GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Materials Science I, PG_00055078		
Field of study	Mechanical Engineering		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	English
Semester of study	1	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Materials Engineering and Bonding -> Faculty of Mechanical Engineering and Ship Technology -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Dionizy Czekaj	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	0.0	0.0	30

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	30	6.0	39.0	75

Subject objectives

Introducing students to the fundamentals of contemporary materials science and materials engineering.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W08	The student has a basic knowledge about selection of materials and processes	[SW1] Assessment of factual knowledge
K6_U10	The student knows the rules of selecting materials	[SU3] Assessment of ability to use knowledge gained from the subject
K6_W03	The student has knowledge about structure, fundamental properties of engineering materials as well as methods of their investigation.	[SW1] Assessment of factual knowledge

Subject contents

Course content – lecture
Classification of materials, advanced materials. Atomic structure; The periodic table of elements; Atomic bonding in solids. Crystal structures - unit cells; crystal systems;close-packed crystal structures; defects and imperfections of crystal structure; Mechanical properties of metals, concepts of stress and strain; elastic deformation; plastic deformation, hardness; Dislocations; slip systems; deformation by twinning; Mechanisms of strengthening in metals; Recovery, recrystallization, and grain growth; Fracture; Fatigue; Creep behaviour; Phase diagrams;definitions and basic concepts; Binary phase diagrams, interpretation of phase diagrams,ceramic and ternary phase diagrams, the Gibbs phase rule; The iron–carbon system - the iron–iron carbide (Fe–Fe3C) phase diagram, development of microstructure in iron–carbon alloys,

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written examination	51.0%	100.0%

Recommended reading	Basic literature	1. W. D. Callister, Jr., Materials science and engineering, an introduction, 7th ed., Wiley, 2007, 2. M. Ashby, H. Shercliff and D. Cebon, Materials Engineering, Science, Processing and Design, Elsevier Ltd, 2007 3. M. Ashby, D. Jones, Engineering Materials 1, An Introduction to Properties, Applications, and Design, Elsevier Ltd, 2012 4. W.Bolton, *Materials for Engineering*, Routledge, Taylor & Francis Group, NY, 2011 5. A.J. Moulson, , J.M. Herbert, Electroceramics, Materials Properties and Applications, Chapman and Hall, 1990 6. R. Pampuch, An Introduction to Ceramics, Springer International Publishing Switzerland, 2014
	Supplementary literature	1. Blicharski M., *Wstęp do inżynierii materiałowej*, Wydawnictwo Naukowo Techniczne, Warszawa 2001 2. M. Kaczorowski, A. Krzyńska, *Konstrukcyjne materiały metalowe, ceramiczne i kompozytowe*, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2017 3. Dobrzański L. A., *Podstawy nauki o materiałach i metaloznawstwo. Materiały inżynierskie z podstawami projektowania materiałowego* ., WNT Warszawa, 2002 4. M.Ashby, H.Shercliff, D.Cebon, *Inżynieria materiałowa,* T1, T2, Wydawnictwo Galaktyka, Łódź, 2011 5. M. Ashby, D. Jones, Engineering Materials 2, An Introduction to Microstructures and Processing, Elsevier Ltd, 2013 6. M.Głowacka, A. Zieliński, (Red.) *Podstawy materiałoznawstwa*, Wydawnictwo Politechniki Gdańskiej, Gdańsk 2011 (skrypt). 7. M. Głowacka (Red), *Metaloznawstwo*, Wydawnictwo Politechniki Gdańskiej, Gdańsk 1996 (skrypt) 8. J. Hucińska (Red), *Metaloznawstwo*. Materiały do ćwiczeń laboratoryjnych, Wydawnictwo Politechniki Gdańskiej, Gdańsk 1995(skrypt).
	eResources addresses	
Example issues/ example questions/ tasks being completed	1. Definitions of stress, strain and modulus of elasticity. 2. Mechanical properties of materials. 3. Crystal structure of advanced ceramics 4. Phase diagrams	
Practical activites within the subject	Not applicable	

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