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COURSE SPECIFICATION

Course code	full-time programme:	M#2-S1-ME-209
	part-time programme:	
Course title in Polish	Materiałoznawstwo I	
Course title in English	Material Science I	
Valid from (academic year)	2024/2025	

GENERAL INFORMATION

Programme of study	MECHANICAL ENGINEERING
Level of qualification	first-cycle
Type of education	academic
Mode of study	full-time programme
Specialism	all
Department responsible	Department of Metal Science and Manufacturing Processes
Course leader	dr hab. inż. Marek Konieczny, prof. PŚk
Approved by	dr hab. Jakub Takosoglu, prof. PŚk, Dean of the Faculty of Mechatronics and Mechanical Engineering

COURSE OVERVIEW

Course type		programme-specific
Course status		compulsory
Language of instruction		English
Semester of	full-time programme	Semester II
delivery	part-time programme	
Pre-requisites		
Examination required (YES/NO)		NO
ECTS value		2

Mode of instruction		lecture	class	laborator y	project	seminar
No. of hours per semester	full-time programme	15		15		
	part-time programme					

LEARNING OUTCOMES

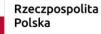
Category of outcome	Outcome code	Course learning outcomes	Corresponding programme outcome code
Knowledge	W01	On completion of the course, students will have an in-depth knowledge of metals and alloys used in mechanical engineering.	MiBM1_W08







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Skills	U01	On completion of the course, students will be able to select appropriate materials for their practical application.	MiBM1_U01		
	U02	MiBM1_U14			
	K01	The student is ready to critically evaluate his knowledge and the need to obtain new information both from the literature and from experts in the field of materials science.	MiBM1 K01		
Competence	K02	The student is aware of the importance and understanding of non-technical aspects and effects of engineering activities, including its impact on the safety of other people and the impact on the environment and the responsibility related to these issues.	MiBM1_K02		

COURSE CONTENT

Type of instruction lecture	Topics covered
lecture	Bonds between atoms and intermolecular bonds. 7 crystallographic systems, 14 types of crystal lattice. Indicating directions and crystallographic planes in regular and hexagonal systems. The phenomenon of allotropy. The structure of real crystals. Lattice defects: point, line and surface and their influence on the properties of metals. Elastic and plastic deformation. The mechanism of plastic deformation: slip and twinning. The role of dislocation in plastic deformation. Deformation of mono and polycrystals. The phenomenon of anisotropy. Investigation of mechanical properties: tensile test, hardness measurements, impact strength, creep, fatigue. Strengthening the metal by plastic deformation. Recrystallization. Diffusion. Crystallization. Metal alloys - basic concepts. Phase equilibrium systems. Basic phase transformations in alloys, taking place with the participation of the liquid phase: eutectic and peritectic transformation. Influence of the allotropic transformation on the phase equilibrium systems. Eutectoid and peritectoid transformation. Deviations from phase equilibrium systems.
laboratory	 Performing 7 laboratory exercises: Characteristics of metals. Investigation of mechanical properties - tensile test. Investigation of mechanical properties - hardness and toughness measurements. Metallographic preparation. Solidification of metals and alloys. Phase diagrams of alloys. Strengthening metals by plastic deformation. Recrystallization.

ASSESSMENT METHODS

Outcome		Methods of ass	sessment (Mar	k with an X wh	ere applicable)		
code	Oral examination	Written examination	Test	Project	Report Other			
W01			Х		Х			
U01			Х		Х			
U02			Х		Х			



Projekt "Dostosowanie kształcenia w Politechnice Świętokrzyskiej do potrzeb współczesnej gospodarki" nr FERS.01.05-IP.08-0234/23





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Rzeczpospolita Polska

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K01			Х
K02			Х

ASSESSMENT TYPE AND CRITERIA

Mode of instruction	Assessment criteria	
lecture non-examination assessment		The pass mark is a minimum of 50% for the final in-class test.
laboratory	non-examination assessment	The pass mark is a minimum of 50% for the final in-class test and each post-lab report.

OVERALL STUDENT WORKLOAD

	ECTS weighting											
		Student workload									Unit	
No.	Activity type			II-tin				•	rt-tir			
		L	C Pro	gram Lb	P	S	L	C	gran Lb	P	S	
1.	Scheduled contact hours	L 15	C		Г	5	L.	C	LU	Г	5	h
	Other content house (affine house			15								
2.	Other contact hours (office hours, examination)	2	2 2								h	
3.	Total number of contact hours	34					h					
4.	Number of ECTS credits for contact hours	1,4					ECTS					
5.	Number of independent study hours		16								h	
6.	Number of ECTS credits for independent study hours			0,6								ECTS
7.	Number of practical hours			25								h
8.	Number of ECTS credits for practical hours	1,0					ECTS					
9.	Total study time	50				h						
10.	ECTS credits for the course 1 ECTS credit = 25-30 hours of study time					2	2					ECTS

READING LIST

- 1. Askeland D.R.: The Science and Engineering of Materials.
- 2. Callister W.D.: Materials Science and Engineering: An Introduction
- 3. Ashby M.F., Jones D.R.: Engineering Materials: part 1 and 2.
- 4. Budinski K.G., Budinski M.K.: Engineering Materials Properties and Selection.
- 5. Konieczny M.: Metal Science Laboratory.

