

Study program: Mechanical Engineering				
Type and level of studies: MSC				
Course unit: Welding technology				
Teacher in charge: Dusan M. Arsic				
Language of instruction: English				
ECTS: 6				
Prerequisites: no				
Semester: <i>Summer semester</i>				
Course unit objective: The main goal of the course is to introduce welding technology in general as well as materials, resources, and equipment used in the process. The students will learn about the metallurgical and mechanical problems of welding, the influence of the temperature field on the properties of the welded materials, as well as its influence on the creation of specific zones of the weld - weld metal, heat-affected zone, melting zone, etc.				
Learning outcomes of Course unit: At the end of the course student will be able to: - Consider the basis of welding science and technology, - Determine the weldability of base metals, - Select the welding parameters, - To estimate the properties of the welded joint.				
Course unit contents: <i>Theoretical classes</i> Introduction. Review of the welding methods. Physical and metallurgical basics of welding. Heat sources for welding. Temperature field during welding. Base and filler metals for welding. Weldability and weldability assessment of different base metals (mostly steels). Application of CCT diagrams during welding in weldability assessment. Residual stresses and deformations after welding of steels. Heat treatment of the welded joints. Methods for testing the welded joints (destructive and non-destructive methods). Reparatory welding (hard-facing) of the damaged steel parts. Safety during welding. <i>Practical classes</i> Independent performance (in presence of a welding instructor) of different welding methods: Oxy-fuel (oxy-acetylene) welding and cutting, Manual metal arc welding (MMAW), Gas metal arc welding (GMAW), Tungsten inert gas welding (TIG), Spot welding, brazing and soldering, hard-facing, metal casting.				
Literature 1. J. Paulo Davim, Welding Technology, Springer, 2021, ISBN 978-3-030-63986-0. 2. A. C. Davies, The Science and Practice of Welding, Cambridge University Press, 2010, ISBN 9780511470974. 3. K. Weman, Welding Processes Handbook, Woodhead Publishing, 2012, ISBN 978-0-85709-510-7. 4. I. Khan, Welding Science and Technology, New Age International Publisher, 2007, ISBN 978-8122420739.				
Number of active teaching hours				Other classes 1
Lectures: 30	Practice: 30	Other forms of classes: mentoring system	Independent work: 0	
Teaching methods Teaching is comprised of lecturing by use of modern teaching resources - video presentations and oral exercises. Practice work in a welding laboratory with real equipment and materials. Evaluation of knowledge: tests and seminar.				
Examination methods (maximum 100 points)				
Exam prerequisites	No. of points:	Final exam	No. of points:	
Student's activity during lectures	5	oral/written examination	30	
practical classes/tests	2×20			
Seminar/homework	15			
Seminar presentation	10			
Grading system				
Grade	No. of points	Description		
10	91-100	Excellent		
9	81-90	Exceptionally good		
8	71-80	Very good		
7	61-70	Good		
6	51-60	Passing		
5	≤ 50	Failing		