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 434			
Course Title in English	Earth Retaining Systems and Slopes			
Course Title in Turkish	Zemin İstinad Yapıları ve Sev Stabilitesi			
Language of Instruction	English			
Type of Course	Flipped Classroom/ Lecture / Project			
Level of Course	Undergraduate			
Course Category (by % of Content)	Basic Science	Basic Engineering	Engineering Design	General Education
		70	30	
Semester Offered	Fall - Spring			
Contact Hours per Week	Lecture: 3 hours	Recitation: -	Lab:-	Other:-
Estimated Student Workload	128 hours			
Number of Credits	5 ECTS			
Grading Mode	Standard Letter Grade			
Pre-requisites	CE 301 Soil Mechanics			
Expected Prior Knowledge	Prior knowledge of soil mechanics is expected.			
Co-requisites	None			
Registration Restrictions	Undergraduate Students & Graduate Students			
Overall Educational Objective	To learn the necessary theoretical background for application of soil mechanics to the design and analysis of various types of retaining structures and slopes.			
Course Description	This course uses the basic principles of soil mechanics to design and analysis of earth retaining systems and slope stability. The following topics are covered: lateral earth pressures, retaining walls, and slope stability analysis.			
Course Description in Turkish	Bu derste zemin mekaniğinin temel kavramları kullanılarak farklı iksa sistemlerinin tasarımı ve şev stabilitesi şu konu başlıkları altında kapsamlı bir şekilde incelenmektedir: yanal zemin basıncı, dayanım yapıları, şev kayma analizleri.			
Course Learning Outcomes and Competencies	Upon successful completion of the course, the learner is expected to: 1. calculate lateral earth pressures; 2. design mechanically stabilized earth and concrete retaining walls, and sheet-pile walls; 3. describe retention systems for deep excavations and learn the design criteria concerning how to select and apply appropriate techniques and tools; 4. understand the importance of water related problems for retaining structures, get familiar with instability problems and instrumentation of deep excavations; 5. analyze the stability of slopes and supported sloped excavations; 6. 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, 4, 5	Flipped Classroom Exercises, 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	Flipped Classroom Exercises, Exams, Project
(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	6	Exams, Project

Prepared by and Date	Asst. Prof. Gökçe Tönük / December 2019	
Semester	Spring 2019-2020	
Name of Instructors	Asst. Prof. Gökçe Tönük	
Course Contents	Week	Topic
	1.	Introduction, lateral earth pressures
	2.	Concrete retaining walls – gravity and cantilever
	3.	Sheet – pile walls
	4.	Mechanically stabilized earth walls
	5.	Mechanically stabilized earth walls - geosynthetics
	6.	Deep excavation retention systems – type of walls, earth pressures
	7.	Deep excavation retention systems - type of supports, type of failures
	8.	Deep excavation retention systems – analysis and design steps
	9.	Deep excavation retention systems – examples
	10.	Water related problems, Instabilities and Instrumentation of excavations
	11.	Slopes – review on slope stability analysis
	12.	Slopes – stability analysis of sloped excavations, soil nailing
	13.	Slopes - examples
	14.	Earth retaining structures and slope stability under seismic loading
	15.	Final Exam/Project/Presentation Period
	16.	Final Exam/Project/Presentation Period
Required/Recommended Readings	Required: None Recommended: • Earth Pressures and Earth Retaining Structures, Chris R.I. Clayton, Rick I. Woods, Andrew J. Bond, Jarbas Milititsky, CRC Press. • Bowles, J. E., Foundation Analysis and Design, McGraw Hill. • Principles for Foundation Engineering, PWS Braja M. Das, 2010, 8th Edition.	

	• Foundation Design, Principles and Practices, Prentice Hall, Donald P. Coduto, William A. Kitch, Man-chu Ronald Yeung, 3rd Edition. • Salgado R., The Engineering of Foundations, McGraw Hill. • Soil Mechanics, Spon Press R.F.Craig, 2004, 7th Edition.
Teaching Methods	Contact hours using "flipped classroom" as an active learning technique
Homework and Projects	Design assignments as take-home midterm exams and a project
Laboratory Work	-
Computer Use	Several software and/or numerical methods for the analysis of retaining wall design / slope stability problems may be introduced.
Other Activities	-
Assessment Methods	Types of assessment — Number — Ratio (%) Take-home Midterm Exams — 2 — 50 Classroom Exercises — 4-6 — 10 Project (Report and Short Presentation) — 20 Final Exam — 1 — 20 Total — 100
Course Administration	**Instructor's office and phone number**: A Block, 5th Floor Room: 535 **email address:** tonukg@mef.edu.tr **Rules for attendance:** Attendance required. Classroom practice contributes to 10% of the final grade. **Missing the project:** No make-up will be given. **Missing a midterm**: Provided that proper documents of excuse are presented, make-up MAY be given. **Missing a final**: University regulations will be enforced. **A reminder of proper classroom behavior, code of student conduct**: YÖK Regulations **Statement on plagiarism**: YÖK Regulations

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/Flipped Classroo	14		3		42	A*(B+C+D)
Quizzes / HWs					0	A*(B+C+D)
Midterm	2	10	15		50	A*(B+C+D)
Project	1	20	1		21	A*(B+C+D)
Final Examination	1	13	2		15	A*(B+C+D)
Total Workload					128	
Total Workload/25					5,12	
ECTS					**5**	