

# UNIVERSITÀ DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

# **Applied Seismology**

2526-1-F7402Q018

#### **Aims**

The goal of the course is to teach students the principles of applied seismology, with a focus on the evaluation of seismic hazard and its implications for land use planning.

#### **Contents**

- a) Basic concepts of seismology
- b) Intensity measures of ground shaking: peak parameters, duration, response spectrum and Fourier spectrum
- c) Local seismic response
- d) Empirical equations for the prediction of ground motion
- e) Introduction to seismic hazard (deterministic and probabilistic)
- f) Introduction to the Italian Seismic Code (section relevant to the profession of a geologist)
- g) Seismic microzonation and insights on seismic-induced landslides and liquafaction

### **Detailed program**

- 1. Basic Concepts of Seismology: causes of earthquakes; seismic waves; earthquake location; magnitude calculation; instrumental earthquake catalogs; monitoring networks; description of seismological instruments.
- Ground Shaking Intensity Measures: Peak and Duration Parameters, Response Spectrum and Fourier Spectrum: description of peak ground motion parameters (peak ground acceleration, velocity, and displacement) and duration (significant duration and bracketed duration); response spectrum and Fourier spectrum.
- 3. Local Seismic Response: basic concepts on the seismic response of stratified soils.

- 4. **Empirical Ground Motion Prediction Equations**: calculation of peak parameters and response spectra based on magnitude, distance, and soil type.
- 5. **Introduction to Deterministic and Probabilistic Seismic Hazard**: simplified methods for ground shaking scenarios, shakemaps, and probabilistic seismic hazard, with a focus on the national seismic hazard model (MPS04).
- 6. **Introduction to the Italian Building Code (NTC2018)**: design spectra for different soil categories and selection of spectrum-compatible accelerograms.
- 7. Seismic Microzonation (with insights on Earthquake-Induced Landslides and Liquefaction): first, second, and third level microzonation; identification of Homogeneous Microzones in Seismic Perspective (MOPS); calculation of amplification factors.

## **Prerequisites**

None

## **Teaching form**

Interactive teaching XXX hours

## Textbook and teaching resource

Lecture slides

Recommended textbooks:

Faccioli E, Paolucci R, (2005) Elementi di sismologia applicata all'ingegneria, Pitagora Editrice Bologna (ISBN: 8837115008)

Lanzo G., Silvestri E. (1999) Risposta Sismica Locale. Hevelius Edizioni ISBN 978-88-86977-91-3

#### Free pdf

F. Bramerini, G. Di Pasquale, G. Naso, M. Severino (2008) Indirizzi e criteri per la microzonazione sismica (Parte I, II, III), Dipartimento della Protezione Civile

#### Semester

First semester (October 2025-January 2026)

#### **Assessment method**

Oral exam

DISCUSSION AND EVALUATION OF THE REPORT OF THE LAB PRACTICALS;

DISCUSSION ON THE TOPICS OF THE LECTU
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## Office hours

By appointment Thursday 9:30 -11:30 (at INGV department via Corti 12, Milano)

## **Sustainable Development Goals**

QUALITY EDUCATION | INDUSTRY, INNOVATION AND INFRASTRUCTURE | SUSTAINABLE CITIES AND COMMUNITIES