



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

| | |
|----------------------|---|
| Teacher(s) : | Verástegui Flores Ramiro Daniel ; Holeyman Alain ; |
| Language : | Français |
| Place of the course | Louvain-la-Neuve |
| Inline resources: | iCampus : LAUCE1172 |
| Prerequisites : | Knowledge of soil formation, soil classification, physical properties, interaction of soil and water and effective stress. <i>The prerequisite(s) for this Teaching Unit (Unité d'enseignement – UE) for the programmes/courses that offer this Teaching Unit are specified at the end of this sheet.</i> |
| Main themes : | The objectives of the course are: -- To describe the notions of soil mechanics, useful for the design of geotechnical elements of a construction project. -- To explain the principles of design of the main geotechnical elements of a construction project: slopes, foundations and retaining structures. -- To familiarize the student with the significance of the applied technology in the execution methods of construction elements in contact with soil. |
| Aims : | Contribution of the course to the program objectives (N°) AA1.1, AA1.2, AA4.2 Specific learning outcomes of the course At the end of the course, students will be capable of: Describing the compression mechanisms of soil Determining the shear strength of soil and describing the difference between drained and undrained strength Describing the failure mechanisms of slopes Calculating the safety factor against failure of a slope. Qualitatively interpreting the results of a cone penetration test (CPT) Choosing the appropriate type of foundation for a given geotechnical scenario. Determining the bearing capacity of a shallow foundation (ULS) Calculating the settlement of a shallow foundation (SLS) Describing the types of deep foundations and their application domain Determining the bearing capacity of a deep foundation (ULS) Describing the different types of retaining structures and their modes of failure. <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> |
| Evaluation methods : | Examen oral avec préparation écrite (livre fermé) |
| Teaching methods : | Ex-cathedra teaching through slides for volume 1. Supervised exercise sessions in classroom for volume 2. Teaching material (e.g. a syllabus and additional documents) will be electronically available on iCampus. |
| Content : | Part I: Supplementary soil mechanics Ch 1 : Compression 1-D: Immediate compression, primary consolidation, secondary compression. Terzaghi's theory, oedometer test interpretation. Ch 2 : In-depth review of the concept of dilatancy and contraction during shearing, effect of preconsolidation. Ch 3 : Shear strength of soil as a function of drainage conditions: drained, undrained and partially drained behaviour. Ch 4 : Critical state strength, stress paths to failure in triaxial tests: drained and undrained conditions. Ch 5 : Stability of slopes, definition of safety factor, slope failure mechanisms. Infinite slope, circular failure surface, non-circular failure surface. Method of slices. Partie II : Foundations and retaining structures Ch 6 : Site investigation, in-situ tests, in particular CPT, choice of foundation type. Ch 7 : Shallow foundations (design criteria, ULS, SLS): limit equilibrium criteria, bearing capacity equation of shallow foundations, correction factors. Ch 8 : Shallow foundations (stresses): vertical stress, stress distribution (Boussinesq, Newmark, Steinbrenner). Ch 9 : Shallow foundations (settlements): limit equilibrium of deformations, evaluation of settlements, causes of differential settlements, solutions. Ch 10 : Review of deep foundation technologies and execution methods: piles, excavations, grouting and anchors. |

| | |
|-------------------------------------|---|
| | <p>Ch 11 : Piled foundation: bearing capacity of a single pile, group effects, negative friction. Ch 12 : Lateral earth pressure on walls: at-rest pressure, active and passive states (Rankine approach); retaining walls: general principles and stability criteria.</p> |
| Bibliography : | <p>Slides, syllabus and lecture notes (available online). Further reading: Cernica, J. (1995), Geotechnical engineering : soil mechanics, Wiley - BST code: A 4 92 056</p> |
| Other infos : | <p>Part 1 of the lectures will be taught in English, Part 2 will be taught in French or English</p> |
| Faculty or entity in charge: | <p>GC</p> |

| Programmes / formations proposant cette unité d'enseignement (UE) | | | | |
|--|----------|---------|---------------------------|---|
| Intitulé du programme | Sigle | Credits | Prerequis | Acquis d'apprentissage |
| Bachelor in Engineering : Architecture | ARCH1BA | 5 | LAUCE1171 |  |
| Minor in Engineering Sciences: Construction | LGCE100I | 5 | LAUCE1171 |  |