UNIVERSITY of NICOSIA

Course Syllabus

Course Code	Course Title	ECTS Credits
CEE-330	Soil Mechanics	7
Prerequisites	**Department**	**Semester**
MENG-250	Engineering	Fall
Type of Course	**Field**	**Language of Instruction**
Required/Elective	Civil & Environmental Engineering	English
Level of Course	**Lecturer(s)**	**Year of Study**
1st Cycle	Dr Ernestos Sarris	3rd
Mode of Delivery	**Work Placement**	**Corequisites**
Face-to-face	N/A	None

Course Objectives:

The main objectives of the course are to:

- Introduce the students to the soil origins and its categories (e.g. sands and clays) and methods of soils classification.
- Understand the three-phase mixture theory (solid, liquid, and gas) phase and understand basic soil properties like unit weight, moisture content, void ratio, and degree of saturation.
- Teach the students to calculate underground stresses and pore pressures due to self-weight loading and due to structure-weight loading.
- Familiarize the students with the concept of effective stress principle and its importance in soil like deformations, failures and settlements.
- Help the students understand similarities and differences in the mechanical behavior between loose sands and normally consolidated clays as well as similarities and differences between dense sands and over-consolidated clays.
- Application of numerical calculations for estimating soil strength and stress distribution within soil masses for design applications due to a variety of external loads.
- Understand the basic principles of groundwater flow and permeability in soils.
- Underline the importance of 1-D consolidation for fine-grained materials.
- Demonstrate the problems arising from primary and secondary consolidation and perform calculations for this physical problem.
- Familiarize the students with laboratory equipment and experimental testing in soil mechanics.
- Allow students to perform laboratory testing for estimating the physical characteristics

of soils (Atterberg limits).
- Perform laboratory testing for understanding soil compaction processes with the Proctor method (Proctor test).
- Handle experimental data of permeability test under steady head.
- Perform laboratory testing of direct shear in soil like materials (granular).
- Perform laboratory testing and collect data of the consolidation (oedometer) test for clay like materials.
- Perform the cone penetration test used in the site for calculating the density of soils.

Learning Outcomes:

After completion of the course students are expected to be able to:

1. Identify soils origin and soil classification.
2. Perform calculations for basic soil properties like unit weight, moisture content, void ratio, and degree of saturation.
3. Explain soil compaction processes and equipment as well as the use of proper laboratory testing related with compaction.
4. Recognize and calculate the stresses distribution in soil mass due to external loads and be able to calculate the soils strength for design applications.
5. Understand the effective stress principle and calculate deformations and failures due to shearing.
6. Recognize how settlement occurs in soil and be able to calculate settlements based on varying loading and soil conditions.
7. Perform calculations of groundwater flow in geotechnical structures.
8. Estimate the permeability of fine and coarse-grained soils.
9. Identify the most important parameters in the physical mechanism of primary and secondary consolidation.
10. Determine the shear strength of soils through applied exercises and laboratory experimentation.
11. Understand and obtain technical knowhow of laboratory equipment.
12. Understand how to prepare a geotechnical and laboratory report.

Course Content:

- Introduction to the origins of soils and rocks.
- Weight-Volume relationships and structure of soils.
- Engineering classification of soils.
- Soil compaction.
- Permeability and seepage.
- Insitu stresses and stresses in a soil mass.
- Compressibility of soils.
- Shear strength of soils.

Learning Activities and Teaching Methods:

Lectures, in-class examples, tutoring exercises, Laboratory experimentation, discussion.

Assessment Methods:

Homework assignments, Project, Laboratory reports, Mid-term examination, Final examination.

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Soil Mechanics and Foundations 3rd ed.	Muni Budhu	John Wiley & Sons, INC.	2011	978-0470556849
Soil properties: Testing, Measurement and evaluation 6th ed.	Cheng Liu and Jack B. Evett	Pearson-Prentice Hall	2009	978-0136141235

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Soil Mechanics 8th ed.	Jonathan Knappett and R.F Graig	CRC Press	2012	978-0415561266
Elements of Soil Mechanics 8th ed.	Ian Smith	Wiley Blackwell	2006	978-1405133708
Principles of Geotechnical Engineering, 8th ed.	Braja M. Das and Khaled Sobhan	Cengage Learning	2013	978-1133108665