



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## COURSE SYLLABUS

### Engineering Geological Survey

2122-1-F7401Q050

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#### Aims

Advanced knowledge of data collection and analysis methods for the physical and hydro-geomechanical characterization of soil and rock masses by surface and sub-surface site investigation.

#### Contents

Theory and techniques of engineering geological and geomechanical characterisation of soils and rock masses at surface and depth.

#### Detailed program

##### Lectures:

- 1) Engineering geological survey and site investigation: technical standards, investigation planning and project staging; general geological and methodological aspects.
- 2) Stereographic projection techniques: emispherical projections; plotting, geometrical and statistical analysis of orientation data; applications to engineering geology and rock mechanics.
- 3) Rock mass characterization: rock mass behaviours; strength and deformability of intact rock, discontinuities and rock masses; field discontinuity surveys using areal and scanline sampling; applications of remote survey techniques (e.g. TDP, TLS); measures of fracture orientation, density/intensity, persistence and strength; rock mass classification schemes (RMR, Q, GSI); hydro-mechanical properties of rock masses, Hoek-Brown approach;

complex rock masses.

- 4) Engineering geological characterization of soils: criteria and tests for field identification and description, technical classification using laboratory or field data (USCS).
- 5) Geological and geotechnical site investigations: work planning; borehole drilling (techniques, equipment, procedures), drilling fluids, borehole support and stabilization, oriented boreholes; geotechnical sampling methods (source of disturbance, sampling techniques and tools); geological, geotechnical and geomechanical borehole logging.
- 6) In situ testing: applicability, advantages and limitations; SPT and dynamic penetration tests, cone penetration tests, field vane test, flat dilatometer and pressuremeter tests, pore pressure measurement.

**Lab work:**

Stereographic projections, engineering classification of soils, geological and geotechnical core logging, analysis of site investigation data.

**Field work:**

Rock mass characterization, geomechanical core logging, site investigation.

**Prerequisites**

Geology, hydrogeology, engineering geology

**Teaching form**

- Lectures, 28 hours (4 credits)
- Exercises, 12 hours (1 credit)
- Fieldwork, 10 hours (1 credit)

During the Covid-19 emergency, teaching will be held in mixed mode, with delayed video-recorded lectures and partial physical presence (practical activities, i.e. some exercises and fieldwork).

**Textbook and teaching resource**

Teacher's lecture notes and supplementary material

## **Semester**

1st semester

## **Assessment method**

Oral examination including a discussion of technical report assignments on laboratory and field work, theory (3 questions) and an exercise on the application of stereographic techniques.

During the Covid-19 emergency, examinations will be held remotely through the Webex platform.

## **Office hours**

On appointment

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