UCL Université catholique de Louvain

# LMECA1100

*2015-2016*

# Deformable solid mechanics.

| 5.0 credits | 30.0 h + 30.0 h | 2q |
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| Teacher(s) : | Doghri Issam ; |
| Language : | Français |
| Place of the course | Louvain-la-Neuve |
| Inline resources: | > http://icampus.uclouvain.be/claroline/course/index.php?cid=MECA1100 |
| 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. |
| 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:<br>--<br>AA1.1, AA1.2, AA1.3<br>--<br>AA2.2, AA2.4, AA2.5<br>--<br>AA3.1, AA3.2<br>--<br>AA5.3, AA5.5, AA5.6<br>--<br>AA6.2, AA6.4<br>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.<br>*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 : | Written examination |
| Teaching methods : | Sessions of hands - - -on problem solving take place in parallel with the course |
| Content : | Complete version: chapters 1 to 10.<br>Reduced version: chapters 1 to 4, 9 and 10.<br><br>Chap. 1 Mechanics of deformable solids and isotropic linear elasticity.<br>Chap. 2 Variational formulations, work and energy theorems.<br>Chap. 3 Theory of beams (strength of materials).<br>Chap. 4 Torsion of beams.<br>Chap. 5 Theory of thin plates.<br>Chap. 6 bending of thin plates in polar coordinates.<br>Chap. 7 Two-dimensional problems in Cartesian coordinates.<br>Chap. 8 Two-dimensional problems in polar coordinates.<br>Chap. 9 Thermo-elasticity<br>Chap. 10 Elastic stability |
| Bibliography : | --<br>I. Doghri, "Mechanics of Deformable Solids- Linear, nonlinear, analytical and computational aspects", Springer, Berlin, 2000. |
| Faculty or entity in charge: | MECA |

| Programmes / formations proposant cette unité d'enseignement (UE) | | | | |
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| Intitulé du programme | Sigle | Credits | Prerequis | Acquis d'apprentissage |
| Master [120] in Mathematical Engineering | MAP2M | 5 | - | |
| Minor in Engineering Sciences: Applied Mathematics | LMAP100I | 5 | - | |
| Minor in Engineering Sciences: Mechanics | LMECA100I | 5 | - | |