UCLouvain

lmeca1100

2024

Deformable solid mechanics.

5.00 credits	30.0 h + 30.0 h	Q1

Teacher(s)	Doghri Issam ;
Language :	French
Place of the course	Louvain-la-Neuve
Main themes	The objective of this course is to show how the theory of isotropic linear elasticity enables to solve a large class of problems stemming from the design of structures and equipments. Although the majority of industrial problems are solved nowadays with numerical software, it is essential that the student first learns how to solve analytically a number of simple problems and understands their physics. This is why the course will develop solutions related to bending, torsion, thermal stresses, buckling, etc. The theory of beams, commonly known as strength of materials, is a simplified theory which represents a very important particular case. Some methods for computing statically determinate or indeterminate beam structures are presented and several examples are studied.
Learning outcomes	**At the end of this learning unit, the student is able to :** 1 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 • AA2.2, AA2.4, AA2.5 • AA3.1, AA3.2 • AA5.3, AA5.5, AA5.6 • AA6.2, AA6.4 Analytical solutions of several problems of solid mechanics with the theory of isotropic linear elasticity. Use the theory of strength of materials to solve statically determinate or indeterminate beam problems.
Evaluation methods	Written examination
Teaching methods	Sessions of hands - - -on problem solving take place in parallel with the course
Content	Chap. 1 Mechanics of deformable solids and isotropic linear elasticity. Chap. 2 Variational formulations, work and energy theorems. Chap. 3 Theory of beams (strength of materials). Chap. 4 Stability and buckling of beams Chap. 5 Vibrations of discrete systems with one degree of freedom Chap. 6 Vibration of discrete systems with multiple degrees of freedom. Chap. 7 Vibration of continuous elastic beams
Inline resources	http://icampus.uclouvain.be/claroline/course/index.php?cid=MECA1100
Bibliography	• Les notes de cours (syllabus et transparents) écrites par les enseignants sont disponibles sur moodle • Doghri, Mechanics of deformable solids • Meirovith, Analytical methods in Vibrations • Tse, Morse, Hinkle, Mechanics Vibrations. • Lalanne, Berthier, Der Hagopian, Mechanical Vibrations for Engineers. • Craig R.R., Structural Dynamics. • Dimaragonas, Vibration for Engineers. • Geradin, Rixen, Théorie des Vibrations. Matière : Dynamique appliquée : 50.14.
Faculty or entity in charge	MECA

Programmes containing this learning unit (UE)

Program title	Acronym	Credits	Prerequisite	Learning outcomes
Specialization track in Mechanics	FILMECA	5		
Master [120] in Mathematical Engineering	MAP2M	5		
Minor in Mechanics	LMINOMECA	5		
Mineure Polytechnique	MINPOLY	5		