LMECA2520
2015-2016

Calculation of planar structures

5.0 credits	30.0 h + 30.0 h	2q

Teacher(s) :	Doghri Issam ;
Language :	Français
Place of the course	Louvain-la-Neuve
Inline resources:	> http://icampus.uclouvain.be/claroline/course/index.php?cid=LMECA2520
Main themes :	-- The objective of the course is to show analytically -in simple cases- and numerically how to model and solve an important class of so-called planar structures, i.e. such that their mechanical problem is reduced to two space dimensions. -- The problems involve " long " solids under plane strain, " thin " solids under plane stress and thin or thick plates under bending loads. -- For each class of problems, appropriate formulations will be developed, together with their finite element discretization, in view of their numerical resolution using a specialized software. Some rather simple problems will also be solved analytically in order to better understand the theory.
Aims :	In consideration of the reference table AA of the program "Masters degree in Mechanical Engineering", this course contributes to the development, to the acquisition and to the evaluation of the following experiences of learning: AA1.1, AA1.2, AA1.3 AA2.1, AA2.2, AA2.3 AA3.1, AA3.2 AA5.1, AA5.2, AA5.3 AA6.1, AA6.2 Analytical and numerical modeling of two-dimensional problems in linear elasticity: -- plane strain; -- plane stress; -- bending of plates. *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".*
Teaching methods :	Travaux pratiques : -- Resolution of several relatively simple problems dealing usually with direct applications of the theory (e.g., tube under inner and outer pressures, stress concentration in a plate with a small circular hole, force on the straight edge of a semi-infinite plate, bending of a circular plate under axisymmetric loading, etc.) -- Use of a finite element numerical software, in order to understand the main steps of the method (geometry definition, input of material data and other problem parameters, space and time discretization, solver algorithms, post-processing and visualization of computation results).
Content :	Chapitre 1 : Plane strain and plane stress in Cartesian coordinates. Chapitre 2 : Plane strain and plane stress in cylindrical coordinates. Chapitre 3 : Kirchhoff-Love plate theory in Cartesian coordinates. Chapitre 4 : Kirchhoff-Love plate theory in cylindrical coordinates. Chapitre 5 : Reissner-Mindlin plate theory. Chapitre 6 : Finite element formulations of plate theories.
Faculty or entity in charge:	MECA

Programmes / formations proposant cette unité d'enseignement (UE)

Intitulé du programme	Sigle	Credits	Prerequis	Acquis d'apprentissage
Master [120] in Architecture and Engineering	ARCH2M	5	-	🔍
Master [120] in Mechanical Engineering	MECA2M	5	-	🔍
Master [120] in Electro-mechanical Engineering	ELME2M	5	-	🔍
Master [120] in Chemical and Materials Engineering	KIMA2M	5	-	🔍
Master [120] in Civil Engineering	GCE2M	5	-	🔍