

Shear Strength and Geohazards

- 1. Course number and name:** 020RCGGS5 Shear Strength and Geohazards
- 2. Credits and contact hours:** 4 ECTS credits, 2x1:15 contact hours
- 3. Name(s) of instructor(s) or course coordinator(s):** Muhsin Elie Rahhal
- 4. Instructional Materials:**
 - a. Duncan, J. M., and Wright, S. G. (2006), Soil strength and slope stability, edited by John Wiley inc.
 - b. Abramson, L. W., Lee, T. S., Sharma S., and Boyce G. M. (2001), Slope Stability and Stabilization Methods edited by John Wiley inc.
 - c. Sharma, H. D. and Reddy, K. R. (2004) Geoenvironmental Engineering: Site Remediation, Waste Containment, and Emerging Waste Management Technologies, edited by John Wiley inc.
 - d. Instructor's Class Notes
- 5. Specific course information**
 - a. **Catalog description:** Understand the basis of soil rheology. Measure the soil shear strength under both static and cyclic stress conditions. Introduce the effect of earthquakes on soils in terms of the mode of rupture. Analyze landslide problems in terms of stability of slopes, excavations and embankments. Understand soil contamination problems.
 - b. **Prerequisites or co-requisites:** 020FOSGS3 Foundation Engineering
 - c. **Required:** Required course for Public Works and Transport Specialty students.
- 6. Educational objectives for the course**
 - a. **Specific outcomes of instruction:**
 - Introduce the students to the soil rheology and shear strength concepts. Determine the shear strength through laboratory testing
 - Understand the behavior of sands (loose and dense) and clays (normally and over consolidated) under drained and undrained loading
 - Understand cyclic loading and determine liquefaction potential of soils
 - Identify factors causing landslides and slope instabilities. Determine stability for slopes, excavations and embankments
 - Identify soil contaminants. Understand contaminants transport. Design landfill sites

b. PI addressed by the course:

PI	1.2	1.4	2.1	2.2	3.1	3.2	5.1	6.1	6.2	6.3
Covered	x	x	x	x	x	x	x	x	x	x
Assessed										

7. Brief list of topics to be covered:

- Introduction to soil rheology and geohazards (2 lectures)
- Determination of shear strength and stress path (4 lectures)
- Shear strength of sands (3 lectures)
- Shear strength of clays (4 lecture)
- Shear strength under cyclic loading. Soil liquefaction (4 lectures)
- Landslides and slope stability (5 lectures)
- Soil Contaminants. Contaminants transport. Landfills (2 lectures)