



Subject card

Subject name and code	PHYSICAL CHEMISTRY, PG_00049198									
Field of study	Chemistry									
Date of commencement of studies	October 2020		Academic year of realisation of subject		2021/2022					
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	2		Language of instruction		Polish					
Semester of study	4		ECTS credits		7.0					
Learning profile	general academic profile		Assessment form		exam					
Conducting unit	Department of Physical Chemistry -> Faculty of Chemistry									
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Janusz Stangret							
	Teachers		prof. dr hab. inż. Janusz Stangret dr hab. inż. Piotr Bruździak dr inż. Anna Kuffel prof. dr hab. inż. Jan Zielkiewicz							
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM			
	Number of study hours	30.0	15.0	45.0	0.0	15.0	105			
	E-learning hours included: 0.0									
Adresy na platformie eNauczanie:										
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		SUM				
	Number of study hours	105		5.0		65.0				
175										
Subject objectives	The aim of the course is to gain the knowledge of the laws governing physical and chemical transitions of systems.									
Learning outcomes	Course outcome		Subject outcome		Method of verification					
	[K6_U03] can make detailed documentation of the results of self-conducted experiments and prepare a report describing these results		Student elaborates and interprets results of self-conducted physicochemical experiments. Student presents the results in the form of a report.		[SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment					
K6_W03		Student has a basic knowledge of theoretical chemistry. Student defines and describes basic laws and phenomena of electrochemistry, chemical kinetics and elementary molecular spectroscopy. Student solves calculation problems in electrochemistry, chemical kinetics and surface science. Student explains theoretical background of physicochemical experiments in electrochemistry, chemical kinetics, surface science and electronic spectroscopy. Student applies knowledge of electrochemistry, chemical kinetics, surface science and electronic spectroscopy in practical laboratory experiments.		[SW1] Assessment of factual knowledge						

Subject contents	<p>Ionic equilibria in solutions: ion activity, electrolyte activity, activity coefficients, theory of strong electrolytes. Electric conductivity of electrolyte solutions. Interfacial electrical potential differences. Galvanic cells: cell thermodynamics, electromotive force (EMF), standard electrode potential, half-cell classification, galvanic series, EMF measurement, pH measurement. Electrode polarization and electrode processes. Electrochemical analytical methods. Chemical kinetics: basic terminology, experimental methods, basic kinetic equations, kinetics of compound reactions, mechanisms of elementary reactions. Catalysis: homo- and heterogenic, enzymatic. Theoretical background of molecular spectroscopy: rotatory, vibrational, electronic, NMR and EPR. Electrical properties of molecules.</p>															
Prerequisites and co-requisites	<p>Preceding subjects: mathematics, physics, general chemistry, physical chemistry 3rd semester. Knowledge of problems from physical chemistry 3rd semester.</p>															
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="446 743 790 777">Subject passing criteria</th><th data-bbox="790 743 1133 777">Passing threshold</th><th data-bbox="1133 743 1486 777">Percentage of the final grade</th></tr> </thead> <tbody> <tr> <td data-bbox="446 777 790 810">Written exam</td><td data-bbox="790 777 1133 810">50.0%</td><td data-bbox="1133 777 1486 810">40.0%</td></tr> <tr> <td data-bbox="446 810 790 844">tests + laboratory reports</td><td data-bbox="790 810 1133 844">60.0%</td><td data-bbox="1133 810 1486 844">20.0%</td></tr> <tr> <td data-bbox="446 844 790 878">exercise - 2 written tests</td><td data-bbox="790 844 1133 878">50.0%</td><td data-bbox="1133 844 1486 878">20.0%</td></tr> <tr> <td data-bbox="446 878 790 911">short tests + seminar presentation</td><td data-bbox="790 878 1133 911">60.0%</td><td data-bbox="1133 878 1486 911">20.0%</td></tr> </tbody> </table>	Subject passing criteria	Passing threshold	Percentage of the final grade	Written exam	50.0%	40.0%	tests + laboratory reports	60.0%	20.0%	exercise - 2 written tests	50.0%	20.0%	short tests + seminar presentation	60.0%	20.0%
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Recommended reading	<p>Basic literature</p> <p>1. Chemia fizyczna, P. W. Atkins, PWN. 2. Chemia fizyczna, 1. Podstawy fenomenologiczne, K. Pigoń i Z. Ruziewicz, PWN. 3. Chemia fizyczna. Ćwiczenia laboratoryjne. Red. H. Strzelecki i W. Grzybkowski, Wydawnictwo PG. 4. Zbiór zadań testowych z chemii fizycznej, I. Uruska, Wydawnictwo PG. 5. Z. Kęcki, Podstawy spektroskopii molekularnej, PWN. 6. Zbiór zadań z chemii fizycznej, I. Uruska, Wydawnictwo Pg, Gdańsk 1997. 7. L.Komorowski, A. Olszowski Chemia Fizyczna. Laboratorium fizykochemiczne, Wydawnictwo PWN, 2013.</p>															
Supplementary literature	<p>1. Elektrochemia, W. Libuś, Z. Libuś, PWN. 2. Chemia fizyczna, 2. Fizykochemia molekularna, K. Pigoń i Z. Ruziewicz, PWN. 3. Chemia fizyczna. Zbiór zadań z rozwiązaniami, P.W. Atkins, C.A. Trapp, M.P. Cady, C. Giunta, PWN. 4. Eksperimentalna chemia fizyczna dla inżynierów, Praca zbiorowa, Red. H. Strzelecki, Wydawnictwo PG. 5. Artykuły źródłowe i opracowania monograficzne. 6. Chemia fizyczna t.3 obliczenia fizykochemiczne, J. Demichowicz-Pigoniowa, A. Olszowski, Wydawnictwo PWN, 2010. 7. M. Pilarczyk, Zadania z chemii fizycznej, PG, Gdańsk 1996. 8. Detailed bibliography can be found in H. Strzelecki, W. Grzybkowski "Chemia fizyczna - Ćwiczenia laboratoryjne" Wydawnictwo PG, Gdańsk, 2004</p>															
	eResources addresses															

Example issues/ example questions/ tasks being completed	
Work placement	Not applicable