UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Geo-Hydrological Risk

2526-1-F7402Q020

Aims

Understanding hydrogeological risks through a general presentation, case study analysis, and physical-mathematical modeling

Contents

1) INTRODUCTION

2) DEBRIS FLOWS

3) ROCK AVALANCHES

4) OTHER TYPES OF HYDROGEOLOGICAL RISK

Detailed program

1) INTRODUCTION

Types of hydrogeological risks; landslides, debris flows, floods; geological materials from which hydrogeological instabilities develop

2) DEBRIS FLOWS

Brief introduction to fluid dynamics and rheology; Newtonian and non-Newtonian fluids;

Debris flows: examples and case studies in moraines, volcanic, alluvial materials; GLOF

Relationship with hydrogeology, rainfall, and climate

Dynamics of debris flows

Risk mitigation from debris flows

Superficial instability

3) ROCK AVALANCHES

Introduction to the physics of friction

Rock avalanches: examples and case studies

Dynamics of rock avalanches

Rockfalls

4) OTHER TYPES OF HYDROGEOLOGICAL RISK

Snow avalanches

Brief introduction to geomorphology and river hydraulics

Floods

Breaking of large dams

Catastrophic emptying of glacial lakes and extraterrestrial analogues

Submarine landslides and tsunamis

The hydrogeological risk in the history of mankind

Epilogue

Prerequisites

basic knowledge of mechanics

Teaching form

Frontal or remote lessons
21 two-hour lectures, in person, Delivered Didactics
2 four-hour lab activities, in person, Interactive Teaching

Textbook and teaching resource

Provided by the teacher; in part, use of books and articles

Semester

Second

Assessment method

1. Basic exam in which the student must:
   a) solve some simple exercises that, while requiring little calculation skill, allow the student to assess their knowledge of the topics.
   b) provide brief explanations of the topics covered, or images from field situations that the student must interpret.
2. Subsequently, the student must take an oral exam in which Part 1 is discussed and explored in more detail, and mistakes from the first part are corrected; additionally, some questions are asked as in a traditional exam.

Office hours

To be defined

Sustainable Development Goals

LIFE ON LAND