



5 credits

30.0 h + 30.0 h

Q1

Teacher(s)	Jacques Pascal ;Simar Aude ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	<ul style="list-style-type: none"> • The welding processes
Aims	<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"> • AA1.1, AA1.2, AA1.3 • AA2.2, AA2.4, AA2.5 • AA3.1, AA3.2 • AA5.2, AA5.3, AA5.4 1 • AA6.1, AA6.2 <ul style="list-style-type: none"> • Understand the main characteristics of each welding process. • Choose the best welding process for a given assembly. • Understand the physical principles underlying the joining operations by welding. • Anticipate the modifications of the microstructure that will be the result of a given welding operation (phase transformation, defects, '). • Discuss the consequences of the welding operation on the thermal cycle and the resulting residual stresses and distortions. <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>Due to the COVID-19 crisis, the information in this section is particularly likely to change.</p> <p>Heat flow in a weld project (15% of the mark)</p> <p>Oral exam with written preparation (85% of the mark)</p> <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	<p>Due to the COVID-19 crisis, the information in this section is particularly likely to change.</p> <p>Lectures, heat flow project, pratical laboratories with small groups of students and exercices</p>
Content	<ul style="list-style-type: none"> • Welding technologies: gas welding, arc welding, resistance welding, laser and electron beam welding, solid-state welding... • Influence of the heat input • Heat flow in welds and its modelling • Mechanical properties of welds, residual stresses in welded joints • Fluid flow in the melt pool of a fusion weld • Gaseous reactions in welded joints • The evolution of the properties in the heat affected zones of welded joints. • Causes and solutions to avoid the main types of cracking.
Inline resources	http://moodleucl.uclouvain.be/enrol/index.php?id=7629
Bibliography	<p>Lectures recommandées :</p> <ul style="list-style-type: none"> • Welding metallurgy, S. Kou, Wiley. • Advanced welding systems, J. Cornu, Springer-Verlag. • Modern Welding Technology, H.B. Cary, S.C. Helzer, Pearson, Prentice Hall. • Manufacturing Engineering and Technology, S. Kalpakjian, S.R. Schmid, Pearson.
Faculty or entity in charge	MECA

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Aims
Master [120] in Mechanical Engineering	MECA2M	5		
Master [120] in Chemical and Materials Engineering	KIMA2M	5		
Master [120] in Electro-mechanical Engineering	ELME2M	5		