

COURSE INFORMATION					
Course Title	Code	Semester	L+P+L Hour	Credits	ECTS
<b>SOIL STRUCTURE INTERACTION</b>	CE .....	-	3+0+0	3	10

<b>Prerequisites</b>	
----------------------	--

<b>Language of Instruction</b>	English
<b>Course Level</b>	Master's Degree (Second Cycle Programmes)
<b>Course Type</b>	Departmental Elective
<b>Course Coordinator</b>	-
<b>Instructors</b>	Dr. Mehmet Ömer TİMURAĞAOĞLU
<b>Assistants</b>	-
<b>Goals</b>	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.
<b>Content</b>	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

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

**Methods:**

### COURSE CONTENT

Week	Topics	Study Materials
1	Fundamentals 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 Mechanics	Lecture Notes and Textbook
4	Dynamic Soil Properties	Lecture Notes and Textbook
5	In situ soil testing	Lecture Notes and Textbook
6	Modeling and Computing of Soil	Lecture Notes and Textbook
7	Ground Response Analysis in Geotechnical Earthquake Engineering	Lecture Notes and Textbook
8	Pile Behavior Under Vertical and Lateral Loading	Lecture Notes and Textbook
9	Midterm Exam	Lecture Notes and Textbook
10	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
15	Work on term project	Lecture Notes and Textbook

### RECOMMENDED SOURCES

<b>Lecture Notes</b>	Notes prepared by the instructor
<b>Textbook</b>	<b><u>Geotechnical Earthquake Engineering:</u></b> Authors: S.L.Kramer, Prentice Hall, 1996.
	<b><u>Seismic Ground Response Analysis:</u></b> Authors: N. Yoshida, Springer, 2015

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

<b>ASSESSMENT</b>		
<b>IN-TERM STUDIES</b>	<b>NUMBER</b>	<b>PERCENTAGE</b>
Mid-terms	1	50
Quizzes	-	-
Assignment	□	20
Lab Work	-	-
Term Project	1	30
<b>Total</b>		<b>100</b>
<b>CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE</b>		40
<b>CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE</b>		60
<b>Total</b>		<b>100</b>

<b>COURSE CATEGORY</b>	Expertise/Field Courses
------------------------	-------------------------

<b>COURSE'S CONTRIBUTION TO PROGRAM</b>					
					Contribution
No Program Learning Outcomes					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.				<b>X</b>
2	Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modelling methods for this purpose.				<b>X</b>
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.				<b>X</b>
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.	

<b>ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION</b>			
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
<b>Total Work Load</b>			240
<b>Total Work Load / 25 (h)</b>			10
<b>ECTS Credit of the Course</b>			10