

## COURSE DESCRIPTION CARD

Faculty of Mechanical Engineering									
Field of study	Mechatronics							Degree level and programme type	Bachelor's degree
Specialization/ diploma path	n/a							Study profile	general (academic)
Course name	Materials Science							Course code	IS-MER0048W
								Course type	obligatory
Forms and number of hours of tuition	L	C	LC	P	SW	FW	S	Semester	winter
	30	-	15	-	-	-	-	No. of ECTS credits	4
Entry requirements	n/a								
Course objectives	Introduction to the basic information regarding the structure, classification and properties of engineering materials. Introduction to methods that provide the ability to alter properties of the engineering materials. Developing skills in the proper selection of engineering materials.								
Course content	Lectures: Atomic and crystal structure of materials, perspectives in materials science. Classification and general characteristics of engineering materials. Phase transitions and phase diagrams. Methods for materials production and processing. The influence of the structure on the properties of materials. Basic engineering materials: metals and their alloys, polymers, ceramics, composites. Applications of the materials in machine construction. Laboratory exercises: Quantitative assessment of metallographic structures by the image analysis methods. Measurements of mechanical properties of materials. Fe-Fe <sub>3</sub> C phase diagram, examination of the structures of steels and cast irons. Heat treatment of steels. Assessment of structures of the selected metallic alloys. Measurements of the properties of polymers and composites.								
Teaching methods	Lecture, laboratory exercises								
Assessment method	Lecture: two written exams Laboratory exercises: evaluation of preparation of the students to the classes: short written exams, discussion during the classes. Evaluation of the written reports.								
Symbol of learning outcome	Learning outcomes							Reference to the learning outcomes for the field of study	
LO1	The student is able to classify and characterize the main groups of engineering materials							MK1_W02	
LO2	The student is able to describe the methods for alteration of structure and properties of materials							MK1_W02	

LO3	The student is able to classify the heat- and thermochemical treatments of metals	MK1_W02	
LO4	The student is able to select proper materials for particular applications	MK1_W02, MK1_U01, MK1_U07	
LO5	The student can plan and perform the basic tests of selected properties of materials	MK1_U01, MK1_K03	
<b>Symbol of learning outcome</b>	<b>Methods of assessing the learning outcomes</b>	<b>Type of tuition during which the outcome is assessed</b>	
LO1	Lecture: two written exams	L	
LO2	Lecture: two written exams	L	
LO3	Lecture: two written exams	L	
LO4	Lecture: two written exams; laboratory classes: evaluation of preparation of the students to the classes: short written exams, discussion during the classes. Evaluation of the written reports.	L, LC	
LO5	Laboratory classes: evaluation of preparation of the students to the classes: short written exams, discussion during the classes. Evaluation of the written reports.	LC	
<b>Student workload (in hours)</b>		<b>No. of hours</b>	
<b>Calculation</b>	Attendance at lectures	30	
	Attendance in laboratory classes	15	
	Preparation for the exams (lecture)	27	
	Preparation for the laboratory classes	22	
	Preparation for the final laboratory classes	3	
	Attendance at the consultation hours	3	
	<b>TOTAL:</b>	<b>100</b>	
<b>Quantitative indicators</b>		<b>HOURS</b>	<b>No. of ECTS credits</b>
<b>Student workload – activities that require direct teacher participation</b>		48	1.9
<b>Student workload – practical activities</b>		41	1.6
<b>Basic references</b>	1. Askeland, Donald R.: The science and engineering of materials. Stamford : Cengage Learning, 2011 2. Farag, Mahmoud M: Materials and process selection for engineering design. CRC Press. Taylor & Francis Group, 2014 3. Ashby, Michael F., Materials and design : the art and science of material selection in product design. Amsterdam, Elsevier/Butterworth Heinemann, 2014 4. Higgins, Raymond A., Materials for engineers and technicians. Amsterdam: Elsevier, Newnes, 2010 5. Callister, W. D., Materials Science and Engineering: an Introduction , 9th ed., Wiley 2013		
<b>Supplementary references</b>	1. Ashby M.F., Jones D.R.H.: Engineering materials. Part 1. An Introduction to their Properties and Applications, Oxford: Pergamon Press, 1991 2. Ashby M.F., Jones D.R.H.: Engineering materials. Part 2. An Introduction to Microstructures, Processing and Design, Oxford: Pergamon Press, 1988 3. Barbero, Ever J. Introduction to composite materials design. Boca Raton: CRC Press,		

	2011	
<b>Organisational unit conducting the course</b>	Department of Materials Engineering and Production	<b>Date of issuing the programme</b>
<b>Author of the programme</b>	DSc. Eng. Małgorzata Grądzka-Dahlke, prof. BUT PhD Eng. Magdalena Łępicka	24.04.2019

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW - field work,

S – seminar