COURSE OUTLINE

(1) General information

FACULTY/SCHOOL	TECHNOLOGY			
DEPARTMENT	ENVIRONMENTAL SCIENCES			
LEVEL OF STUDY	*Undergraduate*			
COURSE UNIT CODE	NEW **COURSE**	**SEMESTER**	5^{th}-6^{th}-7^{th}	
COURSE TITLE	SOIL MECHANICS			
INDEPENDENT TEACHING ACTIVITIES in case credits are awarded for separate components/parts of the course, e.g. in lectures, laboratory exercises, etc. If credits are awarded for the entire course, give the weekly teaching hours and the total credits			**WEEKLY TEACHNG HOURS**	**CREDITS**
THEORETICAL BACKGROUND			4	4
LABORATORY PRACTICE				
TOTAL				
COURSE TYPE Background knowledge, Scientific expertise, General Knowledge, Skills Development	SCIENTIFIC AREA			
PREREQUISITE COURSES:	NO			
LANGUAGE OF INSTRUCTION &EXAMINATION/ASSESSMENT:	GREEK			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	YES			
COURSE WEBSITE (URL)				

(2) LEARNING OUTCOMES

Learning Outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate (certain) level, which students will acquire upon successful completion of the course, are described in detail.

It is necessary to consult:

APPENDIX A

- *Description of the level of learning outcomes for each level of study, in accordance with the European Higher Education Qualifications' Framework.*
- *Descriptive indicators for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and*

APPENDIX B

- *Guidelines for writing Learning Outcomes*

Soil mechanics is a special branch of engineering. It differs from other branches of the science of Civil Engineering such as solid and liquid engineering because soils are three-phase bodies, i.e. they present sets of matter comprised of solids, liquids and gases as well as various organisms, making their study complex. Soil mechanics provides students with the basic background for knowing the mechanical behaviour of the soil mass which is complementary but at the same time necessary for the successful attendance of courses of the Study Program of the Environmental Department. The science of Soil mechanics aims to understand the nature of the soil, to assess its behaviour, and to gain a deeper understanding of the application of the principles of soil engineering to practical engineering solutions.

The aim of the course is:
1. Students should understand the basic concepts of soil mechanics developed in the course, as well as the principles on which its application is based.
2. Students should be able to apply the knowledge they have acquired in the course to solve technical problems, taking into account that for the proper management of the environment many branches of science must cooperate, among which Soil Mechanics holds a prominent position.
3. Knowledge of soil failures and the utility of Soil Mechanics for the Environment.
4. Students should be trained in designing solutions that prevent the creation of failures and not their subsequent treatment.
4. To offer students the knowledge of the mechanical properties of the soil (compression, shear strength) and the ability to measure them.
5. To offer students the ability to control the stability of the slopes, the knowledge of the causes of landslides and the methods of dealing with them.
6. To provide students with the knowledge of soil improvement methods so that these soils can safely receive external loads.

General Competences

Taking into consideration the general competences that students/graduates must acquire (as those are described in the Diploma Supplement and are mentioned below), at which of the following does the course attendance aim?

Search for, analysis and synthesis of data and information by the use of appropriate technologies,
Adapting to new situations
Decision-making
Individual/Independent work
Group/Team work
Working in an international environment
Working in an interdisciplinary environment
Introduction of innovative research
Project planning and management
Respect for diversity and multiculturalism
Environmental awareness
Social, professional and ethical responsibility and sensitivity to gender issues
Critical thinking
Development of free, creative and inductive thinking
……
(Other…….citizenship, spiritual freedom, social awareness, altruism etc.)
…….

- Adaptation to new situations
- Work in an interdisciplinary environment
- Production of new research ideas
- Respect for diversity and multiculturalism
- Respect for the natural environment
- Practice criticism and self-criticism
- Promoting free, creative and inductive thinking

(3) COURSE CONTENT

Theory Outline

1. Introductory course presentation. Natural properties of soils. Granulometric composition. Atterberg limits.
2. Characteristic soil properties, soil nature, porosity, void ratio, unit weight, water content, relation between density and moisture.
3. Classification systems. Soil classification according to Casagrande.
4. Effective and neutral stress. Pore pressure.
5. Darcy's Law. Soil permeability. Permeability coefficient.
6. Mechanical properties of soils. Determination of the cohesion (c) of clay soils. Determination of the friction angle (f) of sandy soils.
7. Shear strength - relationships between stresses - Mohr cycle.
8. Stresses under the application of a certain load. Elastic method of Boussinesq.
9. Deformation of soils-settlements. Calculation of settlements with the help of experimental deformation coefficients.

10. Settlements of preconsolidated clays.
11. Consolidation of saturated clays. Secondary settlement.
12. Slope stability.
13. Lateral earth pressure and retaining walls.

(4) TEACHING METHODS-ASSESSMENT

MODES OF DELIVERY **Face-to-face, in-class lecturing, distance teaching and distance learning etc.**	• Lectures in the amphitheatre • Group discussion
USE OF INFORMATION AND COMMUNICATION TECHNOLOGY **Use of ICT in teaching, Laboratory Education, Communication with students**	• Use of PowerPoint slides. • Videos of relevant material. • Communicating with students via e-mail. • Use of e-class
COURSE DESIGN **Description of teaching techniques, practices and methods:** **Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, Internship, Art Workshop, Interactive teaching, Educational visits, projects, Essay writing, Artistic creativity, etc.** **The study hours for each learning activity as well as the hours of self-directed study are given following the principles of the ECTS.**	

Activity/Method	*Semester workload*
Lectures	52
Workshop	
Theory study	26
Εργασίες κατά ομάδες	26
Course total (25 hours of workload per credit unit)	***100***

STUDENT PERFORMANCE EVALUATION/ASSESSMENT METHODS **Detailed description of the evaluation procedures:** **Language of evaluation, assessment methods, formative or summative (conclusive), multiple choice tests, short- answer questions, open-ended questions, problem solving, written work, essay/report, oral exam, presentation, laboratory work, other……etc.** **Specifically, defined evaluation criteria are stated, as well as if and where they are accessible by the students.**	***Students are assessed in Greek or English. The final grade is formed by tests which include:*** • Written exam: 70% of the final grade (A) • Assigned work: 30% of the final grade (B) **Final grade = 70% (A) + 30% (B)**

(5) SUGGESTED BIBLIOGRAPHY:

-***Suggested bibliography***

1. Anagnostopoulos Ch., Georgiadis M. and Pitilakis K. (1994), "Foundations Support", AUTh Publications.
2.Barnes G. (2005), "Soil Mechanics", Kleidarithmos Publications, ISBN: 960-209-883-X

3. Valalas D. (1977), "Courses in Soil Engineering and Foundations Applied in the study of technical works", Thessaloniki.
4. Valalas D. (1984), "Soil Mechanics", Kyriakidis Publications, Thessaloniki.
5. Grammatikopoulos G. (1999), "Soil Mechanical Exercises and Problems", Kyriakidis Publications.
6. Kavvadas M.I. (2009). Soil Mechanics Data, Symeon Publications, ISBN: 978-960-9400-03-9
7. Kavvadas M.I. (2013). Environmental Geotechnical Data, Tsotra Publications, ISBN: 978-618-80741-0-1
7. Komodromos A. (2012). Foundations-Supports. Kleidarithmos Publications, Athens, ISBN: 978-960-461-506-3
8. Costopoulos Sp. (2009), ¨Geotechnical Constructions, Analysis of Design and Construction Principles¨ Ion Publications, ISBN: 960-411-657-6.
9. Loizos A. (1964). "Soil Mechanics and Foundations Lectures - Landslides of slopes" TEE, Athens.
10. Maragos Ch. (2003), "Technical Infrastructure Projects - Underground Constructions Rock Engineering, Dams", Thessaloniki.
11. Papacharisis N., Manou Andreadi N. and Grammatikopoulos I. (1999), "Geotechnical Engineering", Kyriakidis Publications, Thessaloniki.