UCLouvain

lgciv2041

2020

Numerical analysis of civil engineering structures

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).

4 credits	20.0 h + 15.0 h	Q2

Teacher(s)	Sgambi Luca ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	Variational principles in structural mechanics, classical theory of finite elements for structures: • Trusses (2D and 3D) • Frames (2D and 3D) • Plates and shells • Plane stress and plane strains. More advanced material will eventually be covered: elasto-plastic modelling of frames, structural instabilities, modelling of brittle materials, lage displacements in structures. 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.
Aims	**Contribution of the course to the program objectives (N°)** AA1.1, AA1.2, AA1.3, AA4.2, AA4.4, AA5.6. **Specific learning outcomes of the course** 1 • Students will understand the principles of the finite element method applied to usual civil engineering structures (beams, frames, plates and shells). • Students will be trained in programming the finite element method. This includes the treatment of input data and the post-treatment of the results. - - - - *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".*
Evaluation methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** The final grade will consist of a mark on a written exam (40% of the grade) and a mark on the programming experience (60% of the grade). The programming experience report will be evaluated based on: - The accuracy of the results; - 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; - The quality of the report. In both assessments, the teacher defines a minimum threshold of 6/20 below which the student cannot obtain a positive final assessment. 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.
Teaching methods	**Due to the COVID-19 crisis, the information in this section is particularly likely to change.** 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	• Finite Element Structural Analysis, T.Y Yang, Prentice-Hall, Inc, Englewood, NJ, 1986 • Analyse des structures et milieux continus, volume 6 : Méthode des éléments finis, F. Frey et J. Jirousek, Presses polytechniques et universitaires romandes.

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

Force majeure

Teaching methods	In case of force majeure, the teaching can be given in co-modal mode or totally online.
Evaluation methods	In case of force majeure, the written examination may be replaced by an online oral examination.

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Civil Engineering	GCE2M	4		
Master [120] in Electro-mechanical Engineering	ELME2M	5		
Master [120] in Mathematical Engineering	MAP2M	5		
Master [120] in Mechanical Engineering	MECA2M	5		