



Subject card

Subject name and code		General Chemistry II, PG_00068911						
Field of study		Cosmetic technologies						
Date of commencement of studies		October 2025	Academic year of realisation of subject			2025/2026		
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 Analytical Chemistry -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)		Subject supervisor		dr hab. inż. Błażej Kudlak				
		Teachers		dr hab. inż. Błażej Kudlak dr inż. Tomasz Dymerski dr inż. Joanna Grabowska dr inż. Wojciech Wojnowski dr inż. Natalia Jatkowska dr hab. inż. Dorota Warmińska dr inż. Małgorzata Rutkowska dr inż. Tomasz Majchrzak				
Lesson types		Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
		Number of study hours	20.0	0.0	40.0	0.0	0.0	60
		E-learning hours included: 0.0						
		eNauczanie source address: https://enauczanie.pg.edu.pl/2025/course/view.php?id=4591						
		Moodle ID: 4591 Chemia ogólna II - Techn. kosmetyczne https://enauczanie.pg.edu.pl/2025/course/view.php?id=4591						
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	60	5.0		35.0		100
Subject objectives		The aim of the course is to familiarize students with basic information in the field of analytical and physical chemistry and with performing laboratory exercises in this area (as described below).						
Learning outcomes		Course outcome		Subject outcome		Method of verification		
		[K6_W01] defines the phenomena, processes and physicochemical laws used to produce utility goods and provide services		knows and is able to define physicochemical phenomena, processes and laws used in the production of consumer goods and the provision of services, including analytical services.		[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects		
		[K6_K01] understands the need to constantly expand knowledge in line with the latest scientific achievements, develop professional competences and teamwork skills		understands the need for continuous expansion of knowledge in line with the latest scientific achievements, for developing their professional competences, and for improving their teamwork skills.		[SK2] Assessment of progress of work [SK3] Assessment of ability to organize work [SK4] Assessment of communication skills, including language correctness [SK5] Assessment of ability to solve problems that arise in practice		

Subject contents	<p>Course content – lecture</p> <p>Lecture: Role, place and tasks of chemical analysis; analytical process, analytical signal; sampling and sample preparation for analysis; analytical methods (primary and absolute methods, indirect methods); theoretical foundations and description of selected analytical methods (gravimetry; titrimetric analysis acidbase titration, precipitation titration, redox titration, complexometric titration; electroanalysis; spectroscopic techniques; chromatographic and related techniques); characteristics of an analytical method validation parameters.</p> <p>Intermolecular interactions and their influence on the properties of substances. Volatility, solubility, cohesion and adhesion. Hydrophobicity and lipophilicity of substances. Partition coefficient.</p> <p>States of matter and their physicochemical properties. Gases: gas laws, equation of state of an ideal gas, van der Waals equation for a real gas. Liquids and their properties: Newtonian and non-Newtonian liquids, surface phenomena. Liquid crystals. Solids: polymorphism, crystals, amorphous solids.</p> <p>Phase equilibria in multiphase systems (phase rule, phase diagrams):</p> <ul style="list-style-type: none"> • In a one-component system: evaporation, condensation, crystallization, melting, sublimation, resublimation, critical temperature, critical point and triple point. • In a two-component system of two liquids with limited miscibility, upper and lower critical solution temperatures. • Liquidgas equilibria in two-component systems, vapour pressure above an ideal and a real solution Raoult's law, zeotropic and azeotropic systems. • Liquid-solid equilibria in two-component systems, eutectic systems. • In a three-component system. <p>Course content – laboratory</p> <p>Laboratory: Health and safety rules; principles of correct weighing; use of volumetric glassware; measuring vessels; acidbase titration; precipitation titration; complexometric titration; redox titration. Determination of a liquidvapour phase diagram in a binary system. Determination of a solubility isotherm in liquid ternary systems. Determination of the partition coefficient of acetic acid between chloroform and water.</p>											
Prerequisites and co-requisites	Basic knowledge in mathematics, physics and inorganic chemistry of I grade level. Student should have knowledge of the: stoichiometry, chemical reaction equilibrium, reactions and theory of acids and bases, precipitation reaction, solubility product, reaction mechanism, complex formation constant											
Assessment methods and criteria	<table border="1" data-bbox="448 1010 1489 1115"> <thead> <tr> <th data-bbox="448 1010 798 1043">Subject passing criteria</th> <th data-bbox="802 1010 1141 1043">Passing threshold</th> <th data-bbox="1145 1010 1489 1043">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 1050 798 1077">lecture - exam</td> <td data-bbox="802 1050 1141 1077">60.0%</td> <td data-bbox="1145 1050 1489 1077">55.0%</td> </tr> <tr> <td data-bbox="448 1084 798 1111">laboratory (tests and reports)</td> <td data-bbox="802 1084 1141 1111">60.0%</td> <td data-bbox="1145 1084 1489 1111">45.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	lecture - exam	60.0%	55.0%	laboratory (tests and reports)	60.0%	45.0%
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<p>Example issues/ example questions/ tasks being completed</p>	<ol style="list-style-type: none"> 1. Provide characteristics and conclusions regarding the acid-base/precipitation/complexometric/redoxymetry titration curve. 2. Describe Warder's method determination NaOH and Na₂CO₃. 3. Specify the characteristics and requirements of the base substance. 4. Characterize titration types: direct, indirect, and reverse. 5. Fajans indicators principle and application. 6. The composition and explain the roles of the individual components of the Reinhardt-Zimmermann mixture (manganometric determination of iron ions). 7. Characteristics of the precipitate in the weighing analysis. 8. What are the optimal precipitate conditions in weight analysis? 9. What are the causes of over voltage in electrogravimetry? 10. What affects the representativeness of the sample at the sampling stage? 11. Specify the differences (apparatus, range of applications, measurement beings) between atomic absorption spectroscopy techniques with flame atomization and flame photometry. 12. What are the components of the basic chromatographic system? 13. Range of elementary analysis applications in analytical chemistry. 14. List the calibration techniques and describe one of them. 15. List the electroanalytical techniques used in analytical chemistry and characterize one of them. 16. Discuss the importance of hydrophobicity and lipophilicity in the design of cosmetic formulations. 17. Describe the phase diagram of a two-component system with limited miscibility. 18. Determine the partition coefficient of a substance if its concentration in water is 0.2 mol/dm³ and in the organic phase is 0.8 mol/dm³. 19. How does the partition coefficient affect the penetration of the substance through the skin?
<p>Practical activities within the subject</p>	<p>Not applicable</p>

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