Geomechanics deals with understanding, analysing and modelling the mechanical behaviour of geomaterials. The topics go further steps beyond the classical geotechnical engineering and provide students with the fundamental understanding and tools of the behaviour of soils.

**Content**

- The role of geomechanics in engineering practice
- Strength and deformation (triaxial testing, rheological behaviour, critical state concept)
- Constitutive modelling in geomechanics
- Linear and non-linear elasticity
- Plasticity and failure criteria
- Elastic perfectly plastic models with parameters determination
- Elasto-plastic hardening framework (flow rule, plastic potential and dilatancy)
- Cam-Clay model
- Water in geotechnical engineering (hydro-mechanical coupling in geomechanics; effective stress, consolidation, partial saturation; wetting collapse)
- In-situ tests for parameters determination
- Cyclic loading and liquefaction
- Earth pressures

**Keywords**

Mechanical behaviour of geomaterial, Constitutive models for soils, shales and rocks, elasto-plasticity, numerical modelling in geomechanics, tunneling and underground structures, nuclear waste disposal, CO2 sequestration, foundation engineering, landslide and slope stability, laboratory and in-situ testing.

**Learning Prerequisites**

**Required courses**

Soil mechanics and groundwater seepage

**Learning Outcomes**
By the end of the course, the student must be able to:
• Argue the non-linear behaviour of soils, shales and rocks
• Select appropriately the constitutive model for a given geotechnical problem
• Define the methodological approach of using model for an improved and deepened analysis of geotechnical problems
• Propose the geotechnical testing program to define the model parameters

Teaching methods
• Ex cathedra, exercises and homework

Assessment methods
Mid-term written exam: 20% of the final mark
Homework 20% of the final mark
Final exam written 60% of the final mark

Supervision
Office hours No
Assistants Yes
Forum No

Resources
Bibliography
Lectures notes and handouts given during the course