

Course title:

Landslide hazard: from local assessment to national maps

Duration [number of hours]: **6**

PhD Program [MERC/MPHS/SPACE]: **MERC**

Name and Contact details of unit organizer(s):

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Course Description [max 150 words]:

This course focuses on the hazard assessment of landslides and other disasters involving subsoil. After reviewing the fundamentals of the soil behaviour, a brief discussion on slope stability, liquefaction, and seismic site effects is presented. The main topic is slope stability analysis, ranging from the single slope to large areas, presented through Italian case studies. In the field of physically or numerically based approach, a single slope case study is presented: the Mt. Faito test site (Lattari Mts., southern Italy), where the University of Naples Federico II conducted extensive geophysical, geotechnical, and hydrological characterizations, as well as numerical simulations of slope stability. The same data also serve as inspiration for a data-driven approach application extending from the single slope to homogeneous contexts with common and recurrent characteristics in geological and geomorphological settings. Finally, maps provided by the Italian Institute for Environmental Protection and Research will be presented as an application for recognizing landslide hazards over large areas.

Syllabus [itemized list of course topics]:

- Introduction and motivation
- Fundamentals of soil behaviour
- Stability of the infinite slope
- A multidisciplinary approach: Mt Faito test site
- A data-driven approach: from single slope to large areas
- Pills of Early Warning Systems for rainfall-induced instabilities
- Italian maps of landslide hazard

Assessment [form of assessment, e.g., final written/oral exam, solutions of problems during the course, final project to be handed-in, etc.]:

Final project to be handed: students will be provided with data coming from a real monitoring of an artificially induced landslide; they will have to challenge to make the best prediction of the occurrence.

Suggested reading and online resources:

1. Chae B., Park H.J., Catani F., Simoni A., Berti M. (2017). Landslide prediction, monitoring and early warning: a concise review of state-of-the-art. *Geosciences Journal*, volume 21, pages 1033–1070.
2. Caine N., 1980, The rainfall intensity-duration control of shallow landslides and debris flows. *Geografiska Annaler Series A: Physical Geography*, 62, 23–27.
3. Picarelli L., Rianna G., Urciuoli G. (2010). A simple numerical procedure for timely prediction of precipitation-induced landslides in unsaturated pyroclastic soils. *Landslides* 7(3), pp. 273-289.