Name**	**Semester (X)**	**Credit**
8122001004	Structural Dynamics	X Fall … Spring	T 3 / P 0 / ECTS 5

Instructor(s) (Title, Name Surname)	Language(s) of Instruction (X)	Course Type (X)		Mode of Course (X)	
Assoc. Prof. Dr. Alptuğ ÜNAL	X Turkish … English	Must	Elective	Face to face	Online
			X	X	

Assessment and Evaluation Methods

Evaluation Method	Number	Percentage (%)
Laboratory		
Quiz		
Assignment		
Project		
Midterm Exam		
Final Exam	1	100

Course Objectives and Goals	Investigating the behavior of the structures under the effect of dynamic loads, gaining the students the right methods in the effect of dynamic loads.
Course Content	1-Introduction to Structural Dynamics 2-Single-degree-of-freedom systems, Elements of Lumped-parameter Models 3-Free vibration of SDOF systems,Damped vibration, Harmonic load, Periodic load, General dynamic load, 4-Continuous systems, Mathematical models of continuous systems, free vibration 5-Multiple-degree-of freedom systems, Mathematical models of MDOF system 6- Rayleigh method, Rayleigh-Ritz method 7-Numerical evaluation of modes and frequencies of MDOF systems 8-Mode superposition method 9-Finite element modeling of structures 10-Vibration analysis employing finite element models 11- Dynamics analysis of beams and plates 12-Introduction to earthquake response of structures 13-Resarch and project 14-Resarch and project
Course Learning Outcomes	Evaluation of the behavior of structures under various loads in terms of structural dynamics

Recommended Resources	Craig R.R., Structural Dynamics An Introduction to computer Methods, John Wiley- Sons,1984 Chopra, A.K.; Dynamics of Structures, Prentice Hall, 2002. Clough, R. W., Penzien, J.; Dynamics of Structures, McGraw Hill, 2001. Celep, Z., Kumbasar, N.; Yapı Dinamiği, Beta Dağıtım, 2001. Celep, Z., Kumbasar, N.; Deprem Mühendisliğine Giriş ve Depreme dayanıklı Yapı tasarımı, Beta Dağıtım, 2000 R. R. Craig; Structural Dynamics, John Wiley & Sons, 1981.

Institute	Institute of Graduate Studies
Department	Department of Civil Engineering
Program	MECHANICAL

Program Type	Course Name	Semester	Credits		
☐ Master ■ Doctorate	REPAIR AND REINFORCEMENT METHODS OF MASONRY STRUCTURE DAMAGES	☐ Autumn ■ Spring	T	L	ECTS
			3	0	7,5

Instructor	Language	Course Status (X)	
M. Sami DÖNDÜREN, Prof.Dr.	ˣ Turkish ˣ English ☐ Other………………..	Required	Elective
			X

Methods of Assessment

Exams and Assessment Methods	Number	Percentage (%)
Laboratory		
Oral exam		
Homework + Oral exam	1	%30
Project + Oral exam		
Written exam	1	%70
Other (……………….)		

Course Objectives	Explaining the types of masonry structures, types of repair and strengthening in masonry structures.
Course Content	1-3. week. Description of the building, building types, features sought in the building 4-5. week: Earthquake, earthquake types, fault, fault types. 6-7. week: Description of masonry structure, earthquake behavior 8-9. week: Evaluation of masonry structures in regulations 10-11. week: Repair and strengthening methods in masonry structures 12-14. week: Performance analysis in historical buildings
Course Outcomes	1. Learn the definition of masonry structures, their types, and the section on masonry structures in the regulation. 2. Learns the behavior of masonry structures under the influence of earthquakes. 3. Learns the types of repair and reinforcement in masonry structures.

Teaching Methods	Theoric		
Books & Materials	- Lecture Notes (pdf veya ppt)		
Course Category by Content (%)	Mathematics and Basic Sciences	% ….	
	Engineering Sciences	% 80	
	Design	% 20	
	Architectural Science	% ….	
	Social and Management Sciences	% ….	

T: Theory   L: Laboratory   ECTS: European Credit Transfer System

Name and Code of Course:				
Program Outcomes		1	2	3
1	An ability to apply knowledge of mathematics, science and engineering			x
2	An ability to design and conduct experiments, as well as analyze and interpret data			x
3	An ability to design a system, component on process to meet desired needs			x
4	An ability to function on multi-disciplmary teams		x	
5	An ability to identify, formulate and solve engineering problems			x
6	An understanding of professional and ethical responsibility		x	
7	An ability for effective written and oral communication in Turkish and English		x	
8	The broad education necessary to understand the impact of engineering solutions in a global and societal contents		x	
9	A recognition of the need for and ability to engage in life-long learning			x
10	A knowledge of contemporary issues			x
11	An ability to use the techniques skills and modern engineering tools necessary for engineering practice			x
Course Outcomes: 1: None 2: Partial 3: Completely				

Prepared by : **Prof. Dr. M. Sami DÖNDÜREN**
Date   **: 06/12/2023**

Institute	Graduate Education Institute
Department	Civil Engineering
Division/Program	Mechanics

M. Sc. …			Ph.D. X		
Course Code	Course Name		Semester (X)	Credit	
8122021007	Elastic Stability Theory		… Fall X Spring	T 3	P 0	ECTS 5

Instructor(s) (Title, Name Surname)	Language(s) of Instruction (X)	Course Type (X)		Mode of Course (X)	
Prof. Dr. Mehmet KAMANLI	X Turkish … English	Must	Elective	Face to face	Online
			X	X	

Assessment and Evaluation Methods

Evaluation Method	Number	Percentage (%)
Laboratory		
Quiz		
Assignment		
Project	1	%30
Midterm Exam		
Final Exam	1	%70

Course Objectives and Goals	Necessary definitions and stability methods. Buckling of straight axis bars under different boundary conditions. Lateral buckling of beams. Energy methods. Buckling of bars in elastic media. Buckling of frames. Buckling of plates
Course Content	1- Introduction to Elastic Stability 2- Methods in Stability. 3- General Theory of Elastic Columns. 4- Boundary Conditions. 5- Application 6- Eccentrically Loaded Columns 7- Variability of Compression Force. 8- Midterm exam. 9- Energy Method 10- Application 11- Rayleigh Ratio. 12- Ritz Method. 13- Method of Successive Approximations. 14- General review
Course Learning Outcomes	At the end of this course the student; 1. Knows the basic concepts of stability. 2. Learns the general theory of elastic columns 3. Calculates and analyzes eccentrically loaded columns. 4. Knows the energy method and the method of successive approximations. 5. After the completion of the course, students will have sufficient knowledge about stability and

	They can conduct scientific research and practice on this subject by gaining skills.
Recommended Resources	Lecture Notes, Timeshenko S.P. , Gere J.M.,(1961) Theory of ElasticStability.McGraw

Institute	Graduate Education Institute
Department	Civil Engineering
Division/Program	Mechanics

M. Sc. …			Ph.D. X		
Course Code	Course Name		Semester (X)	Credit	
8122021013	Damage Mechanics		X Fall … Spring	T 3	P 0	ECTS 5

Instructor(s) (Title, Name Surname)	Language(s) of Instruction (X)	Course Type (X)		Mode of Course (X)	
Prof. Dr. Mehmet KAMANLI	X Turkish … English	Must	Elective	Face to face	Online
			X	X	

Assessment and Evaluation Methods

Evaluation Method	Number	Percentage (%)
Laboratory		
Quiz		
Assignment		
Project	1	%30
Midterm Exam		
Final Exam	1	%70

Course Objectives and Goals	In recent years, it has become important to examine the effect of damage caused by external loads or aging on the mechanical behavior of materials with the Damage Mechanics approach. In this course, it is aimed to address the behavior of structural materials such as fracture, creep, fatigue and aging with this approach.
Course Content	1- Introduction. 2- Areas of applicability and usage. Damage variable. 3- Damage assessment scales; modulus of elasticity change 4- change of plasticity quantities 5- variation of viscoplasticity quantities 6- Elementary laws of damage mechanics 7- ductile fracture law, Kachanov creep law, fatigue laws 8- Three-dimensional criteria in damage mechanics 9- released elastic energy density criterion 10- three-variable criterion, unsymmetrical criterion in deformations, fatigue limit criterion 11- Thermodynamic formulation, three-dimensional representation 12- isotropic damage theory, anisotropic damage theory. Specific models 13- ductile plastic damage, creep damage 14- fatigue damage, joint effect of fatigue and creep damage
Course Learning Outcomes	Learning the principles of damage analysis. Evaluates the principles of fracture mechanics together with the concept of damage analysis.
Recommended Resources	Lecture Notes, 1- LeMaitre, J. and Chaboche, J.L:, Mechanics of Solid Materials , Cambridge University Press, New York, 1990, 556 pp.

2-Kachanov, L.M., Iıntroduction to Continuum Damage Mechanics , Martinus Nijhoof Publishers, Dordrecht, 1986, 135 pp.

3-Bazant, Z.P., Cedolin, L., Stability of Structures , Oxford University Press, New York Oxford, 1991 (chapters 8-13).

4-Nemat-Nasser, S. and Hori, M., Micromechanics: Overall Properties of Heterogeneous Materials , North-Holland, 1993, 688 pp.

5-Mura, T., Micromechanics of Defects in Solids , Martinus Nijhoff Publishers, The Hague, 1987, 587 pp.

6-Odquist, F. K. G., Mathematical Theory of Creep and Creep Rupture , Oxford University Press, 1966.

Institute	Institute of Graduate Studies
Department	Department of Civil Engineering
Program	MECHANICAL

Program Type	Course Name	Semester	Credits		
☐ Master ■ Doctorate	REPAIR AND REINFORCEMENT METHODS OF MASONRY STRUCTURE DAMAGES	■ Autumn ☐ Spring	T	L	ECTS
			3	0	7,5

Instructor	Language	Course Status (X)	
M. Sami DÖNDÜREN, Prof.Dr.	ˣ Turkish ˣ English ☐ Other………………..	Required	Elective
			X

Methods of Assessment

Exams and Assessment Methods	Number	Percentage (%)
Laboratory		
Oral exam		
Homework + Oral exam	1	%30
Project + Oral exam		
Written exam	1	%70
Other (……………….)		

Course Objectives	Teaching stress, strain, stress-strain relations and fracture theories in objects
Course Content	1-3. week. Stress, deformation 4-5. week: Stress-strain relationship in 3 dimensions 6-7. week: Fracture theories 8-9. week: Work of internal and external forces 10-11. week: fatigue 12-14. week: dislocation
Course Outcomes	1. Learns stress and deformation behavior in 3 dimensions 2. Learns to calculate internal and external forces 3. Learns fatigue and dislocation issues.
Teaching Methods	Theoric

Books & Materials	- Lecture Notes (pdf veya ppt)		
Course Category by Content (%)	**Mathematics and Basic Sciences**	**%** ….	
	Engineering Sciences	**%** 80	
	Design	**%** 20	
	Architectural Science	**%** ….	
	Social and Management Sciences	**%** ….	

T: Theory   L: Laboratory   ECTS: European Credit Transfer System

Name and Code of Course:				
	Program Outcomes	1	2	3
1	An ability to apply knowledge of mathematics, science and engineering			x
2	An ability to design and conduct experiments, as well as analyze and interpret data			x
3	An ability to design a system, component on process to meet desired needs			x
4	An ability to function on multi-disciplmary teams		x	
5	An ability to identify, formulate and solve engineering problems			x
6	An understanding of professional and ethical responsibility		x	
7	An ability for effective written and oral communication in Turkish and English		x	
8	The broad education necessary to understand the impact of engineering solutions in a global and societal contents		x	
9	A recognition of the need for and ability to engage in life-long learning			x
10	A knowledge of contemporary issues			x
11	An ability to use the techniques skills and modern engineering tools necessary for engineering practice			x
	Course Outcomes: 1: None 2: Partial 3: Completely			

Prepared by : **Prof. Dr. M. Sami DÖNDÜREN**
Date   : **06/12/2023**

Institute	Graduate Education Institute
Department	Civil Engineering
Division/Program	Transportation

M. Sc. …			Ph.D. X		
Course Code	Course Name		Semester (X)	Credit	
				T	P	ECTS
8122051002	FLEXIBLE PAVEMENTS		X Fall	3	0	5
			… Spring			

Instructor(s) (Title, Name Surname)	Language(s) of Instruction (X)	Course Type (X)		Mode of Course (X)	
		Must	Elective	Face to face	Online
Prof. Dr. Osman Nuri ÇELİK	X Turkish … English		X	X	

Assessment and Evaluation Methods

	Evaluation Method	Number	Percentage (%)
	Laboratory		
	Quiz		
	Assignment		
	Project		
	Midterm Exam		
	Final Exam	1	100

Course Objectives and Goals	To provide detailed information on flexible pavements, bituminous mixtures, and binders. To develop laboratory skills related to bituminous materials.
Course Content	1-Types of flexible pavements, 2- Design, 3- Design methods, 4- Stress distribution, 5- Materials, 6- Aggregate and bituminous binders, 7- Hot Bituminous Mixture design, 8- Laboratory investigations, 9- Marshall Mixture design, 10- Superpave Design Method 11- UMATA tests on bituminous mixtures, 12- Pavement deteriorations, 13- Performance Grade (PG) of bituminous binder 14- Surface dressing.
Course Learning Outcomes	1) Explains the types, components, and stress distribution principles of flexible pavement systems. 2) Explains the design principles of flexible pavements and applies the methods used. 3) Designs suitable mixtures by evaluating the properties of bituminous materials, aggregates, and asphalt mixtures. 4) Interprets the performance of bituminous mixtures using performance test data.

	5) Identifies the types of deterioration in pavements and analyzes their causes.
Recommended Resources	1- Asphalt handbook, Asphalt Institute, 2007. 2- Bitumen handbook, Shell, 1990. 3-Road Pavements, Umar F., Ağar E, I.T.U. Yayınları, No: 1299, (in Turkish). 4- Shell Bitumen handbook, İsfalt, 2004, (in turkish). 5- Asphat Aplications, İsfalt, 2001, (in turkish). 6- Asphalt handbook, İsfalt, 2002, (in turkish). 7- SCI index papers.

Institute	Graduate Education Institute
Department	Civil Engineering
Division/Program	Transportation

	M. Sc. …		Ph.D. X		
Course Code	Course Name	Semester (X)	Credit		
			T	P	ECTS
8122051003	ORIGINAL PROBLEMS IN TRANSPORT ECONOMICS	… Fall X Spring	3	0	5

Instructor(s) (Title, Name Surname)	Language(s) of Instruction (X)	Course Type (X)		Mode of Course (X)	
		Must	Elective	Face to face	Online
Prof. Dr. Osman Nuri ÇELİK	X Turkish … English		X	X	

Assessment and Evaluation Methods

	Evaluation Method	Number	Percentage (%)
	Laboratory		
	Quiz		
	Assignment		
	Project		
	Midterm Exam		
	Final Exam	1	100

Course Objectives and Goals	To give decision methods about some specific problems in transport economics and investments.
Course Content	1- Customer and investor profits, 2- Transportation affects to Economy, 3- Value of time, 4- Cost-benefit analysis, 5- Specific methods to solve transport problems, 6- Queuing methods, 7- Simulation methods, 8- Graphs theory, linear programming and transport problems, 9- Dynamic programming, 10- Game theories and competition methods, 11- Bids models, 12- Application of Laplace transforms to queueing models, 13- Amortization- renew and investment models 14- Other new methods
Course Learning Outcomes	1) Analyzes the fundamental principles of transportation economics and the economic impacts of transportation. 2) Evaluates the economic efficiency of transportation projects by applying time value and cost-benefit analyses. 3) Applies analytical methods such as queuing, simulation, and linear programming to solve transportation problems. 4) Optimizes decision-making processes using dynamic programming, game theory, and bidding models.

	5) Applies renewal, investment, and other economic models in transportation systems.
Recommended Resources	1. 'Original Problems in Transport Economics Lecturer Notes', Güngör Evren. 2. 'Cost Accaunting in Transport Manegements' Dr.Feryal Orhon. 3. 'Decision Methods' Prof.Dr. Mahmut Tekin. 4. 'System design and Optimization', Prof. Dr. Aziz Akgül Aklin. 5. 'Transport Ekonomics', P.C. Stubbs, W.J. Tyson ve M.Q. Dalvi. 6. 'Optimization Research', İ.İlhami Karayalçın, İTÜ, (in Turkish). 7. 'Optimization Research', Yaman Köseoğlu, İDMMA, (in Turkish). 8. SCI index papers. 'Earthworks and Railway', Prof. Dr. İnal Seçkin, (in Turkish).

Institute	Graduate Education Institute
Department	Civil Engineering
Division/Program	Structure

M. Sc. …			Ph.D. X		
Course Code	Course Name		Semester (X)	Credit	
8122002023	Ductile Design of Steel Structures		X Fall … Spring	T 3	P 0	ECTS 5

Instructor(s) (Title, Name Surname)	Language(s) of Instruction (X)	Course Type (X)		Mode of Course (X)	
Assoc.Prof.Dr. Günnur YAVUZ	X Turkish … English	Must	Elective	Face to face	Online
			X	X	

Assessment and Evaluation Methods

	Evaluation Method	Number	Percentage (%)
	Laboratory		
	Quiz		
	Assignment	2	50
	Project		
	Midterm Exam		
	Final Exam	1	50

Course Objectives and Goals	Understanding the effect of steel material properties and connections of structural system members on ductile behaviour of structural system, Understanding the effect of plastic behaviour of structural steel system members on energy dissipation capacity, Investigation of code specifications related to the design of ductile steel structures.
Course Content	1- Material properies of structural steel 2- Behaviour types of structural steel members 3- Plastic behavior at the cross-section level 4- Concept of plastic analysis 5- Methods of plastic analysis 6- Plastic behaviour under cyclic loading 7- Ductile moment-resisting frames 8- Ductile concentrically braced frames 9- Ductile eccentrically braced frames 10- Ductile buckling-restrained braced frames 11- Ductile steel plate shear walls 12- Other ductile steel energy dissipating systems 13- Ductile beam-column connections 14- Stability and rotation capacity of steel beams 15- Investigation of of recent studies on ductile design of steel structures
Course Learning Outcomes	Achieve ductile design of a steel structure. Design of structural connections to achieve structural ductility. Use of codes related to ductile design of steel structures. Investigation of current literature related to ductile design of steel structures.
Recommended Resources	1. Bruneau, M., Uang, C.-M. and Whittaker, A., Ductile Design of Steel Structures, 2nd edition , McGraw Hill Co. Inc. , 2011.

2- Deren, H., Uzgider, E., Piroğlu, F., Çağlayan, Ö., Çelik Yapılar, Çağlayan Kitabevi, 2012.
3- Türkiye Bina Deprem Yönetmeliği, 2018.
4- Çelik Yapıların Tasarım, Hesap ve Yapım Esaslarına Dair Yönetmelik, 2018.
5- AISC 341-16, Seismic Provisions for Structural Steel Buildings, 2016.
6- AISC 360-16 Specification for Structural Steel Buildings, 2016.

Institute	Graduate Education Institute
Department	Civil Engineering
Division/Program	Structure

M. Sc. …			Ph.D. X		
Course Code	**Course Name**	**Semester (X)**	**Credit**		
8122011025	Behavior of Reinforced Concrete Shear Walls and Shear Wall Structures	X Fall … Spring	T 3	P 0	ECTS 5

Instructor(s) (Title, Name Surname)	Language(s) of Instruction (X)	Course Type (X)		Mode of Course (X)	
Prof. Dr. S. Bahadır YÜKSEL	**X** Turkish … English	Must	Elective	Face to face	Online
			X	**X**	

Assessment and Evaluation Methods

Evaluation Method	Number	Percentage (%)
Laboratory		
Quiz		
Assignment	2	20
Project	1	40
Midterm Exam		
Final Exam	1	40

Course Objectives and Goals	Purpose of this course This course gives detailed information about the behavior of reinforced concrete shear walls and shear wall structures under the influence of earthquake loads, and analyzes using multi-mode pushover methods with non-linear earthquake calculations in shear wall structures and shear wall frame buildings with building height class (BYS) BYS1, BYS2, BYS3, BYS4, BYS5 aims to teach. Lesson objectives To give information about the behavior of Reinforced Concrete Walls and Shear Wall Structures under Earthquake loads To teach the analysis of shear and shear-framed structures using multi-mode push methods To give information about earthquake calculations of shear walls and shear framed structures with non-linear calculation method in the time domain Evaluation of deformations and internal forces in shear walls and shear-framed structures
Course Content	1- Mathematical models for concrete and steel 2- Behavior of shear-walls under horizontal loads 3- Moment curvature relationship for shear-walls 4- Design of coupled shear-walls and coupling beams 5- Bearing capacity calculation of shear-walls, moment force compatibility, 6- Plastic joint concept for shear walls, capacity design concept 7- Nonlinear behavior models, lumped plastic behavior model,

	distributed plastic behavior models 8- Analysis of shear walls using the variable single-mode push method 9- Analysis of shear walls using multi-mode pushing methods 10- Analysis of shear walls using multi-mode pushing methods 11- Earthquake calculation of shear walls with non-linear calculation method in time domain 12- Earthquake calculation of shear walls with non-linear calculation method in time domain 13- Evaluation of deformations and internal forces in shear walls 14- Evaluation of deformations and internal forces in shear walls
Course Learning Outcomes	1. Has knowledge about the concept of plastic joints for shear walls and the concept of capacity design 2. Information is obtained about nonlinear behavior models, lumped plastic behavior models, and distributed plastic behavior models 3. Information is obtained about the analysis of shear walls and shear-framed structures using the variable single-mode push method. 4. Analysis of shear and shear-framed structures using multimode pushing methods is learned in detail. 5. Obtain information about the non-linear calculation method in the time domain of shear walls and shear framed structures. 6. Obtain information about the non-linear calculation method in the time domain of shear walls and shear framed structures.
Recommended Resources	1. Park, R. and Paulay, T., (1975), *Reinforced Concrete Structures*, John Wiley& Sons, New York. 2. Paulay, T. and Priestley, M.J.N., (1992), *Seismic Design of Reinforced Concrete and Masonry Buildings*, John Wiley&Sons, Inc., New York. 3. Celep, Z., (2020), *Betonarme Taşıyıcı Sistemlerde Doğrusal Olmayan Davranış ve Çözümleme, Türkiye Bina Deprem Yönetmeliği (2018) Kavramları*, Beta Basın Yayın Dağıtım A.Ş. İstanbul. 4. Darılmaz, K., (2022), *Betonarme*, Birsen Yayınevi, İstanbul. 5. Darılmaz, K., (2023), *Depreme Dayanıklı Binaların Tasarımına Giriş*, Birsen Yayınevi, Genişletilmiş 2. Baskı, İstanbul. 6. Doğangün, A., (2024), *Betonarme Yapıların Hesap ve Tasarımı*, Birsen Yayınevi, 18. Baskı, İstanbul. 7. Celep, Z., (2024), *Betonarme Yapılar*, Birsen Yayınevi, Onbirinci ve TBDY (2018)'e uygun baskı, İstanbul. 8. Chopra, A. K. (2023), Dynamics of Structures, Theory and Application to Earthquake Engineering, 6th edition. 9. TBDY-2018, (2018), *Türkiye Bina Deprem Yönetmeliği*, T.C. Bayındırlık ve İskân Bakanlığı, Ankara. 10. TS500-2000, (2000), *Betonarme Yapıların Tasarım ve Yapım Kuralları*, Türk Standardları Enstitüsü, Bakanlıklar / Ankara.

Institute	Graduate Education Institute
Department	Civil Engineering
Division/Program	Structure / (PhD)

M. Sc. …			Ph.D. X		
Course Code	Course Name		Semester (X)	Credit	
8122011029	Energy Methods in Structural Engineering		…**X** Fall … Spring	T 3	P 0	ECTS 5

Instructor(s) (Title, Name Surname)	Language(s) of Instruction (X)	Course Type (X)		Mode of Course (X)	
Prof. Dr. S. Bahadır YÜKSEL	**X** Turkish … English	Must	Elective	Face to face	Online
			X	**X**	

Assessment and Evaluation Methods

Evaluation Method	Number	Percentage (%)
Laboratory		
Quiz		
Assignment	1	20
Project	1	40
Midterm Exam		
Final Exam	1	40

Course Objectives and Goals	To provide students with information about Energy Methods in Structural Engineering
Course Content	1- Fundamental mathematical knowledge, integral formulations 2- Potential operator, functional, Euler equation, transformation from differential operator to functional 3- Stress and equilibrium equations, generalized hook laws, deformation problems 4- Compatibility conditions, kinetic relationships 5- Definition of virtual work, virtual deformation, virtual force principle 6- Total potential energy principle, minimum potential energy principle 7- Complementary energy, Hamilton principle for continuous systems 8- Eigenvalue problems, analyzing of one-, two- and three-dimensional structural members with energy methods 9- Weak formulation of truss and beam elements, formulation of truss systems and beams and solving with energy methods 10- Plane frame 11- Detailed calculation for plane stress and plane strain problems with energy methods 12- Approximate solution techniques 13- Ritz and Rayleigh-Ritz methods 14- Numerical integration

Course Learning Outcomes	1- Have knowledge about energy methods 2- Gaining knowledge about the application of energy methods in structural engineering 3- To be able to analyze structural systems with energy methods
Recommended Resources	1. Reddy, J. N., (1984), Energy and Variational Methods in Applied Mechanics With an Introduction to the Finite Element Method, John Wiley & Sons , Ins., Canada. 2. Krishnamoorthy, C.S., (1986), *Finite Element Analysis*, Tata McGraw-Hill Publishing Company Limited, New Delhi. 3. Yang T.Y., (1992), *Finite Element Structural Analysis*, Prentice-Hall Publ. Co., New York. 4. Reddy, J. N., (2002), Energy Principles and Variational Methods in Apllied Mechanics, Second Edition, John Wiley & Sons , Ins., Canada.

Institute	Graduate Education Institute
Department	Civil Engineering
Division/Program	Structure

M. Sc. …			Ph.D. X		
Course Code	Course Name		Semester (X)	Credit	
8122011035	Cold-formed Steel Structures		… Fall X Spring	T 3	P 0	ECTS 5

Instructor(s) (Title, Name Surname)	Language(s) of Instruction (X)	Course Type (X)		Mode of Course (X)	
Assoc.Prof.Dr. Günnur YAVUZ	X Turkish … English	Must	Elective	Face to face	Online
			X	X	

Assessment and Evaluation Methods

Evaluation Method	Number	Percentage (%)
Laboratory		
Quiz		
Assignment	2	50
Project		
Midterm Exam		
Final Exam	1	50

Course Objectives and Goals	Investigation of material properties of cold formed steel, understanding the behaviour of cold formed steel structures having thin-walled steel, investigation of design and dimensioning rules, investigation of code specifications related to the design of cold formed steel structures.
Course Content	1- Behaviour characteristics of steel structural members 2- Material properties of cold formed steel 3- Cold forming methods 4- Properties, types and application areas of cold-formed steel structural members 5- Design methods 6- Stiffeners of planar compression members 7- Design rules of thin-walled planar compression members 8- Design rules of flexural members 9- Stability problem 10- Design rules of members subjected to concentric compressional load 11- Design rules of members subjected to torsional and flexural-torsional buckling 12- Design rules of members subjected to concentric compression load and flexural moment 13- Design rules of members subjected to tension load 14- Connection members 15- Investigation of of recent studies on cold-formed steel structures
Course Learning Outcomes	Achieve design of cold formed steel structures. Achieve design of structural connections. Use of codes related to cold formed steel structures. Investigation of current literature related to design of cold formed steel structures.

Recommended Resources	1- Uzgider, E., Arda, T.S., 1989 . Soğukta Şekil Verilmiş İnce Cidarlı Çelik Elemanlar, İTÜ. 2- Yu, W-W. , 2000 . Cold Formed Steel Structures, McGraw Hill Co., USA. 3- Türkiye Bina Deprem Yönetmeliği, 2018. 4- Çelik Yapıların Tasarım, Hesap ve Yapım Esaslarına Dair Yönetmelik, 2018. 5- AISI S100-16, North American Specification for the Design of Cold-Formed Steel Structural Members, 2016.

Institute	**Graduate Education Institute**
Department	**Civil Engineering**
Division/Program	**Structure**

M. Sc. …			Ph.D. X …			
Course Code	**Course Name**		**Semester (X)**	**Credit**		
8122011056	Behavior of Reinforced Concrete Members and Structures		… Fall **X** Spring	T 3	P 0	ECTS 5

Instructor(s) (Title, Name Surname)	Language(s) of Instruction (X)	Course Type (X)		Mode of Course (X)	
Prof. Dr. S. Bahadır YÜKSEL	… **X** Turkish … English	Must	Elective	Face to face	Online
			X	**X**	

Assessment and Evaluation Methods		
Evaluation Method	**Number**	**Percentage** (%)
Laboratory		
Quiz		
Assignment	2	20
Project	1	40
Midterm Exam		
Final Exam	1	40

Course Objectives and Goals	To provide students with information about the behavior of reinforced concrete elements and structures
Course Content	1-Examination of the assumption for the Ultimate Strength Design, 2- Limit state design and plastic hinge, 3- Confinement effect for the columns with stirrups, 4- Problems for the creep effect for the columns, 5- Ductility, 6- Computer programs for the beams, 7- Effect of different parameters to column behavior, 8- Computer programs for the columns, 9- Determination of the moment-curvature relationships, 10- Determination of the moment-curvature relationships, 11- Determination of the moment-curvature relationships, 12- Nonlinear Behavior, 13- Nonlinear Behavior, 14- Nonlinear Behavior.
Course Learning Outcomes	1-To be able to analyze reinforced concrete load-bearing elements 2-Ability to design reinforced concrete load-bearing elements 3-Betonarme taşıyıcı elemanların Davranışını Değerlendirebilmek
Recommended Resources	1. Ersoy, U., Özcebe, G., Canbay, E., (2023), *Betonarme - Davranış ve Hesap İlkeleri - Cilt 1*, Nobel Akademik Yayıncılık. 2. Ersoy, U., Özcebe, G., Canbay, E., (2021), Betonarme Cilt 2 - Özel Konular: TS 500-2000 ve TBDY-2019'a Uygun Olarak Geliştirilmiş Yeni Baskı. 3. Park, R. and Paulay, T., (1975), *Reinforced Concrete Structures*,

John Wiley& Sons, New York.

4. Paulay, T. and Priestley, M.J.N., (1992), *Seismic Design of Reinforced Concrete and Masonry Buildings*, John Wiley&Sons, Inc., New York.

5. Celep, Z., (2020), *Betonarme Taşıyıcı Sistemlerde Doğrusal Olmayan Davranış ve Çözümleme, Türkiye Bina Deprem Yönetmeliği (2018) Kavramları*, Beta Basın Yayın Dağıtım A.Ş. İstanbul.

6. Darılmaz, K., (2022), *Betonarme*, Birsen Yayınevi, İstanbul.

7. Darılmaz, K., (2023), *Depreme Dayanıklı Binaların Tasarımına Giriş*, Birsen Yayınevi, Genişletilmiş 2. Baskı, İstanbul.

8. Doğangün, A., (2024), *Betonarme Yapıların Hesap ve Tasarımı*, Birsen Yayınevi, 18. Baskı, İstanbul.

9. Celep, Z., (2024), *Betonarme Yapılar*, Birsen Yayınevi, Onbirinci ve TBDY (2018)'e uygun baskı, İstanbul.

10. Chopra, A. K. (2023), Dynamics of Structures, Theory and Application to Earthquake Engineering, 6th edition.

11. TBDY-2018, (2018), *Türkiye Bina Deprem Yönetmeliği*, T.C. Bayındırlık ve İskân Bakanlığı, Ankara.

12. TS500-2000, (2000), *Betonarme Yapıların Tasarım ve Yapım Kuralları*, Türk Standardları Enstitüsü, Bakanlıklar / Ankara.

Institute	Graduate education institute
Department	Civil engineering
Division/Program	Structure

Course Code		Course Name	Semester		Credits		
☐ Master ■ Doctorate		**Evaluation of seismic performance of existing reinforced concrete structures**	☐ Autumn ■ Spring	T 3	L 0	ECTS 5	

T: Theory   L: Laboratory   ECTS: European Credit Transfer System

Instructor	Language	Course Status	
		Required	Elective
Prof. Dr. M. Hakan ARSLAN	X Turkish X English ☐ Other……………...		**x**

Methods of Assessment

Exams and Assessement Methotds	Number	Percentage (%)
Laboratory		
Oral exam		
Homework + Oral exam	5	20
Project + Oral exam	2	20
Written exam	1	60
Other (………………)		

Course Objectives and Goals	The primary aim of this course is to comprehensively teach both theoretical and practical methods used in evaluating the seismic performance of existing reinforced concrete buildings. Within this scope, the plastic hinge hypothesis and its associated analytical approaches will be examined to model the plastic behavior of structural elements and assess their impact on overall structural performance. The course will detail the determination of ultimate load capacity through load increment methods, the concentration of nonlinear deformations in plastic sections, and the integration of these concepts into pushover analyses. Performance-based design and assessment principles will be reinforced through applied examples using single- and multi-mode nonlinear static analyses, as well as time-domain nonlinear analysis techniques.
Content	1. **Introduction and Fundamental Concepts**: Introduction to performance-based approaches in earthquake engineering, the significance of evaluating existing structures, and an overview of the course objectives. 2. **Plastic Hinge Hypothesis**: Examination of the basic assumptions used to model plastic behavior in structural elements and their applications in engineering practice. 3. **Analysis Based on Plastic Hinge Theory**: Calculation of plastic behavior at the section level, including moment–capacity relationships and evaluation of boundary

	conditions.
	4. **Determination of Ultimate Load Using Load Increment Method**: Definition of elastic and plastic limits and demonstration of how structural capacity is determined through incremental loading.
	5. **Concentration of Nonlinear Deformations in Plastic Sections**: Investigation of energy dissipation, damage zones, and the accumulation of deformation capacity in plastic regions.
	6. **Nonlinear Static Analysis (Single-Mode Pushover)**: Principles of pushover analysis, development of capacity curves, and steps for performance evaluation.
	7. **Multi-Mode Pushover Analysis**: Assessment of modal contributions, the influence of higher modes, and comparison with single-mode analysis.
	8. **Performance-Based Design and Evaluation**: Discussion of target performance levels (immediate occupancy, controlled damage, collapse prevention) and decision criteria.
	9. **Capacity Spectrum Method**: Explanation of the relationship between spectral displacement and capacity curves, including graphical solution techniques.
	10. **Displacement Coefficient Method**: Fundamentals of the method, application steps, and comparison with the capacity spectrum approach.
	11. **Recent Developments in Deformation and Displacement-Based Performance Evaluation**: Review of current literature, experimental findings, and emerging analytical techniques.
	12. **FEMA and ATC Procedures**: Overview of international guidelines such as FEMA 356, FEMA P-58, and ATC-40, with examples and adaptation to Turkish practice.
	13. **Core Principles of the 2018 Turkish Earthquake Code**: Explanation of regulatory foundations for evaluating existing structures, analysis types, and performance targets.
	14. **Performance Assessment Using Linear Elastic and Nonlinear Methods**
Outcomes	1. Earthquake damages and their causes are discussed, 2. The relevant provisions of the codes are examined, 3. Plastic hinge hypotheses and calculations according to plastic hinge theory are discussed and learned, 4. Focus is on finding the limit load by the load increase method, 5. The lumped of non-linear deformations in plastic sections is learned, 6. Non-linear static analysis (pushover analysis), performance-based design and evaluation are performed, 7. Capacity spectrum method and displacement coefficient method are examined, 8. The basic principles in the 2018 TBEC are examined and 9. Determination of earthquake performance and safety of existing structures is carried out using the linear elastic method and linear non-elastic method.
References	-TBEC-2018 -Lecturer notes and published papers (pdf and ppt)

Graduate Course Information Form

Institute	Graduate education institute
Department	Civil engineering
Division/Program	Structure

Course Code		Course Name	Semester	Credits		
☐ Master		**Rapid Evaluation Methods Based on**	■ Autumn	T	L	ECTS
■ Doctorate		**Inventory Information in Buildings**	☐ Spring	3	0	5.0

T: Theory   L: Laboratory   ECTS: European Credit Transfer System

Instructor	Language	Course Status	
		Required	Elective
Prof. Dr. M. Hakan ARSLAN	X Turkish X English ☐ Other………………..		x

Methods of Assessment			
Exams and Assessement Methotds		**Number**	**Percentage (%)**
Laboratory			
Oral exam			
Homework + Oral exam		5	20
Project + Oral exam		2	20
Written exam		1	60
Other (……………..)			

Course Objectives and Goals	The primary aim of this course is to conduct a comparative analysis of rapid assessment methods that enable the efficient and effective evaluation of existing building stock in terms of seismic safety. The focus is on techniques developed based on inventory data, aiming to identify structural vulnerabilities and risks under earthquake conditions. Risk analysis will be performed by examining parameters such as structural system characteristics, material quality, irregularities, and building usage types—thus providing a scientific foundation for pre-disaster intervention planning. Within this scope, national and international rapid assessment techniques such as FEMA-ATC, RVS, the 2019 Turkish Regulation on Risky Buildings, YAKUT, P25, DURTES, PERA, as well as Japanese and Canadian methods will be examined in detail. Each method will be analyzed based on its data requirements, ease of application, accuracy level, and decision-support potential through sample building evaluations. Furthermore, the differences between rapid and detailed assessment approaches used to determine seismic vulnerability will be highlighted, contributing to the decision-making processes of local authorities and engineers. This study ultimately aims to provide a scientific basis for strategic planning in disaster risk reduction.
Content	1. Introduction and fundamental concepts 2. Structural risks under earthquake effects 3. Overview of rapid and detailed assessment methods

	4. FEMA-ATC method 5. RVS (Rapid Visual Screening) method 6. Turkish Regulation on Risky Buildings (2019) 7. YAKUT method 8. P25 method 9. DURTES method 10. PERA method 11. Japanese method 12. Canadian method 13. Comparative analysis of assessment methods 14. Final evaluation and project presentations
Outcomes	1. Types and causes of earthquake-induced structural damage are explained. 2. Structural behavior and risk factors under seismic loading are discussed. 3. Fundamental principles and application areas of rapid assessment methods are analyzed. 4. National and international rapid assessment techniques are compared. 5. Advantages, limitations, and data requirements of each method are evaluated. 6. Rapid assessment applications are conducted on sample buildings. 7. Assessment criteria (structural system, irregularities, material quality, etc.) are applied to perform risk scoring. 8. Contributions of the methods to decision-support processes are analyzed. 9. Strategies for pre-disaster intervention planning by local authorities and engineers are developed. 10. Scientifically grounded approaches for risk reduction are proposed. 11. Cultural and technical differences are discussed through international case studies. 12. Students apply selected methods to a building of their choice and report the results. 13. Group discussions are conducted on the field applicability of the methods.
References	• Online Resources • Lecturer notes (pdf and ppt)

REPUBLIC OF TURKEY
KONYA TECHNICAL UNIVERSITY
Graduate Course Information Form

Institute	Graduate Education Institute
Department	Civil Engineering
Division/Program	Structure

M. Sc. …			Ph.D. X		
Course Code	**Course Name**	**Semester (X)**	**Credit**		
8122021012	Computer Aided Steel Structure Design And Analysis	X Fall … Spring	T 3	P 0	ECTS 5

Instructor(s) (Title, Name Surname)	Language(s) of Instruction (X)	Course Type (X)		Mode of Course (X)	
Assoc.Prof.Dr. Günnur YAVUZ	X Turkish … English	Must	Elective	Face to face	Online
			X	X	

Assessment and Evaluation Methods

Evaluation Method	Number	Percentage (%)
Laboratory		
Quiz		
Assignment	2	50
Project	1	50
Midterm Exam		
Final Exam		

Course Objectives and Goals	Ability to design computer-aided steel structures using computer programs, understanding the processes and parameters that need to be considered in design, modelling of steel structural systems and steel connection details, understanding the analysis and design of steel framed structures and connection details with finite element programs.
Course Content	1- Introducing computer programs used in civil engineering building design 2- Modeling and design of framed steel structures, bridges, industrial structures 3- Structural system selection and system features 4- Modeling of steel structures in finite element based programs 5- Earthquake loads 6- Analysis and design of steel connection details 7- Ductile design methods 8- Seismic dimensioning methods 9- Industrial Structures 10- Cable Structures 11- Structural system features of multi-storey high-rise buildings 12- Economical structural system selection 13- System and element stability 14- Stiffness selection and displacement limits in multi-storey steel structures 15- Investaigation of current studies on computer-aided analysis of steel structures

Course Learning Outcomes	Ability to design of steel structures with the help of computer programs. Ability to design and analyze of structural connections. Design parameters, modeling stages, material assignments, boundary conditions, loading applications and computer analysis.
Recommended Resources	1- Bruneau, M., Uang, C.-M. and Whittaker, A., Ductile Design of Steel Structures, 2nd edition , McGraw Hill Co. Inc. , 2011. 2- Deren, H., Uzgider, E., Piroğlu, F., Çelik Yapılar, Çağlayan Kitabevi, 2012. 3- Türkiye Bina Deprem Yönetmeliği, 2018. 4- Çelik Yapıların Tasarım, Hesap ve Yapım Esaslarına Dair Yönetmelik, 2018. 5- AISC 341-16, Seismic Provisions for Structural Steel Buildings, 2016.

Institute	Graduate Education Institute
Department	Civil Engineering
Division/Program	Construction Materials

M. Sc. …			Ph.D. X		
Course Code	Course Name	Semester (X)	Credit		
			T	P	ECTS
8122001005	Advances In Concrete Technology	… Fall X Spring	3	0	5

Instructor(s) (Title, Name Surname)	Language(s) of Instruction (X)	Course Type (X)		Mode of Course (X)	
		Must	Elective	Face to face	Online
Assoc. Prof. Oğuzhan Öztürk	x Turkish … English		x	x	

Assessment and Evaluation Methods		
Evaluation Method	Number	Percentage (%)
Laboratory		
Quiz		
Assignment		
Project		
Midterm Exam		
Final Exam	1	%100

Course Objectives and Goals	This course aims to enable students, researchers, and practicing engineers in the concrete industry to understand the various concrete constituents, materials, typical properties, and applications developed to address the shortcomings of conventional concretes. Course objectives: • The engineering properties of different concrete mixes • The definitions of special concretes and the standards they adhere to • Mix proportioning and production techniques • Developments in the history of concrete technology • Field applications
Course Content	1.Understands the definition, standards, mix design principles, properties, and applications of structural lightweight concrete. 2.Learns the historical development, significance, fresh and hardened properties, and microstructural evolution of high-strength concretes. 3.Gains knowledge of self-compacting concrete and shrinkage-compensating concrete technologies, including field experiences and adapting mix recipes to desired properties. 4.Becomes familiar with the definitions in standards, historical development, mix adaptations, and impacts on field practice for high-performance and fiber-reinforced concretes.Learns the definitions, application areas, laboratory tests, materials, and mix design of polymer-modified concretes, heavyweight concretes, mass concretes, and roller-compacted concrete. 5.Acquires knowledge about the impact of concrete on the world and civilization, durability and sustainability credits, environmental

	impacts, current challenges in concrete technology, and future concrete demand.
Course Learning Outcomes	1. Define and distinguish the standards, mix-design principles, properties, and application domains of structural lightweight concrete. 2. Explain the historical development of high-strength concrete and interpret its fresh/hardened properties and microstructural evolution using test data. 3. Adapt self-compacting and shrinkage-compensating concrete mix designs to meet specified performance targets, drawing on field experience. 4. Compare high-performance and fiber-reinforced concretes in terms of standard definitions, mixture adaptations, and implications for site practice. 5. Select materials and design mixes for polymer-modified, heavyweight, mass, and roller-compacted concretes, and justify choices with appropriate lab tests. 6. Evaluate durability and sustainability credits, assess environmental impacts, and articulate future demand and challenges for concrete technology.
Recommended Resources	-Concrete Technology, A.M. Neville, J.J Brooks, (kitap) -Concrete, Microstructure, Properties and Materials, Kumar Mehta, Paulo Monteiro (kitap) -Ders notları (pdf veya ppt)

REPUBLIC OF TURKEY
KONYA TECHNICAL UNIVERSITY
Graduate Course Information Form

Institute	Graduate Education Institute
Department	Civil Engineering
Division/Program	Materials Science

M. Sc. …			Ph.D. X		
Course Code	Course Name		Semester (X)	Credit	
8122011048	HIGH-PERFORMANCE CONCRETE		X Fall …. Spring	T 3	P 0

Credit columns: ECTS = 5

Instructor(s) (Title, Name Surname)	Language(s) of Instruction (X)	Course Type (X)		Mode of Course (X)	
Prof. Dr. Ülkü Sultan KESKİN	X Turkish … English	Must	Elective	Face to face	Online
			X	X	

Assessment and Evaluation Methods

Evaluation Method	Number	Percentage (%)
Laboratory		
Quiz		
Assignment		
Project		
Midterm Exam		
Final Exam	1	100

Course Objectives and Goals	The objective of this course is to provide students with detailed information on advanced concrete technologies, high-performance concrete types, their properties, and their applications.
Course Content	1- Concrete technology 2- Internal structure 3- Concrete deformations 4- Classification of high-strength concretes 5- Mixing properties of high-performance concretes 6- Mechanical properties of high-performance concretes 7- Fiber-reinforced concretes and their properties 8- Fiber-reinforced concrete and its properties 9- Fiber-reinforced self-compacting concrete and its properties 10- Cement paste-impregnated fiber-reinforced concrete (SIFCON) and its properties 11- Reactive powder concrete (RPB) and its properties 12- Reactive powder concrete (RPB) and its properties 13- ECC concrete and its properties 14- ECC concrete and its properties
Course Learning Outcomes	Provides details on advanced concrete technologies. Provides information on high-performance concrete design and properties. Explains the scientific principles behind various types of specialty concrete.
Recommended Resources	Lecture Notes prepared using a wide variety of sources Research conducted and articles published on this subject. Concrete Technology - Prof. Dr. İlker Bekir Topçu

Institute	Graduate Education Institute
Department	Civil Engineering
Division/Program	Materials Science

M. Sc. …			Ph.D. X		
Course Code	**Course Name**	**Semester (X)**	**Credit**		
8122011051	Durability in Concrete and Reinforced Concrete Structures	X Fall … Spring	T 3	P 0	ECTS 5

Instructor(s) (Title, Name Surname)	Language(s) of Instruction (X)	Course Type (X)		Mode of Course (X)	
Prof. Dr. Ülkü Sultan KESKİN	X Turkish … English	Must	Elective	Face to face	Online
			X	X	

Assessment and Evaluation Methods

Evaluation Method	Number	Percentage (%)
Laboratory		
Quiz		
Assignment		
Project		
Midterm Exam		
Final Exam	1	100

Course Objectives and Goals	The objective of this course is to introduce the concept of durability and understand its importance, introduce the physical and chemical deteriorating effects that can affect concrete and reinforced concrete structures, identify the physical and chemical causes of concrete deterioration, identify the types of cracks that form in concrete and their causes, gain knowledge about carbonation and corrosion, explaining the mechanisms of these effects and the measures that can be taken, and providing information about the identification of damage and repair principles.
Course Content	1- Definition and types of concrete, the importance of concrete durability - the relationship between strength and durability, the void structure and permeability of concrete, 2- Concrete cracks 3- Classification of Deterioration in Reinforced Concrete Structures, 4- Physical deterioration of concrete 5- Chemical deterioration of concrete 6- Biological effects and efflorescence in concrete 7- Freeze-thaw effect, 8- Fire effect, 9- Acid effect, Sulfate effect, 10- Carbonation 11- Alkali-silica reaction 12- Reinforcement Corrosion, 13- Seawater Effect, Concrete and Reinforced Concrete in Marine Environments 14- Environmental Exposure Classes, Design for Durability,

	Damage Assessment and Repair Principles
Course Learning Outcomes	Evaluates the relationship between the properties of different phases of hardened concrete and the durability of concrete. Reports on measures that can be taken against environmental effects affecting concrete. Defines basic concepts such as concrete internal structure, void distribution, types of deformation, and types of cracks.
Recommended Resources	Durability in Reinforced Concrete Structures- Bülent Baradan

REPUBLIC OF TURKEY
KONYA TECHNICAL UNIVERSITY
Graduate Course Information Form

Institute	Graduate Education Institute
Department	Civil Engineering
Division/Program	Materials Science

M. Sc. …			Ph.D. X		
Course Code	Course Name		Semester (X)	Credit	
8122011058	ADDITIVES USED IN CONCRETE PRODUCTION		… Fall X Spring	T P ECTS 3 0 5	

Instructor(s) (Title, Name Surname)	Language(s) of Instruction (X)	Course Type (X)		Mode of Course (X)	
Prof. Dr. Ülkü Sultan KESKİN	X Turkish … English	Must	Elective	Face to face	Online
			X	X	

Assessment and Evaluation Methods

Evaluation Method	Number	Percentage (%)
Laboratory		
Quiz		
Assignment		
Project		
Midterm Exam		
Final Exam	1	100

Course Objectives and Goals	The aim of this course is to provide students with information about the advantages and disadvantages of additives used in concrete technology and their relationship with sustainability.
Course Content	1- Concrete and additives 2- The need for additives 3- Classification of additives 4- Chemical additives 5- Water-reducing additives 6- Air-entraining agents 7- Setting accelerators and setting retarders 8- Mineral admixtures 9- Pozzolans and pozzolanic reactions 10- Natural pozzolans 11- Artificial pozzolans 12- Other admixtures 13- Admixture cements and their classification 14- Sustainability and green transformation
Course Learning Outcomes	Defines and classifies concrete admixtures. Selects the admixture to be used where needed. Defines alternative methods for sustainability in the concrete and cement industry.
Recommended Resources	Admixtures for Concrete-Turhan ERDOĞAN

REPUBLIC OF TURKEY
KONYA TECHNICAL UNIVERSITY
Graduate Course Information Form

Institute	**Graduate Education Institute**
Department	**Civil Engineering**
Division/Program	**Construction Management**

M. Sc. …			Ph.D. X		
Course Code	**Course Name**	**Semester (X)**	**Credit**		
			T	P	ECTS
	Sustainable Green Buildings	… Fall / X Spring	3	0	5

Instructor(s) (Title, Name Surname)	Language(s) of Instruction (X)	Course Type (X)		Mode of Course (X)	
		Must	Elective	Face to face	Online
Prof.Dr. Mustafa Tolga ÇÖĞÜRCÜ	X Turkish … English		X	X	

Assessment and Evaluation Methods

Evaluation Method	Number	Percentage (%)
Laboratory		
Quiz		
Assignment	1	40
Project	1	60
Midterm Exam		
Final Exam		

Course Objectives and Goals	To teach the issues to be considered for sustainable and green buildings through the examples of green buildings available in the world, To give main information about green buildings and sustainability.
Course Content	1- Sustainability Concept 2- Economic Sustainability 3- Environmental Sustainability 4- Social Sustainability 5- Green Building Concept 6- Energy Efficiency in Buildings 7- Water Efficiency in Buildings 8- Indoor Environment Quality in Buildings 9- Materials in Buildings 10- Urban Transformation and Green Buildings 11- Costs in Green Buildings 12- Green Buildings and Real Estate Development 13- Green Buildings and Project Management 14- Green Building Certification Systems
Course Learning Outcomes	Students will have learned the concept of sustainability in engineering design and will understand the use of resources in green buildings and the relationship of green buildings with real estate and project management.
Recommended Resources	Kibert, J.C. (2022).Sustainable Construction: Green Building Design and Delivery. 5. Edition.ISBN: 978-1-119-70645-8

| | Kubba, S.(2017).Handbook of Green Building Design and Construction: LEED, BREEAM, and Green Globes, Second Edition. ISBN: 978-0-12-810433-0 |

Institute	Graduate Education Institute
Department	Civil Engineering
Division/Program	Construction Management

M. Sc. …			Ph.D. X		
Course Code	Course Name		Semester (X)	Credit	
	Project and Construction Management		X Fall	T	P	ECTS
			… Spring	3	0	5

Instructor(s) (Title, Name Surname)	Language(s) of Instruction (X)	Course Type (X)		Mode of Course (X)	
Prof.Dr. Mustafa Tolga ÇÖĞÜRCÜ	X Turkish … English	Must	Elective	Face to face	Online
			X	X	

Assessment and Evaluation Methods

	Evaluation Method	Number	Percentage (%)
	Laboratory		
	Quiz		
	Assignment	1	40
	Project	1	60
	Midterm Exam		
	Final Exam		

Course Objectives and Goals	Information about different construction project delivery systems. Information on the tender and contract documents. Information on the functions of the project managers of the landlord and contractor.
Course Content	1- Project delivery systems, 2- Construction contract and tender documents 3- Drawings and technical specifications 4- Drawing and technical specification formats, 5- General specifications, 6- Special specifications, 7- Contractor qualification requirements standard documents 8- Main tasks of the contractor's project manager. 9- Cost, duration and contract management duties of the project and construction managers of the owner, 10- Administrative procedures and processes, 11- Manufacturing lists, 12- Proposal documents, bid evaluation 13- Public procurement institution construction works, 14- Consultancy service purchases
Course Learning Outcomes	1. In project delivery systems, project process participants, participants' duties and responsibilities and contracts information 2. Information on contract models that can be used in project delivery systems 3. Ability to select the appropriate project delivery system 4. Information on the functions of the project managers of the

	landlord and contractor
Recommended Resources	Construction Specification Institute, The CSI Project Delivery Practice Guide, John Wiley & Sons, 2011, NJ USA. Gould, F.E., Joyce, N.E., Construction Project Management, Prentice Hall, Columbus Ohio 2000. A Guide to the Project Management Body of Knowledge, PMBoK Guide®-Fourth Edition, An American National Standard, ANSI/PMI 99-001-2008, Project Management Institute Inc., 2008. Proje Yönetimi Bilgi Birikimi Kılavuzu, (PMBoK Kılavuzu®-Dördüncü Baskı, Proje Yönetim Mesleği İlkeleri Teknikleri ve Rotası Derneği (PMI TR), 2009, Istanbul. Construction Extension to PMBoK Guide®-Third Edition, Second Edition, Project Management Institute Inc., 2008…