

Foundation Engineering

1. **Course number and name:** 020FOSGS3 Foundation Engineering
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. Das B. M (2006) *Principles of Foundations Engineering*, Cengage learning editions.
 - b. Canadian Foundations Engineering Manual 4th Edition (2014).
 - c. Class notes
5. **Specific course information**
 - a. **Catalog description:** To introduce the student to the calculation methods and the state of the art in the design and construction of foundations and retaining structures. Identify the mechanical and hydraulic properties of the soil. Understand the principles of geotechnical investigation and get acquainted with in situ soil tests. Design the conventional surface foundations taking into account the bearing capacity and settlement concepts. Understand the principles of active and passive pressures, and apply them to the calculation of retaining walls and different types of walls. Design the pile foundations.
 - b. **Prerequisites or co-requisites:** 020MESGS2 Soil and Rock Mechanics
 - 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 design
 - Understand the means and the objectives of a geotechnical investigation campaign, both through field and laboratory testing. Understand and analyze geotechnical in situ testing. Interpret collected data to establish a geotechnical profile.
 - Determine the soil bearing capacity as well as the soil settlement. Design shallow footings taking into account bearing capacity and settlement constraints. Introduce the geotechnical design of mat foundations.
 - Understand Active and Passive Pressures in soils, as well as Rankine's and Coulomb's theories.
 - Carry out the geotechnical design of Gravity and Cantilever retaining walls
 - Understand the Geotechnical design of sheet piled walls, braced cuts, slurry walls, diaphragm walls

- Understand excavation stability and dewatering
- Carry out the geotechnical design of pile foundations in different types of soils. Understand negative skin friction. Understand the importance of deep foundations in general.
- Prepare the students to the understanding and writing of geotechnical reports.
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- Prepare the students to the understanding and writing of geotechnical reports.

b. PI addressed by the course:

PI	1.2	1.4	2.1	2.2	5.1	6.1	6.2	6.3
Covered	yes							
Assessed		yes		yes		yes		

7. Brief list of topics to be covered:

1. Introduction and reminder of soil mechanics (3 lectures)
2. Geotechnical soil investigation and in situ soil testing (6 lectures)
3. Shallow foundations (9 lectures)
4. Introduction to Mat foundations (2 lectures)
5. Active and passive pressures. Geotechnical design of gravity and cantilever retaining walls. Introduction to the design of sheet pile walls, braced cuts and slurry walls. (10 lectures)
6. Excavation stability and dewatering (5 lectures)
7. Pile foundations (6 lectures)
8. Importance of the geotechnical report (1 lecture)