

Course title: Selected analytical and instrumental techniques in inorganic chemistry

Institute/Specialty: FACULTY OF CHEMICAL ENGINEERING AND TECHNOLOGY /
Department of Chemical Technology and Environmental Analytics

Number of contact hours: 15 hours (laboratory classes)

Course duration: 1 semester

ETCS credits: 1

Course description: The course consists of three laboratory classes aimed at familiarizing students with the basic analytical and instrumental techniques used in inorganic chemistry. During the course, students will carry out experiments that are the basis of gravimetric analysis and carry out different types of titrations using different titrants and analytes. The next classes will be based on instrumental analysis - students will get acquainted with spectroscopic research - with the use of a UV-Vis spectrometer and an IR spectrometer using the reflection and transmission methods. Students independently prepare samples for analysis, independently perform analyzes in accordance with the user manual of a given apparatus and then, after receiving the result, they will independently interpret the obtained spectra, histograms, diffractograms, etc.

Course content:

1. Titrimetric and gravimetric analysis. Students will carry out various types of titrations and gravimetric analysis (complexometric titration, pH-metric titration, determination of the content of selected compounds by gravimetric method).
2. Instrumental analysis - UV-Vis spectroscopy. Students learn practical application possibilities of UV-Vis spectroscopy through quantitative and qualitative determination of various compounds (production and analysis of nanoparticles, determination of phosphorus content)
3. Instrumental analysis - FTIR spectroscopy. Students will learn about the application possibilities of the discussed technique using two types of data collection - the transmission method and the reflection method. Students will receive a number of inorganic compounds for analysis and, on the basis of spectra and databases, they will classify the appropriate bands to given groupings and thus identify the analyzed materials.

Literature:

[1] Skoog D.A., Holler F.J., Crouch S.R., *Principles of Instrumental Analysis*, 2017, Brooks Cole Pub Co

[2] Vyvyan J. R., *Introduction to Spectroscopy*, 2014, Cengage Learning, Inc.

[3] Hollas J.M., *Modern Spectroscopy*, 2003, Wiley

[4] Fifield F.W, Kealey D., , *Principles and Practice of Analytical Chemistry*, 2000, Blackwell Science Ltd

Assessment method: Average grade from all individual reports prepared after each laboratory class

Prerequisites: Student should have knowledge of fundamentals of analytical and instrumental methods applied in inorganic chemistry (titration, UV-Vis, FTIR, XRD, SEM etc.)

Primary target group: all specialties students (Chemical Engineering / Chemical Technology)

Lecturer: PhD Eng. Dagmara Malina

Contact person: PhD Eng. Dagmara Malina (dagmara.malina@pk.edu.pl)

Deadline for application: 15th of January for students applying for spring semester

Remarks: The course is selectable