

CIVIL-530

**Slope stability**

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Cursus	Sem.	Type
Civil Engineering	MA2, MA4	Opt.
Mechanics		Obl.

Language of teaching	English
Credits	3
Session	Summer
Semester	Spring
Exam	Written
Workload	90h
Weeks	14
<b>Hours</b>	<b>3 weekly</b>
Courses	2 weekly
Exercises	1 weekly
<b>Number of positions</b>	

**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

Oral