


5.0 credits	30.0 h + 30.0 h	2q
-------------	-----------------	----

Teacher(s) :	Bolly Pierre-Yves ; Verástegui Flores Ramiro Daniel ;
Language :	Français
Place of the course	Louvain-la-Neuve
Inline resources:	iCampus : LAUCE1171
Prerequisites :	Basic notions of the mechanics of solids and fluids.
Main themes :	<p>The objectif of the course is to impart knowledge on managing different scientific and technical aspects linked to an optimal utilization of geomaterials in construction, including natural resources and also synthetic materials.</p> <p>The course aims at providing future engineers with an essential background on geology and soil mechanics that will be useful to them in their professional life for studying and managing civil engineering projects.</p>
Aims :	<p>Contribution of the course to the program objectives (N°) AA1.1, AA1.2, AA6.1</p> <p>Specific learning outcomes of the course</p> <p>At the end of the course, students will be capable of :</p> <p>-- Describing the physical properties of geomaterials (rock, soil and derivatives). -- Identifying and classifying rocks, mineral and soils. -- Describing methods of geological investigation. -- Describing the interaction of water and geomaterials. -- Choosing appropriate testing methods to evaluate mechanical parameters of soil. -- Calculating soil deformations and capacity against loading.</p> <p><i>The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".</i></p>
Evaluation methods :	Closed-book written exam
Teaching methods :	The teaching is organized in lecture sessions and exercise sessions. The lectures will be given in classroom by means of slides and demonstrations. The exercise sessions will take place in classroom but also laboratory sessions are programmed. Teaching material to support the learning process (e.g. a syllabus and additional documents) will be electronically available.
Content :	<p>The course has been organized into two main branches, the first one dealing with elementary engineering geology aspects and the second one dealing with elementary soil mechanics. The contents include:</p> <p>Elementary engineering geology Introduction: mining georesources. Examples of use of geomaterials for foundations and construction of buildings, tunnels, dams, georisks. Rock cycle. Genesis and genetic classification of rocks: igneous rocks, sedimentary rocks, and metamorphic rocks. Main properties of rocks: real and apparent density, total and open porosity, water adsorption coefficient. Uniaxial compressive strength, abrasion resistance, thermal conductivity. Comparison of these properties to those of artificial materials (concrete, steel, glass, aluminium, masonry, wood, etc.). Principles of macroscopic identification of rocks and granulates. Industrial use. Water georesources: main aquifer resources, exploitation, and protection measurements. Laws and rules. Responsibilities of the engineer. Risk management (flooding, slope failure, earthquakes) In situ geological investigation methods. Destructive methods: continuous boreholes (percussion, rotation, roto-percussion). Nondestructive methods: geophysical prospection. Elementary soil mechanics Physical characterization: Particle size distribution of fine and coarse soils, consistency, soil classification. Volume mass relationships, soil compaction. Soil-water interaction, capillarity, Darcy law, 1D groundwater flow, laboratory hydraulic conductivity test, introduction to 2D groundwater flow (flownets) Stress in soil, total stress, pore water pressure and effective stress. 1D Compression and deformation. Oedometer test. Evaluation of soil settlement due to loading.</p>

	Shear strength of soil, direct shear test, triaxial tests. Features of strength of sand and clay. Mohr Coulomb concept.
Bibliography :	Slides, syllabus and lecture notes (available online).
Other infos :	The lectures on Elementary soil mechanics will be delivered in English. The lectures on Elementary engineering geology will be delivery in French.
Faculty or entity in charge:	GC

Programmes / formations proposant cette unité d'enseignement (UE)				
Intitulé du programme	Sigle	Credits	Prerequis	Acquis d'apprentissage
Bachelor in Engineering : Architecture	ARCH1BA	5	-	
Minor in Engineering Sciences: Construction	LGCE100I	5	-	