KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego

UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY

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		
Faculty of Chemistry	Chemical Business	type	second tier studies (MA)
		form	full-time
		specialty	all
		specialization	all
Faculty of Chemistry	Chemistry	type	second tier studies (MA)
		form	full-time
		specialty	all
		specialization	all
Faculty of Chemistry	Environmental Protection	type	second tier studies (MA)
		form	full-time
		specialty	all
		specialization	all

Teaching staff

dr hab. Dariusz Wyrzykowski

Forms of classes, the realization and number of hours

Forms of classes

Laboratory classes

The realization of activities

classroom instruction

Number of hours

Laboratory classes: 30 hours

ECTS credits

4
classes - 30 h
tutorial classes - 30 h
student's own work - 40 h
TOTAL: 100 h - 4 ECTS

The academic cycle

2023/2024 winter semester

Type of course

an elective course

Language of instruction

english

Teaching methods

Lecture with the use of the multimedia presentation; Practical laboratory work – chemical experiments, analysis of obtained results and discussion.

Form and method of assessment and basic criteria for eveluation or examination requirements

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

presenting basic issues in solution chemistry
presenting the basis of chemical calculations
familiarize students with the basic and more advanced aspects of chemical equilibria in aqueous solutions
familiarize students with the commonly used experimental methods and data processing

Course contents

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.

Bibliography of literature

Extracurricular readings
Robert de Levie, How to Use Excel® in Analytical Chemistry And in General Scientific Data Analysis, Cambridge University Press (2001)
Jean-Louis Burgot, Ionic Equilibria in Analytical Chemistry, Springer Science+Business Media (2012)
Brian M. Tissue, Basics of Analytical Chemistry and Chemical Equilibria, John Wiley & Sons, Inc. (2013)

The learning outcomes (for the field of study and specialization)

Chemical Business:
K_BChII_W01
knows and understands in-depth complex physicochemical processes and is able to analyse their coursee in connection with other fields of science
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
K_BChII_K01
is willing to develop and disseminate appropriate best practices in the workplace and beyond
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

Chemistry:
K_W03
demonstrates in-depth knowledge in the field of modern measuring techniques used in chemical analysis
K_W03
applies mathematics to the extent necessary to understand, describe and model chemical processes of extended complexity
K_W10
uses knowledge of the principles of operation of the scientific and research apparatus used in chemistry

Knowledge

Students know the commonly used experimental methods
for studying chemical equilibria in aqueous solutions

Skills

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

Social competence

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.

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

Contact

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