UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Basic Engineering Geology

2627-3-E3401Q042

Aims

Students will learn basic knowledge about engineering geology, soil and rock mechanics and application of principles to the analysis of geomaterials

Aim of the course is to provide basic and advanced knowledge concerning: engineering geological problems under subaerial and subaqueous conditions; problems linked to engineering structures, mining and environmental engineering; the physical mechanical behaviour of soil, rock and rock masses and their characterization; direct and indirect in situ investigations; in situ stress state and its changes due to natural and anthropic action; seepage in porous media; soil and rock stability.

The student will be finally capable to understand how to apply engineering geological knowledge for solving geological and technical problems, for land use planning, construction of structures and infrastructures, modelling of physical and geological processes.

This course is designed to provide:

Knowledge and understanding of most geological and geological-technical problems. This will be achieved through the application of physics and mechanics principles, primarily by integrating them with the geological knowledge acquired during the three-year program leading up to this course, and by referencing other courses from the same academic year where relevant.

Applied knowledge and understanding within the field of applied geology, particularly concerning problems directly involving the behavior of geological materials and geomaterials, as well as the interaction between different elements such as structures, infrastructure, and geological materials.

Autonomy of judgment: The theoretical foundations and the development of various analytical models and tools presented will enable students to gain independence of judgment, thereby enhancing their critical thinking skills. The aim is to provide tools and approaches for recognizing problems and analyzing them critically, including adapting them to specific issues.

Communication skills: The course will equip students with the technical language and the theoretical and practical tools necessary to communicate their knowledge and geological/geological-technical problems to other technical and non-technical parties involved in the same study and design activities.

Learning ability: The course structure aims to provide a common thread connecting different techniques and problems. This approach, if followed by the student, facilitates the understanding of topics and the construction of a comprehensive and interconnected view.

Contents

Theory: fields of interest; techniques and methods; engineering geological problems; hazard and risk concepts; geomaterials; principles of stress and deformation analysis; constitutive laws, time/deformation models; rheological models. Physical properties of soil and rock and their technical classifications. In situ stress in geological media and their changes. Water seepage and its role on in situ stress and soil/rock stability. Consolidation and settlements. Mechanical properties of soils: compressibility, shear strength, in different stress and drainage conditions. Mechanical properties of intact rocks and rock masses: resistance, deformability. Lateral earth pressure: elastic and plastic soil stability; ultimate bearing capacity. Soil and rock behaviour under dynamic conditions.

Lab exercises: physical and mechanical properties of soil and rock; in situ stresses; seepage, flow nets; consolidation and settlement; earth pressure and bearing capacity.

Detailed program

Theory: fields of interest; techniques and methods; engineering geological problems; hazard and risk concepts; geomaterials; principles of stress and deformation analysis; constitutive laws, time/deformation models; rheological models. Physical properties of soil and rock and their technical classifications. In situ stress in geological media and their changes. Water seepage and its role on in situ stress and soil/rock stability. Consolidation and settlements. Mechanical properties of soils: compressibility, shear strength, in different stress and drainage conditions. Mechanical properties of intact rocks and rock masses: resistance, deformability. Lateral earth pressure: elastic and plastic soil stability; ultimate bearing capacity. Soil and rock behaviour under dynamic conditions.

Lab exercises: physical and mechanical properties of soil and rock; in situ stresses; seepage, flow nets; consolidation and settlement; earth pressure and bearing capacity.

Prerequisites

A base-level knowledge in geology, physics, mathematics and mineralogy is requested

Teaching form

Lectures and lab activities

Following the corse lectures is highly recommended

Textbook and teaching resource

All the material used for the lectures is made available and it is self consistent and complete for preparing the exam

Semester

First Semester

Assessment method

Oral exam with written demonstrations and drawings of the requested problems
No mid term exams
The student wil have to show:

- suitable knowledge of the subjects
- capability to derive solutions and demonstration in written format and using plots
- capability to put together the various subjects by linking them together i a unique vision
- use of examples taken from the course or other courses including geologic knowledge
- use of a suitable and correct scientific and technical language and terms

Office hours

by appointment
8.30 - 19.00

Sustainable Development Goals

LIFE ON LAND