



## 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:

Dr hab. inż. Mariusz Ślachciński

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Wydział Technologii Chemicznej

ul. Berdychowo 4, 60-965 Poznań

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 control work (acid-base titration, oxidation-reduction titrations, complexometric titration, precipitation, gravimetry).

### 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 lecture is verified during the written exam, containing 10-15 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) <sup>1</sup>	40	1,4

<sup>1</sup> delete or add other activities as appropriate