

Soil and Rock Mechanics

1. **Course number and name:** 020MESGS2 Soil and Rock Mechanics
2. **Credits and contact hours:** 6 ECTS credits, 3x1.25 hours
3. **Name(s) of instructor(s) or course coordinator(s):** Muhsin Elie RAHHAL
4. **Instructional Materials:**
 - a. Holtz R. D. and Kovacs W. D. (1981) *An Introduction to Geotechnical Engineering*, by Prentice Hall inc, Englewood Cliffs, NJ.
 - b. Lafleur, J. (1991) *Introduction à la géotechnique*, Presses de l'Ecole Polytechnique de MONTREAL.
 - c. Class notes
5. **Specific course information**
 - a. **Catalog description:** Provide the basis for understanding the behavior of the soil as a material. Identify the physical properties, mineralogical and chemical composition of the porous media. Understand the theory of soil compaction. Introduce soil amelioration techniques. Introduce the notions of pore water pressure and effective stress. Identify the hydraulic properties of the soil. Draw and Interpret water flow nets. Understand consolidation and compute soil consolidation settlement. Understand the Mohr-Coulomb criterion for soils. Introduce the concepts of shear strength and geo-environment.
 - b. **Prerequisites or co-requisites:** 020GELNI4 or 020GELCI4 Geology
 - c. **Required:** Required for all Civil Engineering students.
6. **Educational objectives for the course**
 - a. **Specific outcomes of instruction:**
 - Introduce the students to the geotechnical engineering domain by showing links between geology and civil engineering
 - Define the physical properties required to identify and classify a soil according to USCS and AASHTO standards
 - Explain mineralogical and chemical composition of porous media
 - Familiarize the students with the theory of soil compaction and techniques of soil amelioration
 - Explain soil water interaction properties, and introduce the concepts of pore water pressure and effective stress
 - Explain hydraulic properties of soil. Draw and Interpret water flow nets
 - Understand consolidation and compute soil consolidation settlement

- Understand the Mohr-Coulomb criterion for soils Introduce the concept of shear strength of soils
- Expose the main geo-environmental issues with relations to soils
- Prepare the students to the understanding and writing of geotechnical reports

b. PI addressed by the course:

PI	1.1	1.2	1.3	1.4	2.1	2.2	3.1	3.2	5.1	6.1	6.2	6.3	6.4
Covered	yes												
Assessed										yes	yes	yes	yes

7. Brief list of topics to be covered:

1. Introduction (1 lecture)
2. Reminder of Geology (2 lectures)
3. Soil identification properties and classification concepts (6 lectures)
4. Specific properties of clays (1 lecture)
5. Compaction theory and methods. Introduction of soil amelioration techniques (5 lectures)
6. Water and Soil Properties, pore water pressure and effective stress (2 lectures)
7. Hydraulic soil properties. Water seepage and flow nets (8 lectures)
8. Consolidation and Settlement (8 lectures)
9. Mohr Coulomb criterion and soil shear strength (3 lectures)
10. Introduction to Geo-environment. (1 lecture)