COURSE DESCRIPTION CARD - SYLLABUS

Course name
Instrumental analytical techniques [S1TOZ1>ITA]

Course

Field of study
Circular System Technologies

Year/Semester
2/3

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
30

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

5,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of inorganic and analytical chemistry, apparatus used in the chemical laboratory, mathematical tools used in the chemical calculations. Usage a of basic chemical apparatus and volumetric glassware.

Course objective

To familiarize students with instrumental techniques (apparatus, physicochemical phenomena, quantitative and qualitative analysis) and presentation of the possibility of using the instrumental techniques (analytical atomic spectrometry - F AAS, ET AAS, ICP/MIP/DCP OES, UV-VIS spectrophotometry, chromatography, electroanalytical tchniques, mass spectrometry) and presentation of the possibility of using the instrumental techniques in industry, environmental protection environment in accordance with the requirements for a circular economy (e.g. the so-called "environmental footprint"). Performing analytical calculations based on the obtained results, including those related to the methodology validation.

Course-related learning outcomes

Knowledge:
1. student has the necessary knowledge in the field of instrumental techiques for the understanding of phenomena and processes occurring during analysis - [k_w03, k_w04, k_w11].
2. student has a systematic, theoretically founded general knowledge in the field of instrumental analysis - [k_w09].

Skills:
1. student can obtain the necessary information from the literature to conduct the determination of an analyte in the test sample using instrumental technique - [k_u01, k_u13].
2. student is able to perform basic chemical analysis, interprets the results of analyzes and draw appropriate conclusions - [k_u01, k_u03, k_u04, k_u05].
3. student is able to work both individually and in team during the laboratory work - [k_u08].

Social competences:
1. the student is aware of the principles of engineering ethics in a broader aspect - [k_k01, k_k05].
2. the student is able to interact and work in a group and in different roles - [k_k02].
3. the student understands the need for self-education and improving their professional competences - [k_k05].
4. takes care of the specialist equipment used for researches - [k_k07].
5. is aware of the negative impact of human activity on the state of the environment and actively counteracts its degradation - [k_k10].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Oral and written control of the student"s knowledge before the laboratory classes (carried out in a stationary or remote mode via e-Kursy platform). Written reports of the performed exercises.
Written exam: 10 questions of different scores depending on the difficulty. Carried out in a stationary or remote mode via e-Kursy platform. Passing threshold: 55% of points.

Programme content

Theoretical basis of physicochemical phenomena leading to the analytical signal measurement, signal measurement methods, analytical characteristics of the method. Instrumentl techniques: atomic absorption (F AAS and GF AAS) and emission spectrometry (ICP/MIP/DCP), UV-VIS spectrophotometry, electrochemical methods , chromatography , mass spectrometry, continuous and flow injection analysis. The cycle of the laboratory includes spectroscopic, electrochemical and chromatographic techniques.

Teaching methods

Knowledge acquired during the lectures is verified during the written exam, containing 10-15 questions with different scores depending on the degree of difficulty. Passing threshold: 55% of points.
A series of laboratory exercises of instrumental analysis is preceded by checking the theoretical foundations of the methods used. Students prepare written reports on completed exercises.
1. Lecture: multimedia presentation supported with examples presented on the board.
2. Laboratory classes: analyte determinations using analytical apparatus in accordance with the instructor"s instructions.

Bibliography

Basic
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Additional
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Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,00
Classes requiring direct contact with the teacher	65	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	60	2,50