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