COURSE DESCRIPTION CARD - SYLLABUS

Course name
Analytical Chemistry

Course

Field of study
Chemical Technology

Year/Semester

Area of study (specialization)

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
30	45	
Tutorials	Projects/seminars	

Number of credit points

4

Lecturers

Responsible for the course/lecturer:
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Wydział Technologii Chemicznej

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Responsible for the course/lecturer:
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ul. Berdychowo 4 60-965 Poznań

Prerequisites

Basic knowledge of inorganic 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 the practical use of classical techniques and methods used in analytical chemistry. Learning the proper way to conduct (methodology, preparation of standard solutions, titration, weighing, precipitation and filtration, washing, heating) the methods used in the laboratory (acid-base titration, oxidation-reduction titrations , complexometric titration, precipitation, gravimetric

methods) as well as the acquisition of proficiency in analytical calculations which will shape the student's confidence in their own skills in performing the analyzes.

Course-related learning outcomes

Knowledge

1. Student has the necessary knowledge in the field of chemistry for the understanding of phenomena and processes occurring during the reaction used in analytical chemistry - [[K_W03,K_W11]]

2. Student has a systematic, theoretically founded general knowledge in the field of analytical chemistry - [[K_W08]]

Skills

1. Student can obtain the necessary information from the literature to conduct the determination of an analyte in the test sample - [[K_U01]]

2. Student is able to perform basic chemical analysis, interprets the results of analyzes and draw appropriate conclusions - [[K_U01, K_U18, K_U21]]

3. Student is able to work both individually and in team during the laboratory work - [[K_U02]]

Social competences

1. The students understand the need for self-studying and improvement of their professional competences. - [[K_K01]]

2. The student is aware of the principles of engineering ethics. - [[K_K02, K_K05]]

3. Students can cooperate and work in a group, taking different roles. - [[K_K03]]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired during the lectures is verified during the written exam, carried out in a stationary or remote mode via e-Kursy platform, containing 10 questions with different scores depending on the degree of difficulty. Passing threshold: 55% of points.

Oral and written control of the student's knowledge before the laboratory classes. Written reports of the performed exercises.

Programme content

Practical aspects of analytical chemistry : ionic activity and ionic strength in solutions, strong and weak electrolytes; balance in the acid-base reactions, oxidation-reduction reactions/titrations , complexes and complex formation titrations, precipitate-formation titrations; volumetric analysis techniques (titration curves, indicators, analytical calculations).

1 The assessment of risks occurring during the laboratory work

2. The volumetric analysis:

-ACID-BASE TITRATIONS

- determination of the total acidity or alkalinity of the solution
- determination of NaHCO3 and Na2CO3
- determination of ammonia by the formalin

-OXIDATION-REDUCTION TITRATIONS

- determination of Ca2+
- determination of dissolved oxygen by the Winkler method .
- determination of phenol

-COMPLEX FORMATION TITRATIONS

- determination of iron.
- determination of calcium and magnesium.

-PRECIPITATE-FORMATION TITRATIONS

- determination of chloride using Mohr method
- determination of chloride using Volhard method

Teaching methods

Knowledge acquired during the lecture is verified during the written exam, carried out in a stationary or remote mode via e-Kursy platform, containing 10 questions with different scores depending on the degree of difficulty. Passing threshold: 55% of points.

A series of laboratory exercises from classical analysis is preceded by checking the theoretical foundations of the methods used (carried out in a stationary or remote mode via e-Kursy platform). Students prepare written reports on completed exercises.

Bibliography

Basic

1. .D.A.Skoog, D.M. West, F.J. Holler, S.R. Crouch, Podstawy chemii analitycznej, t.1 i 2, WNT Warszawa 2006/2007

2. J. Minczewski, Z. Marczenko, Chemia analityczna, t.1 i 2, WN PWN Warszawa 2007

3. A. Cygański, Chemiczne metody analizy ilościowej, WNT Warszawa 2019

4. A. Cygański, B. Ptaszyński, J. Krystek, Obliczenia w chemii analitycznej, WNT Warszawa 2004

5. M. Wesołowski, K. Szefer, D. Zimna, Zbiór zadań z analizy chemicznej,WNT Warszawa 2002

Additional

1. W. Ufnalski, Równowagi jonowe, WNT Warszawa 2004

2. A. Hulanicki, Reakcje kwasów i zasad w chemii analitycznej, WN PWN Warszawa 2012

3. Z. Galus, Ćwiczenia rachunkowe z chemii analitycznej, WN PWN Warszawa 2020

Breakdown of average student's workload

	Hours	ECTS
Total workload	120	4,0
Classes requiring direct contact with the teacher	70	2,3
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam preparation) [1]	50	1,7

[1] delete or add other activities as appropriate