(B) Course information in English

General course information:

Course title:	Soil Mechanics I	**Course code:**	CE05_G04
Credits:	5	**Work load (hours):**	125
Course level:	Undergraduate ☒	Graduate ☐	
Course type:	Mandatory ☒	Selective ☐	
Course category:	Basic ☒	Orientation ☐	
Semester:	5	**Hours per week:**	4

Course objectives (capabilities pursued and learning results):

The students study: the fundamental problems and practical applications in Geotechnical Engineering, the natural properties of soils, the types of laboratory and field testing, the computation of stresses, the stress-strain relationship and strength of a soil element, the settlement of foundations.

Upon the completion of the course, the students are capable of:

1. Describing (qualitatively and quantitatively) and classifying a given soil
2. Describing the stress and deformational state of a soil element using the Mohr circle.
3. Computing the geostatic stresses and the stresses imposed by the constructed structures
4. Selecting appropriate experimental tests for modeling the evolution of the stress state in various practical applications
5. Solving problems related to the stress-strain behavior and strength of sandy soils
6. Solving problems related to the stress-strain behavior and strength of clayey soils in CD, CU and UU triaxial tests
7. Solving problems related to immediate, consolidation and secondary compression settlements.

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 Geotechnical Engineering. Soil Mechanics applications in Civil Engineering projects.	**4**	**2**
2	Origin and formation of soils. Types of soils.	**4**	**2**
3	Soil as a multi-phase medium. Density, porosity, degree of saturation, water content. Grain size distribution, relative density of granular soils. Problems.	**4**	**2**
4	Atterberg limits and plasticity of clayey soils. Characterization and classification of soils. Site geotechnical investigation, examples of soil profiles. Problems. **1st homework set.**	**4**	**5**
5	Stress in soil elements. Stress state and Mohr circle. Problems. **2nd homework set.**	**4**	**5**
6	Geostatic stresses. Effective stress. Deformation and Mohr circle. Problems. **3nd homework set.**	**4**	**5**
7	Stress – strain relationship of soil element. One-dimensional compression, triaxial compression, simple shear, direct shear, torsion, and other tests. Application of laboratory testing in Civil Engineering projects.	**4**	**2**
8	The concept of failure. Mohr-Coulomb failure criterion. Strength of loose and dense granular soil. The role of particle interlocking. Problems. **4th homework set.**	**4**	**5**
9	Stress-strain relationship and strength of normally consolidated and over-consolidated clay. Excess pore water pressure development in one-dimensional compression, isotropic compression, triaxial compression and simple shear testing. Problems.	**4**	**2**
10	Triaxial tests CU and UU. The concept of $\varphi = 0^{o}$. Applications in Geotechnical projects. Problems. **5th homework set.**	**4**	**5**
11	Concentrated load on elastic half-space (Boussinesq). Stresses due to concentrated and distributed loads on elastic half-space. Superposition of geostatic and external loads. Problems. **6th homework set.**	**4**	**5**
12	Foundation settlements. Design criteria. Immediate settlements. Problems.	**4**	**2**

13	Consolidation settlements. Secondary compression settlements. Problems. **7th homework set.**	**4**	**5**
14	Geotechnical applications. Problems. Review.	**4**	**2**

Additional hours for:			
Class project	**Examinations**	**Preparation for examinations**	**Educational visit**
	3	15	2

Suggested literature:

1. Soil Mechanics, 3rd Edition, Barnes, Kleidarithmos, 2014 (distributed, in Greek)
2. Soil Mechanics Notes, G. Gazetas, NTUA, 2014 (distributed, in Greek)

Other textbooks

3. Principles of Geotechnical Engineering, 5th edition, B. Das, PWS-Kent, 2006.
4. Soil Mechanics and Foundations, 3rd edition, M. Budhu, 2010.
5. An Introduction to Geotechnical Engineering, Holtz and Kovacs, Prentice-Hall, 1981.

Teaching method *(select and describe if necessary -* **weight***):*		
Teaching	☒	70%
Seminars	☐	
Demonstrations	☐	5%
Laboratory	☒	
Exercises	☒	25%
Visits at facilities	☐	
Other *(describe):* …….	☐	
Total		100%

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