

# Geology and engineering geology

**Lecturer**

Pierre GERARD (Coordinator)

**Course mnemonic**

CNST-H312

**ECTS credits**

5 credits

**Language(s) of instruction**

English

**Course period**

Second term

**Campus**

Solbosch

## Course content

**Part 1 - Introduction to geology**

The Earth System

The rock cycle

Types of minerals and rocks

Processes of weathering, transport and diagenesis

Stratigraphy

Basic principles of structural geology

Interpretation of geological maps

**Part 2 - Engineering geology**

Interpretation of geotechnical maps

Basic principles of hydrogeology

Problematic soils: alluvial plains, subsidence, karst, swelling and shrinking soils, post-mining problems, etc.

Introduction to the main geophysical methods for subsurface characterization (seismic refraction, electrical prospecting, micro-gravimetry, ground penetrating radar)

Engineering geology associated with dams and tunnels construction

## Objectives (and/or specific learning outcomes)

At the end of the course, the students will be able to:

- > describe the basic geological processes
- > identify the main minerals and rocks encountered on Earth surface
- > describe the basic principles of geophysical methods and their contributions in geotechnical engineering
- > explain how the geological conditions, the heterogeneity of the subsurface and the behaviour of geological materials can influence some civil engineering applications

- > analyse and interpret geological, geotechnical, hydrogeological and geophysical data and reports to identify the geotechnical properties of the subsurface and their consequences for a civil engineering project

## Teaching method and learning activities

Lectures for theoretical aspects (slides available on UV)

Exercises (rocks and minerals identification, interpretation of geological maps, interpretation of in-situ tests campaign, interpretation of geophysical data, etc.)

A site visit will be organized according to the possibilities

## Contribution to the teaching profile

This teaching unit contributes to the following competences:

- > In-depth knowledge and understanding of exact sciences with the specificity of their application to engineering
- > Think critically about and evaluate projects, systems and processes, particularly when based on incomplete, contradictory and/or redundant information
- > A critical attitude towards one's own results and those of others
- > An attitude of life-long learning as needed for the future development of his/her career
- > Design (conceptually and quantitatively) geotechnical structures by applying the fundamental concepts of soil mechanics
- > Integrate the behaviour of geomaterial as a construction or a geological material in complex civil engineering problems

## References, bibliography and recommended reading

Additional details and explanations about the content of the course can be found in the following references:

Understanding Earth. Grotzinger J., Jordan T., Press F. and Siever R. 2007. Ed. Freeman

Geology - Basics for engineers. Parriaux A. 2009. CRC Press/Balkema

Geological engineering. Gonzalez de Vallejo L. 2011. CRC Press

## Course notes

Université virtuelle

## Other information

## Place(s) of teaching

Solbosch

## Contact(s)

Prof. Pierre Gerard - Solbosch campus - Building C - Level 4 -  
Laboratory of GeoMechanics - gerard.pierre@ulb.be

## Evaluation method(s)

Oral examination, written examination and Written report

### Evaluation method(s) (additional information)

The final mark is based on :

- > a written report related to the content of one exercises session
- > a written examination related to exercises
- > an oral examination related to the theory and rocks/minerals identification

### Determination of the mark (including the weighting of partial marks)

The final mark is obtained with the following weighing:

- > written report (25%)
- > written examination (40%)
- > oral examination (35%)

In case of failure in first session, only the mark corresponding to the written report can be kept for the second session. The oral exam and the written exam have always to be taken in second session.

### Main language(s) of evaluation

English

## Programmes

### Programmes proposing this course at the Brussels School of Engineering

BA-IRCI | **Bachelor in Engineering Sciences** | option Bruxelles/unit 3 and MA-IRCN | **Master of science in Civil Engineering** | finalité Professional/unit 2