Summary
The course aims at providing future civil engineers with a comprehensive view on soil slope stability. It addresses landslide types and mass movement classification; slope failure mechanisms and methods for slope stability analysis are discussed; remedial measures and risk analysis are presented.

Content
- Mass movement classification and landslide activity
- Methods of slope stability analysis
  - Limit equilibrium analysis
  - Infinite slope analysis
  - Methods for circular and non-circular slip surface
  - Seismic slope stability
  - Methods for modelling soil mass movements
- Coupled and un-coupled numerical analyses
  - The role of pore water pressure
  - Characterization of the pore water pressures in slopes
    - Drained and undrained conditions
    - Delayed failure
    - Rapid drawdown
    - Unsaturated conditions
  - Failure mechanisms and choice of geotechnical parameters
- Shear strength of soils in unsaturated conditions
- Progressive failure
- Landslide instrumentation
  - Measurement of displacements
  - Location of the slip surface
  - Measure of pore water pressures
• Methods for slope stabilisation
  - Slope geometry modification and loads
  - Drainage systems
  - Retaining structures
  • Basics of risk analysis and early warning systems

**Learning Prerequisites**

**Required courses**
Soil mechanics and groundwater seepage

**Recommended courses**
Geomechanics

**Learning Outcomes**

By the end of the course, the student must be able to:
• Recognize type and occurrence of natural and man-made slope movements
• Assess / Evaluate the key geotechnical parameters that govern slope stability
• Use methods for slope stability assessment, modelling of slope movement and back-analysis of failed slopes
• Judge capabilities and limitations of slope stability analysis software
• Decide the fundamental steps for landslide investigations and select remedial measures
• Discuss risk analysis and early warning systems

**Transversal skills**
• Take responsibility for environmental impacts of her/ his actions and decisions.
• Use a work methodology appropriate to the task.
• Access and evaluate appropriate sources of information.
• Use both general and domain specific IT resources and tools
• Set objectives and design an action plan to reach those objectives.

**Teaching methods**
Ex cathedra, exercises, case study analysis

**Assessment methods**
Written