

## 。 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	4.0		
Learning profile	general academic pro	ofile	Assessmer	nt form		asses	assessment		
Conducting unit	Department of Chemi	istry and Techr	ology of Funct	ional Materials	-> Facı	ulty of C	Chemistry		
Name and surname	Subject supervisor	prof. dr hab. inż. Elżbieta Luboch							
of lecturer (lecturers)	Teachers		prof. dr hab. Anna Lisowska-Oleksiak						
		prof. dr hab. inż. Elżbieta Luboch							
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Projec	ct Seminar		SUM	
of instruction	Number of study hours	30.0	15.0	0.0	0.0		0.0	45	
	E-learning hours inclu			i		1			
Learning activity and number of study hours	Learning activity Participation in d classes included plan				Self-study SUM				
	Number of study 45 hours		5.0		50.0 100		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			
			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		textbooks or other literature			[SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information			

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	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.					
and criteria         Lecture: two written colloquia         50.0%         60.0%           Tutorials: two written colloquia         50.0%         40.0%           Recommended reading         Basic literature         1. L. Jones, P. Atkins, Chemia agolna. Cząsteczki, materia, reakcje, PWN 2009. 2. P. Atkins, L. Jones, L. Loverman, Chemia ogólna. PWN 2002. 3. M.J. Sienko, R.A. Plane, Chemia. Podstawy i zastosowania WN 2002. 3. M.J. Sienko, R.A. Plane, Chemia. Podstawy i zastosowania WN 2002. 3. M.J. Sienko, R.A. Plane, Chemia. Podstawy i zastosowania WN 2002. 3. M.J. Sienko, R.A. Plane, Chemia organiczna WW 2015. 7. J. McMurry, Chemia organiczan WW 2015. 7. J. McMurry, Chemia organiczan WW 2015. 7. J. McMurry, Chemia organiczanica WW 2015. 7. J. McMurry, J. J. J. P. W. Atkins, Potsawa 2017. 9. P. Mtastawa 2017. 9. J. McMurr							
Example         Example         Solone         Solone           Tutorials: two written tests         50.0%         40.0%           Recommended reading         Basic literature         1. L. Jones, P. Atkins, Chemia ogdina. Cząsteczki, materia, reakcje, PWN 2009. 2. P. Atkins, L. Jones, L. Loverman, Chemia ogdina. PWN 2020. 3. M. J. Sienko, R.A. Pilane, Chemia. Potatawi J zestosowania WNT 2002. 4. P.W. Atkins, Podstawy Chemin fizycznej PWN 1998. 5. P. Atkins Chemia organiczna 'WMP 2021. 8. Eblacka-Florianczyk, J. Wostowska 'Chemia organiczna 'WMV 2021. 8. Eblacka-Florianczyk, J. Wostowska 'Chemia organiczna 'WMV 2021. 8. Eblacka-Florianczyk, J. Wastalerz Chemia organiczna 'WMV 2021. 8. Eblacka-Florianczyk, J. Wostowska 'Chemia organiczna 'WM 2021. 8. Eblacka-Florianczyk, J. Wostowska 'Chemia organiczna 'WM 2021. 8. Eblacka-Florianczyk, J. Wostowska 'Chemia organiczna 'Wd. Chemiczne 2002.           Example issues/ example questions/ tasks being completed         Constitutional isomerism of organic compounds: substitution. Addition, ehlinination and rearrangement reactions. Changes in organic compounds: substitutens. Inductive and rearrangement reactions classifier of organic compounds. Solone there, properties. Petide and radica' structure, onfiguration of organic compounds. For what purpose are spectroscopse used in oroganic chemistyr, NMR. Ri and MS? Addition polymerization of winy	Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade			
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PWN 2009. 2. P. Atkins, L. Joneš, L. Loverman, Chemia ogólna. PWN 2002. 3. N. J. Sienko, R.A. Plane, Chemia, Podstawy izasiosowania WNT 2002. 4. P.W. Atkins, Podstawy izasiosowania WNT 2002. 4. P.W. Atkins, Chemia fizyczna, WyAnie II, PWN 2001. 6. A. Warszawski, S. Koter, Elektrochemia fayozna, wybrane zagadnienia, UMK 2005. 7. J. McMurry, Chemia organiczna PWN 1291. 6. A. Warszawski, S. Koter, Elektrochemia organiczna PWN 2021. 8. E. Białcoka-Florianzyk, J. Wostowska "Chemia organiczna Wyd. Chemiczne 2002.         Supplementary literature       1. P.W. Atkins, Przewodnik po chemi fizycznej PWN 1997.         eResources addresses       Adresy na platformie eNauczanie:         WYKLAD Z PODSTAW CHEMII ORGANICZNEJ I FIZYCZNEJ - Moodel ID: 29534         https:/lenauczanie.gp.edu.pl/moodle/course/view.php?id=29534         tasks being completed         Constitutional isomerism of organic compounds: types, examples, Atkane nomenclature - Nomenclature of particular classes of organic compounds: types, examples, Atkane nomenclature, Nomenclature of particular classes of organic compounds: types, examples, Atkane nomacibation and rearrangement reactions (General scheme and examples). Electronic effects of substitution, addition, elimination and rearrangement reactions (General scheme and examples). Electronic effects of substitution polymers: structure, configuration (optical in 80° Addition optimerization of ving monatic. Condenatio polymeris. Structure, organic compounds. Transformations, Gorganic compounds. Techniques of isolation and purification of organic compounds. For what purpose are spectroscopes used in organic chemistry. VMR, IR and WS? Addition optimerization of ving mormares. Condenation polymeris. Structure, organic chemistry. VMR, JWR dWR dWS? Additinon and clegest starch and not digest cellulose? Nucleic		Tutorials: two written tests	50.0%	40.0%			
Supplementary literature         1. P.W. Atkins, Przewodnik po chemii fizycznej PWN 1997.           eResources addresses         Adresy na platformie eNauczanie: WYKŁAD 2 PODSTAW CHEMII ORGANICZNEJ I FIZYCZNEJ - Moodie ID: 2945 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29445 Chemia &viczenia - Moodle ID: 29534 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29534           Example guestions/ 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 substituten of publication 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 anino acids and their physical properties. Peptide synthesis. Primary and secondary structure of proteins. Lipids: an example of a trigyceride. Sugars: how is D-gluccose buil? 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 equilibrium constant of the given chemical transformation. Show that the synthesis of ammonia from nitrogen and hydrogen should take piace 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	Recommended reading	Basic literature	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. F 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, Włostowska "Chemia organiczna" WNT, Warszawa 2007. 9. P.				
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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	example questions/	particular classes of organic compounds. Transformations of organic compounds: short characteristic ionic and radical reactions. Changes in organic compounds: substitution, addition, elimination and rearrangement reactions (general scheme and examples). Electronic effects of substituents: inductive 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 u organic chemistry: NMR, IR and MS? Addition polymerization of vinyl monomers. Condensation polym structure, preparation, application. Influence of macromolecule structure on its physical properties. Pro- amino acids: structure, configuration (optical isomerism). Ionic structure of amino acids and their phys 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? Nucle acids: primary and secondary structure of DNA.					
Work placement Not applicable	Work placement	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					

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