



ECTS COURSE INFORMATION FORM

Faculty	Faculty of Engineering		
Program	B.Sc. in Civil Engineering	Elective	
	B.Sc. in Computer Engineering	Elective	
	B.Sc. in Electrical-Electronics Engineering	Elective	
	B.Sc. in Industrial Engineering	Elective	
	B.Sc. in Mechanical Engineering	Elective	

Course Code	CE 483			
Course Title in English	Earthquake Resistant Structural Design			
Course Title in Turkish	Depreme Dayanıklı Yapı Tasarımı			
Language of Instruction	English			
Type of Course	Flipped Lecture / Lecture / Project			
Level of Course	Undergraduate			
Course Category (by % of Content)	Basic Science	Basic Engineering	Engineering Design	General Education
			100	-
Semester Offered	Spring			
Contact Hours per Week	Lecture: 3 hours	Recitation: -	Lab: -	Other: -
Estimated Student Workload	131 hours			
Number of Credits	5 ECTS			
Grading Mode	Standard Letter Grade			
Pre-requisites	CE 304 Theory of Structures II			
Expected Prior Knowledge	Prior knowledge in homogenous differential equations and computing stiffness and displacements is expected.			
Co-requisites	None			
Registration Restrictions	Undergraduate Students & Graduate Students			
Overall Educational Objective	To comprehend the fundamental concepts, principles and applications of seismic analysis and design of different structures.			
Course Description	This course covers structural design of different types of structures under seismic loads. The topics discussed include basics of structural dynamics, seismic design philosophy, seismic codes, performance based design, retrofit and strengthening, seismic isolation and reliability of existing structures.			
Course Description in Turkish	Bu derste farklı yapı sistemlerinin deprem yükleri altında tasarımı konusu şu başlıklar altında çalışılacaktır: yapı dinamiğinin temelleri, depreme dayanıklı yapı tasarımının esasları, deprem yönetmelikleri, performansa yönelik tasarım, iyileştirme ve güçlendirme, sismik izolasyon, mevcut yapıların değerlendirilmesi.			
Course Learning Outcomes and Competencies	Upon successful completion of the course, the learner is expected to: <ol style="list-style-type: none">1. analyze structural behavior of different types of structural systems under seismic loading;2. comprehend seismic design principles for different types of structural systems;3. apply advanced engineering technologies and tools in structural design;4. develop computational skills by an analysis software.			

Relationship of the Course with the Student Outcomes	Level	Learning Outcome(s)	Assessed by
Student Outcomes	N=None S=Supportive H=High		Exam, Project, HW, Experiment, Presentation, etc.
(1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	H	1	Project, HWs, Exams
(2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	H	2, 3	Project, HWs, Exams
(3) an ability to communicate effectively with a range of audiences			
(4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts			
(5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives			
(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions			
(7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies	S	4	Project
Prepared by and Date	Asst. Prof. Bahadır Şadan / December 2019		
Semester	Spring 2019-2020		
Name of Instructor	Asst. Prof. Bahadır Şadan		
Course Contents	Week	Topic	
	1.	Introduction.	
	2.	Basics of Earthquake Resistant Design	
	3.	Physics of Vibration, Analysis Methods and Tools	
	4.	Design According to Turkish Building Seismic Code (TBSC2018) - Ground Motion and General Design Concepts	
	5.	Design According to Turkish Building Seismic Code (TBSC2018) - Strength Based Design Principles	
	6.	Design According to Turkish Building Seismic Code (TBSC2018) - Worked Example	
	7.	Seismic Design Principles for High Rise Buildings	
	8.	Seismic Design Principles for Bridges	
	9.	Performance Assessment and Retrofitting of Existing Buildings - Site Survey and Analysis	
	10.	Performance Assessment and Retrofitting of Existing Buildings - Retrofitting Design	
	11.	Performance Assessment and Retrofitting of Existing Buildings - Worked Example	
	12.	Seismic Isolation and Energy Dissipation - Introduction	
	13.	Seismic Isolation and Energy Dissipation - Types of Isolators and Dampers	
	14.	Seismic Isolation and Energy Dissipation - Codes and Analysis	
	15.	Final Exam/Project/Presentation Period	
	16.	Final Exam/Project/Presentation Period	
Required/Recommended Readings	Required: None Recommended: <ul style="list-style-type: none"> Earthquake Engineering from Engineering Seismology to Performance Based Design, Y. Bozorgnia, V.V. Bertero Displacement Based Design of Structures, M.J. N. Priestly, G.M. Calvi, M.J. Kowalsky Seismic Design of Reinforced Concrete Buildings, J. Moehle 		

	<ul style="list-style-type: none"> Seismic Design and Retrofit of Bridges, M.J.N. Priestley, F. Seible, G.M. Calvi Principles of Passive Supplemental Damping and Seismic Isolation, C. Christopoulos, A. Filiatrault Design of Isolated Structures - From Theory to Practice, F. Naeim, J.M. Kelly
Teaching Methods	Lectures/contact hours using 'flipped classroom' as active learning technique.
Homework and Projects	Term Project and HWS
Laboratory Work	-
Computer Use	Students are encouraged to use an analysis software to verify their solutions to assignments.
Other Activities	-
Assessment Methods	Midterm: 30% In-class Quizzes and HWS: 30% Term Project: 40%
Course Administration	<p>Instructor's office: 544 Office hours: To be defined E-mail address: sadanb@mef.edu.tr Rules for attendance: YÖK Regulations. Missing an assignment/quiz: Provided that proper documents of excuse are presented the missed quiz will be excluded from evaluation. Missing any quiz without any proper documents of excuse presented will be evaluated as null. Missing a midterm/term paper: Provided that proper documents of excuse are presented, a make-up exam will be given for the missed mid-term. Late submission rules will apply in case of missing the deadline of term paper. Missing the mid-term without any proper documents of excuse presented will be evaluated as null. Missing a final: Faculty regulations. A reminder of proper classroom behavior, code of student conduct: YÖK Regulations Statement on plagiarism: YÖK Regulations.</p>

ECTS Student Workload Estimation	Activity	No/Weeks	Hours			Calculation	Explanation
		No/Weeks per Semester (A)	Preparing for the Activity (B)	Spent in the Activity Itself (C)	Completing the Activity Requirements (D)		
	Lecture	14	1	3		56	A*(B+C+D)
	Homeworks	2	15			30	
	Quizzes	3	5	1		18	A*(B+C+D)
	Term Project	1	25	2		27	A*(B+C+D)
	Total Workload					131	
	Total Workload/25					5,24	
	ECTS					5	