



### LANDSLIDES HAZARD AND RISK

Anno immatricolazione	2020/2021
Anno offerta	2021/2022
Normativa	DM270
SSD	GEO/05 (GEOLOGIA APPLICATA)
Dipartimento	DIPARTIMENTO DI INGEGNERIA CIVILE E ARCHITETTURA
Corso di studio	INGEGNERIA PER L'AMBIENTE E IL TERRITORIO
Curriculum	Territoriale
Anno di corso	2°
Periodo didattico	Secondo Semestre (07/03/2022 - 17/06/2022)
Crediti	6
Ore	58 ore di attività frontale
Lingua insegnamento	English
Tipo esame	SCRITTO
Docente	MEISINA CLAUDIA (titolare) - 3 CFU BORDONI MASSIMILIANO - 3 CFU
Prerequisiti	The students of this course have to own or to obtain an adequate initial knowledge about the following basic principles of engineering geology: hydrological balance; properties and parameters of groundwater; geological, physical and mechanical properties of soils and rocks; methods for the geological underground prospecting and investigation surveys; concept of geological model.
Obiettivi formativi	Scope of the course is to introduce the student to recognize and characterize different types of slope instabilities and to be able to use tools for the landslide hazard and risk assessment, to select techniques for monitoring and mitigation of landslide risk.
Programma e contenuti	Landslide terminologies and types, classifications. Landslide dynamics. Predisposing and triggering factors, landslide occurrence as a

consequence of land use and climate changes. Methodologies of landslide investigation and mapping, landslide inventories. Methods for landslide susceptibility and hazard assessment (initiation and run out): knowledge –driven, data-driven and physically based methods. Evaluation of the performance of landslide zonation map. Landslide monitoring and early warning: ground-based and remote surface displacements measurement techniques, monitoring of hydro-meteorological variables. Rainfall threshold for landslide prediction. Landslide mitigation: structural and non-structural protection. Lesson learnt from some case histories.

Landslide Risk analysis, assessment and management: from Qualitative to Quantitative Risk Analysis , human induced landslides and the role of human activities in relation to landslides, landslide risk assessment and sustainable development: methods and tools for land-planning, risk management framework, resilience assessment, case histories.

The course is integrated and complemented by computer lab exercises concerning landslide hazard and risk assessment and field trip to landslides in the Alps and in the Apennines.

The course content covers some Goals defined by the United Nations in the 2030 Agenda for Sustainable Development: Goal 2) end hunger, achieve food security and improved nutrition and promote sustainable agriculture; Goal 13) take urgent action to combat climate change and its impacts).

#### Metodi didattici

The course consists of lectures to illustrate the theory and tutorial sessions where the emphasis is on applications and problem solving. Each subject is illustrated with the support of experimental and observational evidences and well-documented case histories concerning landslide hazard and risks drawn from the experience of the instructors.

#### Testi di riferimento

? Lynn M. Highland, United States Geological Survey, and Peter Bobrowsky, Geological Survey of Canada (2008). The Landslide Handbook—A Guide to Understanding Landslides. USGS Circular 1325. Reference textbook.

? Landslides: Investigation and Mitigation : Special Report 247 (Special Report (National Research Council (U S) Transportation Research Board)) by A. Keith Turner (Editor), Robert L. Schuster (Editor). Reference textbook.

? Thomas Glade, Malcolm Anderson, Michael J. Crozier (2005). Landslide Hazard and Risk. John Wiley & Sons, 15 apr 2005 - 802 pagine. Reference textbook.

? Course notes, scientific articles and other material will be provided during the course.

#### Modalità verifica apprendimento

Three assignments about the concepts and the topics of the course will be handed over and graded during the course. At the end of the course, a final examination will be also scheduled, consisting in a three hours-written test with open questions regarding the topics of the course. The final grading will be obtained from the following proportion: 40% evaluation of the assignments, 60% evaluation of the final exam.

**Altre informazioni**

**Obiettivi Agenda 2030 per lo  
sviluppo sostenibile**

[\\$lbl legenda sviluppo sostenibile](#)