


5.0 credits	45.0 h + 15.0 h	1q
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Teacher(s) :	Holeyman Alain ; Verástegui Flores Ramiro Daniel ;
Language :	Anglais
Place of the course	Louvain-la-Neuve
Inline resources:	iCampus : LAUCE2171
Prerequisites :	Basic concepts of soil classification, effective stress, compressibility, shear strength, laboratory and site investigation, design of shallow and deep foundations.
Main themes :	<p>The objectives of the course are:</p> <p>--</p> <p>To strengthen the knowledge of geotechnical engineering through discussion of advanced concepts: lateral actions, soil-structure interaction, soil anisotropy and heterogeneity, unsaturated soil mechanics.</p> <p>--</p> <p>To explain the design principles of geotechnical elements of a construction project: slurry walls, sheet pile walls, laterally loaded piles, soil improvement methods.</p> <p>--</p> <p>To familiarize the student with the significance of certain elements on the stability of constructions: presence and seepage of groundwater, drainage conditions and time, post construction observation and monitoring.</p>
Aims :	<p>Contribution of the course to the program objectives (N°)</p> <p>AA1.2, AA1.3, AA2.1, AA2.2, AA4.1, AA5.1, AA5.2, AA5.3, 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 execution methods for the installation of walls and their application domains.</p> <p>Designing a retaining wall taking account of external and internal loads to which it is subjected.</p> <p>Describing soil improvement methods and their application domains.</p> <p>Modelling an element of a geotechnical project by means of the software Plaxis, taking into account its phases of execution.</p> <p>Calculating deformation and loading of structures (foundation mats, walls, piles) interacting with soil.</p> <p>Identifying potentially dangerous situations in presence of groundwater and methods to reduce issues in such cases.</p> <p>Describing features of behaviour of soft soils and calcareous sands.</p> <p>Describing features of behaviour of unsaturated soils.</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 :	The evaluation is oral with written preparation (closed book).
Teaching methods :	<p>Ex-cathedra teaching through slides for volume 1.</p> <p>Supervised exercise sessions in classroom for volume 2.</p> <p>Teaching material (e.g. a syllabus and additional documents) is electronically available on iCampus.</p>
Content :	<p>Ch 1 - Installation technology of retaining panels: slurry walls, sheet pile walls, reinforcement, anchors - Limit state design</p> <p>Ch 2 - Walls and sheet-pile walls: analytical calculation of cantilever walls and anchored walls</p> <p>Ch 3 - Soil improvement through densification: replacement and compaction, preloading, vertical drains, vibrocompaction, dynamic consolidation.</p> <p>Ch 4 - Soil improvement through reinforcement: stone columns, micropiles, geotextiles, terre armée.</p> <p>Ch 5 - Constitutive laws of soil behaviour. Finite element modelling. Introduction to Plaxis (elasto-plasticity)</p> <p>Ch 6 - Foundation mats and slabs: stiffness, deformations and admissible deformations. Settlement of a single pile.</p> <p>Ch 7 - Horizontal loading: piles and retaining structures, tension piles and anchors.</p> <p>Ch 8 - Slope stability: limit equilibrium methods and strength reduction methods.</p> <p>Ch 9 - Slope stabilization: causes of failure, drainage, cut and fill methods, biotechnical methods, stabilizing piles.</p> <p>Ch 10 - Behaviour of calcareous soil in shear and compression. Impact of crushable particles.</p> <p>Ch 11 - Behaviour of soft soils, consolidation theories, evaluation of consolidation properties.</p> <p>Ch 12 - Shear strength of soft soils, impact of disturbance on undrained shear strength, anisotropy, strain-rate effect.</p> <p>Ch 13 - Behaviour of unsaturated soil, matric suction and its effect on shear strength and compression, hydraulic conductivity.</p>
Bibliography :	Slides, syllabus and lecture notes (available online).

Other infos :	/
Faculty or entity in charge:	GC

<b>Programmes / formations proposant cette unité d'enseignement (UE)</b>				
Intitulé du programme	Sigle	Credits	Prerequis	Acquis d'apprentissage
Master [120] in Civil Engineering	GCE2M	5	-	
Master [120] in Architecture and Engineering	ARCH2M	5	-	