



## Subject card

Subject name and code	Physical Chemistry , PG_00048440						
Field of study	Chemistry in Construction Engineering						
Date of commencement of studies	October 2022	Academic year of realisation of subject				2023/2024	
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	3	ECTS credits				6.0	
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		dr hab. inż. Maciej Śmiechowski				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	30.0	0.0	0.0	90
	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	90		5.0		55.0	150
Subject objectives	Cognition of physical laws governing chemical processes, thorough understanding of basic principles of thermodynamics allowing for effortless application of its conceptual framework in various disciplines of chemical sciences.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	K6_K03		Student independently prepares reports on the physicochemical experiments, correctly estimating the measurement errors and confronting the obtained results with reliable literature values			[SK5] Assessment of ability to solve problems that arise in practice [SK2] Assessment of progress of work	
	K6_U07		Student independently solves the problems in basic thermodynamics, chemical equilibrium, phase equilibria and the basics of electrochemistry, using the known physicochemical laws			[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject	
	K6_W03		Student possesses a well-established and theoretically founded knowledge in the field of physical chemistry, including the knowledge necessary to describe and understand physicochemical phenomena and processes occurring in civil engineering as well as to measure and determine the parameters of these processes			[SW1] Assessment of factual knowledge	
Subject contents	Basic concepts of phenomenological thermodynamics: the first and second law of thermodynamics and their consequences. Employing of thermodynamics in chemistry. The chemical equilibrium, Le Chatelier rule, dependence of equilibrium constant on temperature. Phase equilibria, the Clausius-Clapeyron equation, phase diagrams in a single and multi-component systems. Ideal and real solutions, activity coefficients. Principles of electrochemistry: the potential difference on the border of phases. Cells and electrode potentials. The polarization of electrodes. Surface phenomena and adsorption. Principles of chemical kinetics. Reaction rate, rate constant, order of reaction and activation energy, the influence of temperature on reaction rate. Catalysis.						

Prerequisites and co-requisites	Mathematics, Physics, General Chemistry, Technical Thermodynamics		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written colloquia	60.0%	30.0%
	Final written exam	50.0%	40.0%
	Entry tests	60.0%	30.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> <li>1. P. W. Atkins, Chemia fizyczna, Wydawnictwo Naukowe PWN, Warszawa 2001</li> <li>2. P. W. Atkins, Podstawy chemii fizycznej, Wydawnictwo Naukowe PWN, Warszawa 1999</li> <li>3. K. Pigoń, Z. Ruziewicz, Chemia fizyczna Tom 1. Podstawy fenomenologiczne, Wydawnictwo Naukowe PWN, Warszawa 2009</li> <li>4. H. Strzelecki, W. Grzybkowski (red.), Chemia fizyczna: ćwiczenia laboratoryjne, Wydawnictwo PG, Gdańsk 2004</li> <li>5. I. Uruska (red.), Zbiór zadań z chemii fizycznej, Wydawnictwo PG, Gdańsk 1997</li> </ol>	
	Supplementary literature	<ol style="list-style-type: none"> <li>1. H. Buchowski, W. Ufnalski, Podstawy termodynamiki, WNT 1994</li> <li>2. A. Kiswa, Elektrochemia I. Jonika, WNT 2000.</li> <li>3. A. Kiswa, Elektrochemia II. Elektrodyka, WNT 2001</li> <li>4. A. Molski, Wprowadzenie do kinetyki chemicznej, WNT 2001</li> <li>5. M. R. Heal, A. R. Mount, A. G. Whittaker, Krótkie wykłady. Chemia fizyczna, Wydawnictwo Naukowe PWN, Warszawa 2003</li> </ol>	
	eResources addresses	Adresy na platformie eNauczenie:	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		