



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Analytical Chemistry

		Course
Field of study		Year/Semester
Environmental Protection Technologies		I/2
Area of study (specialization)		Profile of study
-		general academic
Level of study		Course offered in
First-cycle studies		polish
Form of study		Requirements
full-time		compulsory

		Number of hours
Lecture	Laboratory classes	Other (e.g. online)
30	0	0
Tutorials	Projects/seminars	
0	0	
Number of credit points		
3		

		Lecturers
Responsible for the course/lecturer:		Responsible for the course/lecturer:
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Prerequisites

Basic knowledge of inorganic chemistry, apparatus used in the chemical laboratory, mathematical tools used in the chemical calculations.

The student uses the basic literature, can choose the analytical procedure and the appropriate instrumentation (chemical apparatus and laboratory glass).

Course objective

To familiarize students with the use of conventional 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 techniques) 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_W02,K_W07]]
2. Student has a systematic, theoretically founded general knowledge in the field of analytical chemistry - [[K_W07]]

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 interpret the results of analyzes and draw appropriate conclusions - [[K_U01, K_U06, K_U13]]

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]]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written exam (acid-base titration, oxidation-reduction titrations, complexometric titration, precipitation, gravimetry). 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.

Programme content

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

Teaching methods

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.

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

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	90	3,0
Classes requiring direct contact with the teacher	50	1,6
Student's own work (literature studies, preparation for exam) ¹	40	1,4

¹ delete or add other activities as appropriate