GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00059020		
Field of study	Nanotechnology		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2022/2023
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	Polish
Semester of study	2	ECTS credits	4.0
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	prof. dr hab. inż. Elżbieta Luboch	
	Teachers	prof. dr hab. Anna Lisowska-Oleksiak prof. dr hab. inż. Elżbieta Luboch	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	0.0	0.0	0.0	45
	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	45	5.0	50.0	100

Subject objectives	Acquisition by students of basic knowledge of organic chemistry and physical chemistry

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W01	Student discusses relations between substance properties and types of underlying bonds. Student is also able to bind the properties of materials with the possibility of their use.	[SW1] Assessment of factual knowledge
K6_W05	The student explains the chemical formulas of organic compounds. He can relate the structures of organic and bioorganic compounds with their properties. The student evaluates the reactivity of organic compounds. The student indicates which elements of the polymer structure determine its properties. The student points to the importance of learning about the energy effects accompanying chemical changes. Student analyzes the properties of electrolyte solutions. The student acquires basic knowledge of electrochemistry.	[SW1] Assessment of factual knowledge
K6_U04	Student is able to draw conclusions and formulate opinions. Student is able to analyze the obtained results.	[SU2] Assessment of ability to analyse information
K6_U01	Student can individually in the textbooks or other literature search for relevant information.	[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information

Subject contents	Organic compounds: classification, nomenclature, isomerism, properties, reactivity. Reaction mechanisms of organic compounds. Basic laboratory techniques in organic chemistry. Methods of identification of organic substances. Macromolecules: methods of polymer synthesis, chemical structure of polymer and its properties. Biologically important organic molecules and macromolecules: structure of proteins, lipids, sugars and nucleic acids. Chemical equilibrium. Equilibria in aqueous solutions of electrolytes. Conductivity of liquid electrolytes: aqueous and non-aqueous. Strong electrolytes. Basics of electrochemistry: Nernst equation - electrodes of the 1st, 2nd and 3rd kind. Electrode/electrolyte interface. Electrolysis - Faraday's laws. Electrochemical series. Galvanic cells: primary and secondary. Thermodynamics. Kinetics of chemical reactions.
Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Lecture: two written colloquia	50.0%	60.0%
Tutorials: two written tests	50.0%	40.0%

Recommended reading	
Basic literature	1. L. Jones, P. Atkins, Chemia ogólna. Cząsteczki, materia, reakcje, PWN 2009. 2. P. Atkins, L. Jones, L. Loverman, Chemia ogólna. PWN 2020. 3. M.J. Sienko, R.A. Plane, Chemia. Podstawy i zastosowania WNT 2002. 4. P.W. Atkins, Podstawy chemii fizycznej PWN 1999. 5. P. Atkins Chemia fizyczna, wydanie II, PWN 2021. 6. A. Warszawski, S. Koter, Elektrochemia, wybrane zagadnienia, UMK 2005. 7. J. McMurry, Chemia organiczna PWN 2021. 8. E. Białecka-Floriańczyk, J. Włostowska "Chemia organiczna" WNT, Warszawa 2007. 9. P. Mastalerz Chemia organiczna Wyd. Chemiczne 2002.
Supplementary literature	1. P.W. Atkins, Przewodnik po chemii fizycznej PWN 1997.
eResources addresses	Adresy na platformie eNauczanie: WYKŁAD Z PODSTAW CHEMII ORGANICZNEJ I FIZYCZNEJ - Moodle ID: 29445 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29445 Chemia ćwiczenia - Moodle ID: 29534 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29534
Example issues/ example questions/ tasks being completed	Constitutional isomerism of organic compounds: types, examples. Alkane nomenclature. Nomenclature of particular classes of organic compounds. Transformations of organic compounds: short characteristics of ionic and radical reactions. Changes in organic compounds: substitution, addition, elimination and rearrangement reactions (general scheme and examples). Electronic effects of substituents: inductive and resonant effects. Influence of electronic substituent effects on the reactivity of aromatic compounds. Techniques of isolation and purification of organic compounds. For what purpose are spectroscopes used in organic chemistry: NMR, IR and MS? Addition polymerization of vinyl monomers. Condensation polymers: structure, preparation, application. Influence of macromolecule structure on its physical properties. Protein amino acids: structure, configuration (optical isomerism). Ionic structure of amino acids and their physical properties. Peptide synthesis. Primary and secondary structure of proteins. Lipids: an example of a triglyceride. Sugars: how is D-glucose built? Why do we digest starch and not digest cellulose? Nucleic acids: primary and secondary structure of DNA. The second law of thermodynamics and the direction of chemical transformations. Give the definition of the enthalpy of a chemical change State the law of action of the masses. Write the expressions for the equilibrium constant of the given chemical transformation. Show that the synthesis of ammonia from nitrogen and hydrogen should take place under increased pressure. What physicochemical quantities. characterize the speed of a chemical reaction, give the kinetic equation of the chemical transformation. Calculate the equilibrium potential for the given redox system with known standard potential. Calculate the efficiency of the electrode reaction for the given electrode transformation (example data: in the reduction reaction of the water molecule, the charge of 2F was used, the volume of hydrogen was 11.2 dm3. What is the efficiency of the process). Calculate the theoretical charge capacity of the lithium anode (Li metallic). Give Tafel's equation.
Work placement	Not applicable

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