UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Engineering Geological Survey

2425-1-F7401Q050

Aims

The course aims to provide the student with an in-depth knowledge of the *in situ* physical and hydro-geomechanical properties of rock masses and soils and of the methods that allow their characterization, as well as practical skills in the use of these methods through surface surveys and subsurface site investigations.

Contents

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

Detailed program

Lectures (Delivered Didactics)

1. Engineering geological survey and site investigation: main 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. laer scanning, photogrammetry, thermography); 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: technical standards and investigation 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 (Interactive teaching)

Analysis of directional data using stereographic projection techniques (by hand and using software); SfM photogrammetric processing and basic treatment of point clouds with reference to the geo-structural analysis of rock masses; core logging and technical classification in soils and rocks; processing of data from in situ geotechnical tests.

Field work (Interactive Teaching)

Rock mass characterization, geomechanical core logging, site investigation.

Prerequisites

Course of "Safety in the Field" (status: "Approved"). Basic knowledge of Engineering Geology and Structural Geology.

Teaching form

The course is taught in Italian and divided into:

- 14 two-hour Lectures in person, Delivered Didactics (4 ECTS, 28 hours)
- 3 four-hour practical classes, in person, Interactive Teaching (1 ECTS, 12 hours)
- 2 six-hour field activities, in person, Interactive Teaching (1 ECTS, 12 hours)

The field activity consists of two separate days in the field during the course.

Textbook and teaching resource

Lecture notes, supplementary materials, and datasets provided by the Teacher thorugh the e-learning page.

Semester

1st semester

Assessment method

Verification of the knowledge and skills acquired by the students takes place by means of a final examination, aimed at assessing the student's theoretical preparation and his ability to: apply the basic knowledge of stratigraphy, structural geology and applied geology to the engineering geological site investigation; identify the objectives of the geological-technical survey and structure the related activities; illustrate the methods used, analyze the acquired data and provide a clear interpretative synthesis.

The final exam consists of an individual ORAL EXAMINATION, structured in:

- an interview on the reports of the practical activities carried out, for the verification of disciplinary problem solving skills
- an interview on the topics covered in class (3 questions), for the verification of knowledge and communication skills in the disciplinary field
- an interactive exercise on the application of stereographic techniques.

There are no *in itinere* tests.
The final grade is awarded in thirtieths.

Office hours

The Teacher receives on appointment, to be scheduled by e-mail.

Sustainable Development Goals

QUALITY EDUCATION | AFFORDABLE AND CLEAN ENERGY | INDUSTRY, INNOVATION AND INFRASTRUCTURE