COURSE INFORMATON					
Course Title	*Code*	*Semester*	*L+P+L Hour*	*Credits*	*ECTS*
SOIL STRUCTURE INTERACTION	CE	-	3+0+0	3	10

Prerequisites	

Language of Instruction	English
Course Level	Master's Degree (Second Cycle Programmes)
Course Type	Departmental Elective
Course Coordinator	-
Instructors	Dr. Mehmet Ömer TİMURAĞAOĞLU
Assistants	-
Goals	Understanding the dynamic properties of soils and detecting soil properties under the influence of different dynamic loadings. In addition, being able to design structure-soil-pile systems and interpret their behavior by making use of structural and geotechnical basic information.
Content	Mechanical properties of soils; constitutive relations; linear-elastic models; nonlinear-elastic models; elastic-plastic models; Finite element method; Numerical analysis is discussed along with its implementation and application in dynamic analysis

Course Learning Outcomes	**Program Learning Outcomes**	**Teaching Methods**	**Assessment Methods**
1) Ability to interpret and analyze dynamic soil properties	1,2,4	1,2	A,C
2) Understanding dynamic soil responses and being able to interpret the reactions under the influence of different dynamic loads	1,2,4	1,2	A,C
3) Ability to use approximate and numerical methods in modeling Structure-Soil-Foundation systems	1,2,4	1,2	A,C
4) Ability to determine the dynamic characteristics of the Structure-Soil-Foundation systems	1,2,4	1,2	A,C
5) Analysis of Structure-Soil-Foundation systems depending on dynamic load character	1,2,4,8,9,12,14	1,2,4	A,C

Teaching Methods:	1: Lecture, 2: Question-Answer, Lab, 4: Case study
Assessment	A: Testing, B: Experiment, C: Homework, D: Project

Methods:	

COURSE CONTENT		
Week	**Topics**	**Study Materials**
1	Fundamentials of Earthquakes Motion	Lecture Notes and Textbook
2	Wave Propagation in Grounds, One-Dimensional and Three-Dimensional Wave Propagation	Lecture Notes and Textbook
3	Fundamentals of Soil Mechnaics	Lecture Notes and Textbook
4	Dynamic Soil Properties	Lecture Notes and Textbook
5	In Situ Soil Testing	Lecture Notes and Textbook
6	One Dimensional Ground Response Analysis in Geotechnical Earthquake Engineering	Lecture Notes and Textbook
7	Two and three Dimensional Ground Response Analysis in Geotechnical Earthquake Engineering	Lecture Notes and Textbook
8	Pile Behavior Under Vertical and Lateral Loading	Lecture Notes and Textbook
9	Methods for Estimating Pile Capacity	Lecture Notes and Textbook
10	Soil Structure Interaction; Modeling Pile and Soil Pile Interaction	Lecture Notes and Textbook
11	Soil Nonlinear Constitutive Modeling	Lecture Notes and Textbook
12	Numerical Modeling of Soil Plasticity	Lecture Notes and Textbook
13	Nonlinear Dynamic Analysis in Geotechnical Earthquake Engineering	Lecture Notes and Textbook
14	Nonlinear Dynamic Analysis in Geotechnical Earthquake Engineering (Soil Pile Interaction)	Lecture Notes and Textbook

RECOMMENDED SOURCES	
Lecture Notes	Notes prepared by the instructor
Textbook	**Geotechnical Earthquake Engineering:** Authors: S.L.Kramer, Prentice Hall, 1996.
	Seismic Ground Response Analysis: Authors: N. Yoshida, Springer, 2015

MATERIAL SHARING	
Documents	Lecture notes delivered to the students
Assignments	Homeworks are returned to students after they are graded
Exams	Exams questions are solved if demanded

ASSESSMENT		
IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-terms	-	-
Quizzes	-	-
Assignment	3	30
Lab Work	-	-
Term Project	1	30
Total		**60**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		**100**

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM							
No	Program Learning Outcomes	Contribution					
		1	2	3	4	5	
1	Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied information in these areas to model and solve engineering problems.					**X**	
2	Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modelling methods for this purpose.					**X**	
3	Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose.						
4	Ability to devise, select, and use modern techniques and tools needed for engineering practice; ability to employ information technologies effectively.					**X**	
5	Ability to design and conduct experiments, gather data, analyze and						

	interpret results for investigating engineering problems.	
6	Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually.	
7	Ability to communicate effectively both orally and in writing; knowledge of a minimum of one foreign language.	
8	Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to continue to educate him/herself.	x
9	Awareness of professional and ethical responsibility.	x
10	Information about business life practices such as project management, risk management, and change management; awareness of entrepreneurship, innovation, and sustainable development.	
11	Knowledge about contemporary issues and the global and societal effects of engineering practices on health, environment, and safety; awareness of the relationship between Civil Engineering and contemporary issues.	
12	Awareness on various Civil Engineering majors such as hydraulics, materials, geotechnical, structural, construction management, transportation engineering and the necessity of their coordination.	x
13	Ability to work efficiently during team working for laboratory activities and to work efficiently during individual working for homework.	
14	Ability to work individually.	x
15	Awareness about the dynamics civil engineering market and main responsibilities of a civil engineer before graduation.	
16	Fundamentals of compulsory relationships, contract concept, knowledge on general concepts about obligations, their impacts and types.	

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION

Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Excluding the exam weeks: 14x Total course hours)	14	3	42
Hours for off-the-classroom study (Pre-study, practice)	14	2	28
Midterm examination	1	3	10
Homework	6	15	90
Project	1	50	50
Final examination	1	2	20
Total Work Load			240
Total Work Load / 25 (h)			10
ECTS Credit of the Course			10