




4.00 credits

20.0 h + 15.0 h

Q2

Teacher(s)	Sgambi Luca ;
Language :	English
Place of the course	Louvain-la-Neuve
Prerequisites	Good knowledge of structural mechanics, structures stability and basis of finite elements method, as taught in LGCIV1022 et LGCIV1023
Main themes	<p>Variational principles in structural mechanics, classical theory of finite elements for structures:</p> <ul style="list-style-type: none"> <li>• Trusses (2D and 3D)</li> <li>• Frames (2D and 3D)</li> <li>• Plates and shells</li> <li>• Plane stress and plane strains.</li> </ul> <p>More advanced material will eventually be covered: elasto-plastic modelling of frames, structural instabilities, modelling of brittle materials, large displacements in structures.</p> <p>A computer project will be assigned to students that will consist in the development of a finite element code for a specific type of structure. The code will have to deal with inputs and outputs, including a graphical user interface.</p>
Learning outcomes	<p><b>At the end of this learning unit, the student is able to :</b></p> <p><b>Contribution of the course to the program objectives (N°)</b>                  AA1.1, AA1.2, AA1.3, AA2.1, AA2.2, AA2.3, AA2.4, AA3.1, AA3.2, AA4.2, AA4.4, AA5.6.</p> <p><b>Specific learning outcomes of the course</b></p> <p>1</p> <ul style="list-style-type: none"> <li>• Students will understand the principles of the finite element method applied to usual civil engineering structures (beams, frames, plates and shells).</li> <li>• Students will be trained in programming the finite element method. This includes the treatment of input data and the post-treatment of the results.</li> </ul>
Evaluation methods	<p>The final grade will consist of a mark on a written exam (40% of the grade) and a mark on the programming / use experience (60% of the grade).</p> <p>The programming / use experience report will be evaluated based on:</p> <ul style="list-style-type: none"> <li>- The accuracy of the results;</li> <li>- Comments: explanations of the algorithms, links with the theoretical part, explanation of the simplified study cases, explanation of the real study case, interpretation of the results;</li> <li>- The quality of the report.</li> </ul> <p>In both assessments, the teacher defines a minimum threshold of 6/20 below which the student cannot obtain a positive final assessment.</p> <p>Due to the current health crisis, the written exam could be done in person or online, or it could be replaced by an oral (online) exam.</p>
Teaching methods	The preferred form of teaching is in presence. However, due to the current health crisis, the course could be done in a co-modal mode way or totally online.
Content	See "Main themes".
Inline resources	The slides of the lessons and other materials are available on MOODLE.
Bibliography	<ul style="list-style-type: none"> <li>• Finite Element Structural Analysis, T.Y Yang, Prentice-Hall, Inc, Englewood, NJ, 1986</li> <li>• Analyse des structures et milieux continus, volume 6 : Méthode des éléments finis, F. Frey et J. Jirousek, Presses polytechniques et universitaires romandes.</li> </ul>
Other infos	More detailed information about the course and evaluation procedures will be explained during the first lesson and will be contained in the "Course Outline" (downloadable from MOODLE).

Faculty or entity in charge	GC
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<b>Programmes containing this learning unit (UE)</b>				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Mechanical Engineering	<a href="#">MECA2M</a>	5		
Master [120] in Electro-mechanical Engineering	<a href="#">ELME2M</a>	5		
Master [120] in Civil Engineering	<a href="#">GCE2M</a>	4		
Master [120] in Mathematical Engineering	<a href="#">MAP2M</a>	5		