

CIVIL-530	Slope stability				
	Ferrari Alessio				
Cursus		Sem.	Туре	Language of teaching Credits Session	English
Civil Engineering		MA2, MA4	Opt.		
Mechanics			Opt.		3 Summer
				Semester Exam Workload Weeks Hours Lecture Exercises Number of positions	Spring Written 90h 14 3 weekly 2 weekly 1 weekly

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

Resources

Moodle Link

• https://go.epfl.ch/CIVIL-530

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