(B) Course information in English

General course information:

Course title:	Soil Dynamics	**Course code:**	CE07_GE06
Credits:	5	**Work load (hours):**	120
Course level:	Undergraduate ☒	Graduate ☐	
Course type:	Mandatory ☒	Selective ☐	
Course category:	Basic ☐	Orientation ☒	
Semester:	7	**Hours per week:**	4

Course objectives (capabilities pursued and learning results):

The students study: the response of single and two-degrees of freedom systems, the propagation of waves in one, two and three dimensions, cyclic behavior of soil, the seismic response of multi-layered soil formations, the seismic stability of slopes, seismic earth pressures on retaining structures, the dynamic soil-structure interaction of simple systems, and vibrations of machine foundations.

At the end of the course the students are capable of solving:

1. Problems of a single degree and two degrees of freedom systems
2. Problems of wave propagation in one, two and three dimensions
3. Problems related to dynamic properties, dynamic compaction and liquefaction of soils.
4. Problems related to the seismic response of multi-layered soil formations
5. Seismic stability of slopes and seismic earth pressures on retaining systems
6. Problems related to vibrations of machine foundations

Prerequisites:

Instructor's data:

Name:	Panos Dakoulas
Level:	Professor
Office:	Civil Engineering, 105
Tel. – email:	24214-74161, dakoulas@uth.gr
Other tutors:	

Specific course information:

Week No.	Course contents	Hours	
		Course attendance	Preparation
1	Introduction to Soil Dynamics and Geotechnical Earthquake Engineering. Introduction to Seismology. Earth structure, tectonic plates, seismic faults.	**4**	**2**
2	Characteristics of strong ground motion. Assessment of ground motion parameters. Seismic risk. **1st homework**	**4**	**4**
3-4	Seismic response of a SDOF system. Response spectra. Problems. Dynamic response of a 2 DOF system. Problems. **2nd homework**	**8**	**8**
5	Seismic waves. Wave propagation in one dimension.	**4**	**2**
6	Applications of wave propagation in one dimension. Problems. Surface waves. Rayleigh waves. Love waves. Problems. **3rd homework**	**4**	**5**
7	Dynamic behavior of soil element. Laboratory measurement of soil properties. Cyclic behavior and dynamic compaction of soil element. **4th homework**	**4**	**4**
8	Liquefaction and cyclic mobility of granular soil. In situ measurement of dynamic properties. **5th homework**	**4**	**4**
9	Seismic response of a multi-layered soil profile. Equivalent linear and nonlinear numerical analysis. Numerical Applications. **6th homework**	**4**	**5**
10	Effect of soil characteristics and topography on the seismic response. Examples of seismic response from actual earthquakes. Design spectra. Micro-zonation studies.	**4**	**1**
11	Newmark Method. Seismic stability of slopes.	**4**	**2**
12	Seismic pressures on retaining structures. **7th homework**	**4**	**5**
13	Dynamic soil - structure interaction. Dynamic impedance. Kinematic and inertial soil - structure interaction.	**4**	**2**
14	Machine vibrations. Dynamic impedance for various foundation conditions. **8th homework**	**4**	**5**
Additional hours for:			

Class project	Examinations	Preparation for examinations	Educational visit
	3	12	

Suggested literature:

1. Soil Dynamics, P. Dakoulas, U.Th., 2005 (distributed, in Greek)
2. Soil Dynamics, G. Gazetas, NTUA, 2006 (in Greek)
3. Geotechnical Earthquake Engineering, K. Pitilakis, 2010 (in Greek).

Others books

4. Kramer, S., Geotechnical Earthquake Engineering, Prentice Hall, NJ, 1996.
5. Greek Seismic Code, TEE, 2008.

Teaching method *(select and describe if necessary* - **weight***):*		
Teaching	☒	70%
Seminars	☐	
Demonstrations	☐	
Laboratory	☐	
Exercises	☒	30%
Visits at facilities	☐	
Other *(describe):* …….	☐	
Total		100%

Evaluation method *(select)*- **weight:**				
	written	*%*	*Oral*	*%*
Homework	☒	0%	☐	
Class project	☐		☐	
Interim examination	☐		☐	
Final examinations	☒	100%	☐	
Other *(describe):* ……	☐		☐	