





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                 | <p>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.</p> |
| Learning outcomes           | <p><b>At the end of this learning unit, the student is able to :</b></p> <p>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:</p> <ul style="list-style-type: none"> <li>• AA1.1, AA1.2, AA1.3</li> <li>• AA2.2, AA2.4, AA2.5</li> <li>• AA3.1, AA3.2</li> <li>• AA5.3, AA5.5, AA5.6</li> <li>• AA6.2, AA6.4</li> </ul> <p>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.</p>  |
| Evaluation methods          | Written examination  |
| Teaching methods            | Sessions of hands - - on problem solving take place in parallel with the course  |
| Content                     | <p>Chap. 1 Mechanics of deformable solids and isotropic linear elasticity.</p> <p>Chap. 2 Variational formulations, work and energy theorems.</p> <p>Chap. 3 Theory of beams (strength of materials).</p> <p>Chap. 4 Stability and buckling of beams</p> <p>Chap. 5 Vibrations of discrete systems with one degree of freedom</p> <p>Chap. 6 Vibration of discrete systems with multiple degrees of freedom.</p> <p>Chap. 7 Vibration of continuous elastic beams</p>  |
| Inline resources            | <a href="http://icampus.uclouvain.be/claroline/course/index.php?cid=MECA1100">http://icampus.uclouvain.be/claroline/course/index.php?cid=MECA1100</a>  |
| Bibliography                | <ul style="list-style-type: none"> <li>• Les notes de cours (syllabus et transparents) écrites par les enseignants sont disponibles sur moodle</li> <li>• Doghri, Mechanics of deformable solids</li> <li>• Meirovith, Analytical methods in Vibrations</li> <li>• Tse, Morse, Hinkle, Mechanics Vibrations.</li> <li>• Lalanne, Berthier, Der Hagopian, Mechanical Vibrations for Engineers.</li> <li>• Craig R.R., Structural Dynamics.</li> <li>• Dimarogonas, Vibration for Engineers.</li> <li>• Geradin, Rixen, Théorie des Vibrations. Matière : Dynamique appliquée : 50.14.</li> </ul>  |
| 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       |              |  |