


KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

 Projekt współfinansowany przez
Unię Europejską w ramach
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Społecznego

UNIA EUROPEJSKA
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Course title		ECTS code	
Experimental methods for studying chemical equilibria in aqueous solutions		13.3.1218	
Name of unit administrating study			
null			
Studies			
faculty	field of study	type	drugiego stopnia
Wydział Chemii	Biznes chemiczny	form	stacjonarne
		specjalty	wszystkie
		specialization	wszystkie
Wydział Chemii	Chemia	type	drugiego stopnia
		form	stacjonarne
		specjalty	wszystkie
Wydział Chemii	Ochrona środowiska	specialization	wszystkie
		type	drugiego stopnia
		form	stacjonarne
		specjalty	wszystkie
		specialization	wszystkie
Teaching staff			
dr hab. Dariusz Wyrzykowski			
Forms of classes, the realization and number of hours		ECTS credits	
Forms of classes		4	
Laboratory classes		classes - 30 h	
The realization of activities		tutorial classes - 30 h	
classroom instruction		student's own work - 40 h	
Number of hours		TOTAL: 100 h - 4 ECTS	
Laboratory classes: 30 hours			
The academic cycle			
2024/2025 winter semester			
Type of course		Language of instruction	
an elective course		English	
Teaching methods		Form and method of assessment and basic criteria for evaluation or examination requirements	
Lecture with the use of the multimedia presentation; Practical laboratory work – chemical experiments, analysis of obtained results and discussion.		Final evaluation	
		Graded credit	
		Assessment methods	
		reports and short tests	
		The basic criteria for evaluation	
		Laboratory classes: a positive note from all short tests and reports; final note is an average from notes from tests and reports:	
		91-100%: 5.0	
		81-90%: 4.5	
		71-80%: 4.0	
		61-70%: 3.5	
		51-60%: 3.0	
		< 51%: 2.0	
Method of verifying required learning outcomes			
Required courses and introductory requirements			
A. Formal requirements			
lack			

B. Prerequisites	
lack	
Aims of education	
<p>presenting basic issues in solution chemistry</p> <p>presenting the basis of chemical calculations</p> <p>familiarize students with the basic and more advanced aspects of chemical equilibria in aqueous solutions</p> <p>familiarize students with the commonly used experimental methods and data processing</p>	
Course contents	
<p>The set of physico-chemical experiments includes 10 laboratory classes thematically related to chemical equilibria in aqueous solutions. The course is intended to familiarize students with the commonly used experimental methods, namely potentiometry and conductometry as well as an advanced method, namely isothermal titration chemistry for studying chemical equilibria, designing experiments, calculations as well as presentation of the obtained results.</p>	
Bibliography of literature	
<p>Extracurricular readings</p> <p>Robert de Levie, How to Use Excel® in Analytical Chemistry And in General Scientific Data Analysis, Cambridge University Press (2001)</p> <p>Jean-Louis Burgot, Ionic Equilibria in Analytical Chemistry, Springer Science+Business Media (2012)</p> <p>Brian M. Tissue, Basics of Analytical Chemistry and Chemical Equilibria, John Wiley & Sons, Inc. (2013)</p>	
The learning outcomes (for the field of study and specialization)	Knowledge
<p>Chemical Business:</p> <p>K_BChII_W01 knows and understands in-depth complex physicochemical processes and is able to analyse their course in connection with other fields of science</p> <p>K_BChII_W02 knows and understands the axiological conditions regarding the use of modern techniques and measuring instruments as well as IT tools in chemistry, taking into account economic aspects K_BChII_U01 is able to based on the acquired knowledge, propose a solution to problems in chemistry, taking into account the economic aspect, using advanced measurement and analytical techniques K_BChII_U02 is able to define his/her interests, develop them within the chosen field of study and in connection with the subject of the master's thesis by implementing the process of self-education and planning his/her professional career</p> <p>K_BChII_K01 is willing to develop and disseminate appropriate best practices in the workplace and beyond</p> <p>K_BChII_K02 is willing to create and manage group work plans and take responsibility for the work of the entire team, properly assessing his/her own work and that of individual team members</p> <p>Chemistry:</p> <p>K_W03 demonstrates in-depth knowledge in the field of modern measuring techniques used in chemical analysis</p> <p>K_W03 applies mathematics to the extent necessary to understand, describe and model chemical processes of extended complexity</p> <p>K_W10 uses knowledge of the principles of operation of the scientific and research apparatus used in chemistry</p>	<p>Students know the commonly used experimental methods for studying chemical equilibria in aqueous solutions</p>
	Skills
	<p>Students: design experiments, process experimental data as well as present the obtained results; interpret and analyze information connected with chemistry presented as text, tables, plots, schemes, figures; formulate descriptions of different chemical phenomena and processes, describe them with use of own words and figures (schemes); notice causal links in chemical processes performed in different conditions, where typical chemical reactions occur; explain course of different phenomena from everyday life with the use of chemical knowledge in correlation with other sciences; interpret information, formulates conclusions and explain opinions</p>
	Social competence
	<p>Students: understand need for learning, inspire other for learning; cooperate in group, taking different roles; exhibit creativity in determination of priorities necessary for realization of different tasks; understand social aspects of practical use of knowledge and abilities as well as connected with them responsibility.</p>

<p>K_U01 plans and implements chemical experiments of extended complexity</p> <p>K_U02 critically assesses the results of conducted, performed observations and theoretical calculations and discusses errors</p> <p>K_U04 applies acquired knowledge of chemistry and related scientific disciplines</p> <p>K_K02 works in a team taking on various roles in it</p> <p>Environmental Protection:</p> <p>K_OŚII_W09 applies safety and hygiene principles when working independently on a test or measurement stand in a laboratory or in the field</p> <p>K_OŚII_U07 has advanced skills in presenting the results of their own research, discussions based on literature data and public speaking, including leading a debate</p> <p>K_OŚII_K02 recognises threats, creates safe work conditions and is responsible for the safety of own and other people's work</p> <p>K_OŚII_K07 is willing to undertake individual and team activity; to professionally plan and organise its course and set priorities for their actions</p> <p>K_OŚI_K08 is responsible for and takes care of the specialist equipment entrusted to her/him for research and laboratory or field work</p>	
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