UCLouvain

lmeca2860

2023

Welding Science and Technology

5.00 credits	30.0 h + 30.0 h	Q1

Teacher(s)	Jacques Pascal ;Simar Aude ;
Language :	English > French-friendly
Place of the course	Louvain-la-Neuve
Main themes	• The welding processes
Learning outcomes	**At the end of this learning unit, the student is able to :** 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: • 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 • 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.
Evaluation methods	Heat flow in a weld project (15% of the mark). For this work, the use of generative AIs such as ChatGPT, Consensus, Perplexity, etc. is prohibited. Oral exam with written preparation (85% of the mark) In the event of a health situation requiring the switch to distantial mode, the oral exam will be held on microsoft teams
Teaching methods	Lectures, heat flow project, pratical laboratories with small groups of students and exercices
Content	• 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	https://moodle.uclouvain.be/course/view.php?id=1015 - course outline - course slides - laboratory/practical statements
Bibliography	Lectures recommandées : • 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	Learning outcomes
Master [120] in Chemical and Materials Engineering	KIMA2M	5		
Master [120] in Mechanical Engineering	MECA2M	5		
Master [120] in Electro-mechanical Engineering	ELME2M	5		