COURSE SPECIFICATION

Course code	full-time programme:	**M#2-S2-ME-202**
	part-time programme:	
Course title in Polish	**Kształtowanie struktury i własności materiałów inżynierskich**	
Course title in English	**Processes for Altering the Structure and Properties of Engineering Materials**	
Valid from (academic year)	**2024/2025**	

GENERAL INFORMATION

Programme of study	**MECHANICAL ENGINEERING**
Level of qualification	**second-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 delivery	full-time programme	**Semester II**
	part-time programme	**Semester II**
Pre-requisites		
Examination required (YES/NO)		**NO**
ECTS value		**2**

Mode of instruction		**lecture**	**class**	**laboratory**	**project**	**seminar**
No. of hours per semester	full-time programme	**15**		**30**		
	part-time programme					

LEARNING OUTCOMES

Category of outcome	Outcome code	Course learning outcomes	Corresponding programme outcome code
Knowledge	W01	Has detailed and in-depth knowledge of material manufacturing and processes for altering the structure and properties.	MiBM2_W05
	W02	Has comprehensive knowledge of surface engineering covering various issues related to the methods of altering the structure and properties of surface layers of materials.	MiBM2_W11
Skills	U01	Can use knowledge from the area of basic sciences to solve complex tasks related to the selection of materials and their altering methods.	MiBM2_U01
	U02	Is able to select appropriate engineering materials to ensure correct operation of the machine.	MiBM2_U12
Competence	K01	Is aware of the need to independently supplement and expand knowledge in the field of materials science.	MiBM2_K01
	K02	Is aware of the importance of aspects and consequences of engineering activities related to materials science, including its impact on the safety of other people and the impact on the environment.	MiBM2_K02

COURSE CONTENT

Mode of instruction	Topics covered
lecture	Division of engineering materials. Methods of altering the structure and properties of metallic engineering materials. Crystal structure of materials and its influence on properties. Metallurgical methods of altering the structure of materials. Influence of heat treatment on the structure and properties of materials. Influence of surface treatments on the structure and properties of surface layers of materials. Influence of plastic processing on the structure and properties of metallic materials.
laboratory	Performing laboratory exercises: • Division and characterization of engineering materials. • Methods of testing engineering materials. • Crystal structure of materials and its influence on properties. • Metallurgical methods of altering the structure of materials. • Altering the properties of materials by adding reinforcing particles. • Designing alloys. • Altering the structure and properties of alloys. • Altering the structure and properties of materials by deforming them. • The influence of different types of annealing on the structure and properties of alloys. • The influence of hardening on the structure and properties of alloys. • The influence of tempering on the structure and properties of alloys. • Altering the structure and properties of alloys using precipitation hardening. • The influence of surface treatments on the structure and properties of surface layers of materials.

ASSESSMENT METHODS

Outcome code	Methods of assessment					
	Oral examination	Written examination	Test	Project	Report	Other
W01			X			
W02			X			

U01			X		X	
U02			X		X	
K01						X
K02						X

ASSESSMENT TYPE AND CRITERIA

Mode of instruction	Assessment type	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												
No.	Activity type	Student workload										Unit
		full-time programme					part-time programme					
		L	C	Lb	P	S	L	C	Lb	P	S	
1.	Scheduled contact hours	15		30								h
2.	Other contact hours (office hours, examination)	2		2								h
3.	**Total number of contact hours**	**49**										h
4.	**Number of ECTS credits for contact hours**	**1,6**										ECTS
5.	**Number of independent study hours**	**11**										h
6.	**Number of ECTS credits for independent study hours**	**0,4**										ECTS
7.	**Number of practical hours**	**40**										h
8.	**Number of ECTS credits for practical hours**	**1,3**										ECTS
9.	**Total study time**	**60**										h
10.	**ECTS credits for the course** *1 ECTS credit = 25-30 hours of study time*	**2**										ECTS

READING LIST

1. Przybyłowicz K.: Metaloznawstwo, WNT, Warszawa 2003.
2. Przybyłowicz K.: Metaloznawstwo teoretyczne, WNT, Warszawa 2001.
3. Blicharski M. : Wstęp do inżynierii materiałowej WNT, Warszawa 2001.
4. Ashby M.F., Jones D. R.H.: Materiały inżynierskie, WNT, Warszawa 1995.
5. Askeland D.R.: The Science and Engineering of Materials, Wadsworth, Belmont 2010.