



Course Code CVEE-330	Course Title Soil Mechanics	ECTS Credits 8
Department Engineering	Semester Fall, Spring	Prerequisites MENG-250
Type of Course Elective	Field Civil & Environmental Engineering	Language of Instruction English
Level of Course 1 st Cycle	Year of Study 3 rd	Lecturer(s) Dr Ernestos N. Sarris
Mode of Delivery Face-to-face	Work Placement N/A	Co-requisites None

Objectives of the Course:

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 for design applications due to a variety of external loads.
- Understand the basic principles of groundwater flow and permeability in soils.
- 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 test for clay like materials.
- Perform the cone penetration test used in the site for calculating the density of soils.

Learning Outcomes:

Upon completion of the course, the student should be able to:

- Identify soils origin and soil classification.
- Perform calculations for basic soil properties like unit weight, moisture content, void ratio, and degree of saturation.
- Explain soil compaction processes and equipment as well as the use of proper laboratory testing related with compaction.
- Recognize and calculate the stresses distribution in soil mass due to external loads and be able to calculate the soils strength for design applications.
- Understand the effective stress principle and calculate deformations and failures due to shearing.
- Recognize how settlement occurs in soil and be able to calculate settlements based on varying loading and soil conditions.
- Perform calculations of groundwater flow in geotechnical structures.
- Understand and obtain technical knowhow of laboratory equipment.
- Understand how to prepare a geotechnical and laboratory report.

Course Contents:

- 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 and exercises, projects, discussion

Assessment Methods:

Homework assignments, Laboratory reports, Mid-term, Final exam.

Required Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Braja M. Das and Khaled Sobhan	Principles of Geotechnical Engineering, 8 th ed.	Cengage Learning	2013	978-1133108665
Braja M. Das	Soil Mechanics Laboratory Manual, 8 th ed.	Oxford University	2012	978-0199846375

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Jonathan Knappett and R.F	Soil Mechanics	CRC Press	2012	978-0415561266

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Ian Smith	Elements of Soil Mechanics, 8 th ed.	Wiley-Blackwell	2006	978-1405133708