COURSE OUTLINE

(1) GENERAL

SCHOOL	**UNIVERSITY OF THESSALY**		
ACADEMIC UNIT	DEPARTMENT OF CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**ΓΚ2201**	**SEMESTER**	5ο
COURSE TITLE	Soil Mechanics I		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
	4	5
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialized general knowledge, skills development*	General background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek Greek
IS THE COURSE 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 level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The students study the fundamental problems and practical applications in Geotechnical Engineering, the natural properties of soils, the types of laboratory testing and field testing, the computation of stresses, the stress-strain relationship and strength of a soil element and 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 structures.
4. Selecting appropriate experimental tests for modeling the evolution of 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.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking Working in an interdisciplinary environment*
Production of new research ideas	*……*
	Others…
	…….

The students acquire the following general competences:

1. Search for, analysis and synthesis of data and information
2. Decision-making
3. Project planning

(3) SYLLABUS

Introduction to Geotechnical Engineering. Soil Mechanics applications in Civil Engineering projects. Origin and formation of soils. Types of soils. Soil as a multi-phase medium. Density, porosity, degree of saturation, water content. Grain size distribution, relative density of granular soils. Atterberg limits and plasticity of clayey soils. Characterization and classification of soils. Site geotechnical investigation, examples of soil profiles. Stress in soil elements. Stress state and Mohr circle. Geostatic stresses. Effective stress. Deformation and Mohr circle. 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. The concept of failure. Mohr-Coulomb failure criterion. Strength of loose and dense granular soil. The role of particle interlocking. 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. Triaxial tests CU and UU. The concept of $\phi = 0^o$. Applications in Geotechnical projects. Concentrated load on elastic half-space (Boussinesq). Stresses due to concentrated and distributed loads on elastic half-space. Superposition of geostatic and external loads. Foundation settlements. Design criteria. Immediate settlements. Consolidation settlements. Secondary compression settlements. Geotechnical applications.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY ***Face-to-face, Distance learning, etc.***	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of ICT in teaching, communication with students

TEACHING METHODS

The manner and methods of teaching are described in detail.
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

The student's study hours for each learning activity are given as well as the hours of non- directed study according to the principles of the ECTS

Activity	*Semester workload*
Lectures	56
Exercises	49
Examinations	3
Preparation for examinations	15
Educational visit	2
Course total	*125*

STUDENT PERFORMANCE EVALUATION ***Description of the evaluation procedure*** *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open- ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Assessment is conducted through written examinations at the end of the semester in the Greek language. The examinations are based on solving a series of problems that cover all the fundamental chapters of the course. They require a thorough understanding of the theory and extensive preparation through the completion of exercise booklets throughout the semester.

(5) **ATTACHED BIBLIOGRAPHY**

-Suggested bibliography:

1. Soil Mechanics, 3rd Edition, Barnes, Kleidarithmos, 2014 (distributed, in Greek)
2. Soil Mechanics Notes, G. Gazetas, NTUA, 2014 (distributed, in Greek)
3. Principles of Geotechnical Engineering, 5th edition, B. Das, PWS-Kent, 2006.
4. Soil Mechanics and Foundations, 3rd edition, M. Budhu, 2010.

- Related academic journals:

1. Géotechnique, ICE
2. Journal of Geotechnical and Geoenvironmental Engineering, ASCE