

4 credits

22.5 h + 22.5 h

Q2

Teacher(s)	Nysten Bernard ;Pardoen Thomas ;
Language :	French
Place of the course	Louvain-la-Neuve
Main themes	<p>Selection of a material-type linked to the main constituent of an appealing product</p> <p>Critical analysis of the material choice for the specific application</p> <p>Description of the different steps involved in the synthesis and the forming of the material</p> <p>Study of the match between the materials properties and technological, legal, economic and environmental constraints</p> <p>Unraveling of the link between properties-microstructure-processing</p> <p>Description of experimental techniques allowing to measure the relevant properties</p> <p>Comparison with the properties of competing materials</p> <p>Proposal of an alternative solution which is more performing, more economical and/or more ecological</p>
Aims	<p><b>Contribution of the course to the program objectives</b></p> <p>Regarding the <a href="#">learning outcomes of the program of Bachelor in Engineering</a>, this course contributes to the development and the acquisition of the following learning outcomes:</p> <ul style="list-style-type: none"> <li>• LO 1.1</li> <li>• LO 2.1, 2.2, 2.4, 2.8</li> <li>• LO 3.1</li> <li>• LO 4.2, 4.3, 4.5</li> <li>• LO 5.1</li> </ul> <p><b>Specific learning outcomes of the course</b></p> <p>The skills addressed by « Project 4 » include on one hand transverse skills, common to all projects 4, and on the other hand disciplinary, technical skills that are specific to each engineering specialty.</p> <p>Transversal learning outcomes:</p> <p>Projects 4 aim at providing students with transversal skills close to the practice of engineering jobs within a multi-disciplinary context :</p> <p>1</p> <ul style="list-style-type: none"> <li>• analyse and improve existing systems ;</li> <li>• analyse experimental data with a critical mind ;</li> <li>• make the distinction between reality and models used to describe or modify it ;</li> <li>• deal with the notion of uncertainty in the project approach, its conception and the obtained results.</li> </ul> <p>The project will allow for a trial-and-error approach, typically adopted by young engineers at the beginning of their careers.</p> <p>Disciplinary learning outcomes:</p> <p>At the end of the course the students will be able to</p> <ul style="list-style-type: none"> <li>• use the basis of a rational approach to materials selection,</li> <li>• understand the technological and scientific aspects of the elaboration processes of a class of materials,</li> <li>• describe and analyse the main steps in the life-cycle of a material,</li> </ul> <p>understand and choose adapted techniques to characterise the microstructure and the functional properties of selected materials</p> <p>-----</p> <p><i>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".</i></p>
Evaluation methods	<p>Students will be evaluated both orally in group and individually through a written examination (organised simultaneously for all Projects 4) on the basis of the above mentioned objectives. An evaluation grid is provided at the beginning of the course.</p> <p>Students present and defend their project in front of a jury composed of all teachers, completed by other tutors having contributed to the project supervision.</p>

Teaching methods	<p>Students work in group of 3 or 4 under the supervision of one or two tutors. Each group study the main material in which is fabricated a device/object.</p> <p>Tutorials on some specific topics are given by the teachers.</p> <p>Each group is granted access to the laboratories of the teachers to characterise the main properties of his material.</p>
Content	<p>Students realize in group a 'reverse engineering' project on an object or device. This project comprises the following steps:</p> <ul style="list-style-type: none"> <li>• identification of one of the main materials constituting the object or device and determination of the required properties of the material;</li> <li>• justification of the choice of the material for the targeted application;</li> <li>• analysis of the material life-cycle;</li> <li>• description of the relationships between properties, microstructure and forming of the materials;</li> <li>• choice and realisation of experimental tests to characterise the material properties;</li> <li>• comparison of the material properties with those of concurrent materials;</li> <li>• suggestion of alternative solutions.</li> </ul>
Inline resources	<p><a href="http://icampus.uclouvain.be/claroline/course/index.php?cid=LFSAB1505">http://icampus.uclouvain.be/claroline/course/index.php?cid=LFSAB1505</a></p>
Bibliography	<p>Notes des tutoriels                  Une version, en prêt, du livre de M.F. Ashby « Materials Selection »                  Notice d'emploi des équipements</p>
Other infos	<p>This course is part of the set of courses « Project 4 » of the programme of bachelor in engineering. Projects 4 share common transversal objectives, but exist under different versions oriented towards specific disciplinary objectives, corresponding to the majors/minors of the programme. Each student chooses either the project related to his/her major or to his/her minor (if available).</p>
Faculty or entity in charge	<p>FYKI</p>

<b>Programmes containing this learning unit (UE)</b>				
Program title	Acronym	Credits	Prerequisite	Aims
Bachelor in Engineering	FSA1BA	4		