KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

Projekt współfinansowany przez Unię Europejską w ramach Europejskiego Funduszu Społecznego

UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY

| Course title | ECTS code |
|---|---|
| Diploma lecture - Analytical aspects of intermolecular interactions | 13.3.0918 |

**Name of unit administrating study**

Faculty of Chemistry

**Studies**

| faculty | field of study | | |
|---|---|---|---|
| Wydział Chemii | Chemia | type | pierwszego stopnia |
| | | form | stacjonarne |
| | | specialty | wszystkie |
| | | specialization | wszystkie |

**Teaching staff**

prof. dr hab. inż. Tadeusz Ossowski; dr Paweł Niedziałkowski; dr Anna Wcisło; dr Jaromir Kira; dr hab. Beata Grobelna, profesor uczelni; dr Iwona Dąbkowska; dr Dorota Zarzeczańska; dr hab. Grzegorz Romanowski

**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**

2
classes - 30 h
tutorial classes – 15 h
student's own work – 5 h

Total: 50 h - 2 ECTS

**The academic cycle**

2024/2025 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**

written exam with open questions (tasks)
written exam with multiple choice questions (tasks)

**The basic criteria for evaluation**

Positive evaluation of the written exam consisting of 5 open questions (tasks) and 10 multiple choice questions covering the issues listed in the program content of the subject; answers to the questions will require solving tasks related to the presented learning outcomes; the grading scale will be adjusted to the rating range of the assessed works

**Method of verifying required learning outcomes**

**Required courses and introductory requirements**

**A. Formal requirements**

Analytical chemistry, physical chemistry

**B. Prerequisites**

Basic issues in the field of analytical and physical chemistry, the ability to describe the equilibrium in solution with chemical reactions

**Aims of education**

- Acquainting with instrumental and computational techniques for analysis of equilibrium reactions in solution
- Ability to select a technique to analyze intermolecular interactions
- Ability to write, graphically present and apply chemical programs to describe and analyze intermolecular interactions

## Course contents

Practical design of the synthesis of organic compounds. Preparation of samples for spectroscopic measurements (UV-Vis and CD). Spectroscopic and graphical analysis, IR and NMR spectra processing using appropriate software. Basics of electrochemistry in the study of intermolecular interactions. Calculation of acid dissociation constants based on spectroscopic and potentiometric measurements. Equilibrium modeling based on results obtained from potentiometry or spectroscopy. Kinds of intermolecular interactions and their description by means of quantum chemistry. Searching for available databases, using selected databases to find physicochemical properties of selected organic compounds.

## Bibliography of literature

Literature required to pass the course
J. Polster, H. Lachmann, Spectrometric Titrations: Analysis of Chemical Equilibria, Weinheim; Basel (Switzerland);Cambridge, New York NY
A. Cygański, Metody spektroskopowe w chemii analitycznej, WNT, Warszawa 2009
L. Piela „Idee chemii kwantowej" PWN Warszawa 2003
Extracurricular readings
J. Inczedy Równowagi kompleksowania w chemii analitycznej, Warszawa PWN 1979
J.B. Lambert, H.F. Shurvell, D.A. Lightner, R.G. Cooks, Organic Structural Spectroscopy, Prentice Hall, New Jersey, 1998

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

### Knowledge

1. Defines and explains the basic concepts of spectroscopy and electrochemistry
2. Describes the forces defining intermolecular interactions.
3. Lists the types of intermolecular interactions
4. Selects the analytical technique adequate to the study of a given type of intermolecular interaction.

### Skills

Estimates the strength of possible intermolecular interactions based on the monomer structure
Analyzes IR and NMR spectra and performs graphic processing.
Calculates the acid dissociation constants of compounds based on potentiometric and spectrophotometric measurements.
Plans and optimizes oxidation reaction conditions with catalysts
Designs selected organic compounds
Is searching in available databases of physicochemical properties for the tested compounds

### Social competence

Shows cautious criticism in receiving information, especially available in the mass media

## Contact

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