GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Materials Science - laboratory, PG_00047757						
Field of study	Biomedical Engineering						
Date of commencement of studies	October 2024		Academic year of realisation of subject	2025/2026			
Education level	first-cycle studies		Subject group	Obligatory subject group in the field of study			
Mode of study	Full-time studies		Mode of delivery	at the university			
Year of study	2		Language of instruction	Polish			
Semester of study	3		ECTS credits	2.0			
Learning profile	general academic profile		Assessment form	assessment			
Conducting unit	Department of Chemistry and Technology of Functional Materials -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Radosław Pomećko				
	Teachers		dr inż. Radosław Pomećko				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	30.0	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		2.0	18.0		50
Subject objectives	The main objective of exercises conducted under laboratory is to familiarize students with the properties of selected materials and the method of selection criteria required to perform the functions imposed on them. materials constituting the first subject of the evaluation are those that are used in analytical devices, sensors, as casing materials, etc .						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W53] Knows and understands, to an advanced extent, selected aspects of materials science and biomaterials constituting general knowledge related to the field of study	As part of the lab the student will possess the ability to: - determination of such characteristics of the materials that are relevant to the intended use, - choice of methods to assess the suitability of the material, - identification of additional features not directly related to the expected function, for example, beyond the hardness of the material can be important as its durability, resistance to corrosion, biological effects, etc. - visualization features of technical materials, which are contributed to this application.	[SK3] Assessment of ability to organize work
[K6_U52] can determine properties of materials and biomaterials used in biomedical engineering	As part of the lab the student will possess the ability to - Selection of appropriate materials, in accordance with their intended purpose - To determine such physical and physicochemical to be able to fulfill certain functions - determination of such characteristics of the materials that are relevant to the intended use, - choice of methods to assess the suitability of the material, - identification of additional features not directly related to the expected function, for example, beyond the hardness of the material can be important as its durability, resistance to corrosion, biological effects, etc. - visualization features of technical materials, which are contributed to this application.	[SU3] Assessment of ability to use knowledge gained from the subject

Subject contents

Solid materials, physical and practical definition, a solid structure. The chemical structure and the structure. Elements of crystallography, crystal network, single crystals, polycrystals. Elements of symmetry. Crystal systems. Polymorphism, isomorphism, allotropic variety of elements, diamond, graphite, fullerenes, carbon nanotubes, isotropy and anisotropy. Metals, alloys, śródwęzłowe, sinters. Inorganic coatings on metals, corrosion. Ceramic materials. Amorphous materials, glass, variety, application. Natural and synthetic fibers, organic and inorganic. Layers and monolayers. Lipophilicity and hydrophilicity, wettability, lipo-and hydrophilic groups. Dispersed Systems, lotions, role of detergents. Colloids, types, production, biological functions. Osmosis, electroosmosis, deionized colloids, coagulation. Colloidal materials in medicine. Monomers, organic polymers, methods of production. Polymerization reaction types, isomerism, cross-linked polymers. Condensation polymers and addition, biocompatibility. Chemical modification of polymers, ion exchangers. Reinforced Plastics, introduction to composite materials. Copolymers. The relationships between the structure and properties of plastics. Examples of applications of polymers in medicine, valves, artificial heart, artificial kidney. Application examples of metals and ceramics in medicine. Properties of materials: mechanical, thermal, electrical, magnetic, optical, biological. Methods for producing industrial materials. Monitoring and control of production processes. The industrial synthesis of pharmaceutical preparations. Forms of drugs, manufacture, quality evaluation. Therapeutic systems. The use of materials in biomedical engineering.

Prerequisites and co-requisites

Issues carried out under the subject "Chemistry", "Physics", "Mathematics"

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
written exam	51.0%	100.0%

Recommended reading

Basic literature

Basic literature:

1. Each encyclopedia of materials science.

2. Podstawy dyfrakcji promieni rentgenowskich, B.D. Cullity, PWN, Warszawa 1964.
3. Materiały ceramiczne, R. Pampuch, PWN Warszawa 1988.
4. Farmacja stosowana, S. Janicki, A. Fiebig, M. Sznitowska, Warszawa PZWL 2006.
5. Chemia, L. Pauling, P. Pauling, PWN Warszawa 1997.
Z. Florjańczyk, S. Pęczek (red.), Chemia polimerów tom I, II i III, Akademicka Oficyna Wydawnicza EXIT, Warszawa 2001.

	Supplementary literature	Supplementary literature: 1. Biocybernetyka i inżynieria biomedyczna 2000. Tom 3. Sztuczne narządy, pod red. M. Nałęcza. 2. Wpływ obróbki termicznej i hydrolizy enzymatycznej na alergenność białek http://www.pttz.org/zyw/wyd/czs/2007,%203(52)/15_Szymkiewicz.pdf
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	