


5.00 credits

30.0 h + 30.0 h

Q1

Teacher(s)	Simar Aude ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	<ul style="list-style-type: none"> <li>• Manufacturing process selection</li> <li>• Complements on machining and computer assisted processing</li> <li>• Additive manufacturing</li> <li>• Non-conventional machining processes</li> <li>• Virtual manufacturing</li> </ul>
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>• AA2.1, AA2.4, AA2.5</li> <li>• AA3.2, AA3.3</li> <li>• AA4.1, AA4.2, AA4.3, AA4.4</li> <li>• AA5.1, AA5.5, AA5.6</li> <li>• AA6.1, AA6.4</li> </ul> <p>1</p> <p>More precisely, at the end of the course, the student will be capable to :</p> <ul style="list-style-type: none"> <li>• Choose a manufacturing process for a given workpiece using quantifiable criteria</li> <li>• Choose optimal cutting conditions (machines, forces, tools, ')</li> <li>• Perceive the interest of computational tools for manufacturing.</li> <li>• Evaluate the interest of additive manufacturing in comparison to classical processing methods</li> <li>• Pose hypothesis for the numerical modelling of manufacturing</li> <li>• Translate the geometry of a workpiece in manufacturing operations</li> <li>• Communicate their needs to the technicians un a manufacturing plant.</li> </ul>
Evaluation methods	<ul style="list-style-type: none"> <li>• Projects in groups and active participation to visits and laboratories (40% of the mark)</li> <li>• Oral exam during the exam session (60% of the mark)</li> </ul> <p>In the event of a health situation requiring the switch to distancial mode, the oral exam will be held on microsoft teams</p>
Teaching methods	<ul style="list-style-type: none"> <li>• Magistral courses</li> <li>• Two projects (additive manufacturing, process selection)</li> <li>• CNC machining laboratory</li> <li>• Plant visits</li> </ul>
Content	<ul style="list-style-type: none"> <li>• Manufacturing process selection : selection strategy, project of process selection.</li> <li>• Complements on machining: cutting forces, power, surface conditions, automatisaton, realization on machine.</li> <li>• Additive manufacturing: processes, process selection criteria, metallurgical quality of the workpieces, project of topological optimisation with a practical realization in Laser Powder Bed Fusion (metal)</li> <li>• Non-conventional machining processes with a focus on electro-erosion</li> <li>• Virtual manufacturing: Hypothesis of finite elements calculations, application to machining</li> </ul>
Inline resources	<a href="http://moodleucl.uclouvain.be/enrol/index.php?id=7627">http://moodleucl.uclouvain.be/enrol/index.php?id=7627</a> lecture slides
Bibliography	<ul style="list-style-type: none"> <li>• Materials Selection in Mechanical Design, M.F. Ashby, Butterworth Heinemann. E-book disponible par la BST (connexion UCL obligatoire): <a href="http://www.sciencedirect.com/science/book/9781856176637">http://www.sciencedirect.com/science/book/9781856176637</a></li> <li>• Manufacturing Engineering and Technology, S. Kalpakjian, S.R. Schmid, Pearson.</li> <li>• Manufacturing processes and equipment, G. Tlusty, Prentice Hall.</li> <li>• Usinage, J.-F. Debongnie, Céfal.</li> </ul>
Other infos	Bases of manufacturing are usefull for the understanding of the course but will be recalled in lecture 1

Faculty or entity in charge	MECA
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<b>Programmes containing this learning unit (UE)</b>				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Mechanical Engineering	MECA2M	5		
Master [120] in Electro-mechanical Engineering	ELME2M	5		