

Due to the COVID-19 crisis, the information below is subject to change, in particular that concerning the teaching mode (presential, distance or in a comodal or hybrid format).

5 credits	30.0 h + 30.0 h	Q2
-----------	-----------------	----

Teacher(s)	Cap Jean-François ;
Language :	French
Place of the course	Louvain-la-Neuve
Prerequisites	<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	See part 'Content' hereunder.
Aims	<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> <p>-----</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	<p><b>Due to the COVID-19 crisis, the information in this section is particularly likely to change.</b></p> <p>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.</p>
Teaching methods	<p><b>Due to the COVID-19 crisis, the information in this section is particularly likely to change.</b></p> <p>Ex cathedra courses with slides.</p> <p>Workshop exercises.</p>
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
Bibliography	<ul style="list-style-type: none"> <li>- Transparents du cours (syllabus) et Formulaire EN 1992-1-1+ ANB ;</li> <li>- Norme NBN EN 1992-1-1 - Eurocode 2 : Calcul des structures en béton - Partie 1-1 : Règles générales et règles pour les bâtiments</li> <li>- René Walther, Manfred Miehlsbradt. Dimensionnement des structures en béton - Traité de Génie Civil Volume 7 . Presses polytechniques et universitaires romandes.</li> <li>- 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.</li> </ul>
Faculty or entity in charge	GC

<b>Programmes containing this learning unit (UE)</b>				
Program title	Acronym	Credits	Prerequisite	Aims
Minor in Construction	<a href="#">LMINOGCE</a>	5		
Bachelor in Engineering : Architecture	<a href="#">ARCH1BA</a>	5	<a href="#">LGCIV1031</a> AND <a href="#">LGCIV1022</a>	
Specialization track in Construction	<a href="#">FILGCE</a>	5		