





5.00 credits

30.0 h + 30.0 h

Q2

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|---------------------|---|
| Teacher(s)          | Cap Jean-François ;   |
| Language :          | French  |
| Place of the course | Louvain-la-Neuve  |
| Prerequisites       | This course requires a good knowledge of materials, strength of materials, mechanics of structures and stability of constructions as taught in courses LGCIV1031, LGCIV1022, LGCIV1023.   |
| Main themes         | See part 'Content' hereunder.   |
| Learning outcomes   | <p><b>At the end of this learning unit, the student is able to :</b></p> <p>With respect to the program's AA reference system, this course contributes to the development, acquisition and evaluation of the following learning outcomes: AA1.1, AA1.2, AA1.3, AA3.1, AA5.3, AA5.4</p> <p>More specifically, at the end of this course, the student must have acquired a theoretical and practical knowledge of methods for calculating and designing structural elements in reinforced concrete.</p> <p>1 He/she should be able to design and calculate simple elements in reinforced concrete (beams, columns, ...) by respecting the rules prescribed in the European standards in force (Eurocode 2) and to understand reinforcement and formwork plans.</p> <p>He will also master the fundamental concepts of the theory of reinforced concrete that will allow him to address problems of designing more complex elements (slabs, shells, etc.).</p>   |
| Evaluation methods  | The exam covers the theoretical concepts seen in the course, as well as practical exercises. The details are specified during the course and described on Moodle.   |
| Teaching methods    | Ex cathedra courses with slides.<br>Workshop exercises.   |
| Content             | <p>Topics are discussed in the context of calculations in service (elastic behavior hypothesis) and rupture (plastic behavior hypothesis). The design methods presented refer to the rules prescribed in the current European standards (Eurocode 2).</p> <p>History of reinforced concrete</p> <p>Mechanical and physical properties of concrete</p> <p>Mechanical and physical properties of reinforcement steel</p> <p>Basic principles of calculation of reinforced concrete structures</p> <p>Structural safety and limit states</p> <p>Fundamental principles of bending calculation</p> <p>Behavior of a beam led to rupture by simple bending</p> <p>Elastic calculation and calculation at break of the sections subjected to the simple bending.</p> <p>Section subjected to a simple compression</p> <p>Sections subjected to the composite bending, elastic design and plastic design.</p> <p>Sections subjected to shear force</p> <p>Sections subject to torsion</p> <p>Shear forces at interfaces between 2 concrete zones</p> <p>Punching slabs</p> <p>Slender elements subjected to compression (buckling)</p> <p>Serviceability limit states: limitation of the stresses in service, limitation of the cracking, arrows.</p> <p>Plastic calculations by means of tie-rods</p> <p>Technological aspects of reinforcement of reinforced concrete elements</p> |
| Inline resources    | Available on Moodle   |

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| Bibliography                | - Transparents du cours (syllabus) et Formulaire EN 1992-1-1+ ANB ;<br>- Norme NBN EN 1992-1-1 - Eurocode 2 : Calcul des structures en béton - Partie 1-1 : Règles générales et règles pour les bâtiments<br>- René Walther, Manfred Miehlsbradt. Dimensionnement des structures en béton - Traité de Génie Civil Volume 7 . Presses polytechniques et universitaires romandes.<br>- R. Favre, J.-P. Jaccoud, O. Burdet, H. Charif. Dimensionnement des structures en béton - Traité de Génie Civil Volume 8 . Presses polytechniques et universitaires romandes. |
| Faculty or entity in charge | GC  |

| <b>Programmes containing this learning unit (UE)</b> |          |         |              |   |
|--|----------|---------|--------------|---|
| Program title  | Acronym  | Credits | Prerequisite | Learning outcomes   |
| Bachelor in Engineering :<br>Architecture            | ARCH1BA  | 5       |              |  |
| Specialization track in<br>Construction              | FILGCE   | 5       |              |  |
| Minor in Construction                                | LMINOGCE | 5       |              |  |
| Mineure Polytechnique                                | MINPOLY  | 5       |              |  |