KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego

UNIA EUROPEJSKA
EUROPEJSKI FUNDUSZ SPOŁECZNY

Course title	ECTS code
Graduate study lecture - Methods of physicochemical analysis of inorganic and hybrid compounds	13.3.1171

Name of unit administrating study

Faculty of Chemistry

Studies

faculty	field of study		
Wydział Chemii	Chemia	type	drugiego stopnia
		form	stacjonarne
		specialty	chemia biomedyczna, chemia i technologia środowiska, analityka i diagnostyka chemiczna, chemia obliczeniowa
		specialization	wszystkie

Teaching staff

prof. dr hab. inż. Lech Chmurzyński; dr hab. Joanna Makowska, profesor uczelni; dr inż. Krzysztof Żamojć; dr hab. Dariusz Wyrzykowski

Forms of classes, the realization and number of hours

Forms of classes

Lecture

The realization of activities

classroom instruction

Number of hours

Lecture: 30 hours

ECTS credits

3
classes - 30 h
tutorial classes – 10 h
student's own work – 35 h

Total: 75 h - 3 ECTS

The academic cycle

2022/2023 summer semester

Type of course

obligatory

Language of instruction

polish

Teaching methods

multimedia-based lecture

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

Final evaluation

Graded credit

Assessment methods

(mid-term / end-term) test

The basic criteria for evaluation

Positive grade from the colloquium on the topic presented in the lecture based on program content.

Method of verifying required learning outcomes

Required courses and introductory requirements

A. Formal requirements

B. Prerequisites

- knowledge of the sources of absorption spectra of inorganic compounds, knowledge of the vocabulary used in chemical spectroscopy; competences in interpretation of UV-Vis and IR spectra, knowledge of basic instrumental techniques; Basic knowledge of the structure and properties of amino acids and peptides

Aims of education

acquire all of the issues listed in the contents of the lecture program

Course contents

Evaluation of measurement errors. Basics of potentiometry; the use of potentiometric method to determine the values of acid-base and complex equilibrium constants in solutions; the use of theoretical methods for the estimation of the potentiometric curves; methods to phase transitions studies in biologically active compounds with the use of the differential scanning calorimetry; circular dichroism; energy effects of physical and chemical changes; definitions and abbreviations used in the thermal analysis, examples; isothermal titration calorimetry; the scheme and operating

principles of the TG, DTA and DSC anlyzer; UV-vis spectroscopy, fluorescence spectroscopy and NMR spectroscopy in chemical analysis; the use of theoretical methods to determine the values of acid-base equilibrium constants.

Bibliography of literature

Literature required to pass the course
A. Literatura wymagana do ostatecznego zaliczenia zajęć (zdania egzaminu):
A.1. wykorzystywana podczas zajęć
http://www.shu.ac.uk/schools/sci/chem/tutorials/molspec/uvvisab1.htm
http://www.cem.msu.edu/~reusch/VirtualText/Spectrpy/UV-Vis/spectrum.htm
A2. Literatura studiowana samodzielnie przez studenta:
D. A. Skoog, D.M. West, F.J. Holler – Fudamentals of Analytical Chemistry
J. Kenkel – Analytical Chemistry for Technicians
T. Jasiński – Analiza miareczkowa w środowiskach niewodnych
J. Minczewski, Z. Łada – Miareczkowanie potencjometryczne
J. Minczewski, Z. Marczenko – Chemia analityczna
S.F.A. Kettle – Fizyczna chemia nieorganiczna
S.J. Lippard, J.M. Berg – Podstawy chemii bionieorganicznej
G.W.H. Höhne, W.F. Hemminger, H.J. Flammersheim – Differential Scanning Calorimetry
A. Molski – Wprowadzenie do kinetyki chemicznej
B. Extracurricular readings

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

Knowledge

The student
- knows the methodology for determining the structure of chemical compounds and basic spectral methods (infrared spectroscopy, UV-VIS spectroscopy);
- knows the basic classification systems for liquid chemical reaction environments;
- knows and understands the processes of acid-base interactions occurring in non-aqueous environments;
- understands the theory of hydrogen bonding and proton transfer equilibria in non-aqueous environments;
- knows the basic instrumental methods of testing equilibrium in non-aqueous environments;
- knows the theoretical methods enabling the study of the effect of pH and solvent type on the conformation of model peptides and a method for predicting the course of potentiometric titration curves and determining pKa constants for peptide systems;
- knows the correct nomenclature and chemical symbols used in thermal analysis and calorimetry;
- knows the techniques used in thermal analysis and calorimetry;
- knows the elements of chemistry of complex single-core compounds;
- understands the equilibrium of formation of single-core complexes and knows the methodology for determining the stability constants of acid-base single-core complexes by spectrophotometric and potentiometric methods;
- knows the hydrogen bond characteristics along with the occurrence (inorganic and organic compounds);
- knows measurement techniques enabling finding hydrogen bond in a chemical compound (infrared spectroscopy, 1H-NMR, fluorescence, UV and UV-VIS spectroscopy, potentiometry, conductometry, calculation methods, calorimetry, dielectric studies, diffraction studies);
- knows the division of amino acids due to the structure of the side chain and understands models for describing hydrophobic association.

Skills

The student has the ability to critically evaluate the results of conducted experiments, observations and / or theoretical calculations.

Social competence

The student understands the need for lifelong learning, inspires and organizes the learning process of others; is able to use chemical knowledge in correlation with other natural sciences to explain the course of phenomena encountered in everyday life.

Contact

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