



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Analytical Chemistry - Titrants and Acid-Base Standardization

### Course

Field of study

Year/Semester

Chemical Technology

II/3

Area of study (specialization)

Profile of study

-

general academic

Level of study

Course offered in

First-cycle studies

English

Form of study

Requirements

full-time

elective

### Number of hours

Lecture

Laboratory classes

Other (e.g. online)

0

20

0

Tutorials

Projects/seminars

0

0

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

Responsible for the course/lecturer:

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Faculty of Chemical Technology

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### Prerequisites

Knowledge gained during the lectures on analytical chemistry and basic analytical chemistry laboratories. Basic knowledge of inorganic chemistry and analytical chemistry (acid-base reactions, oxidation-reduction reactions, complexometric reactions, precipitate-formation titrations and gravimetric analysis theory) and mathematical tools used in the chemical calculations.

Usage a of basic chemical apparatus, volumetric glassware, knowledge of laboratory equipment for volumetric analysis. Student is able to perform basic chemical analysis, interprets the results of analyses and draw appropriate conclusions.

### Course objective

The aim of the course is familiarization Students with the practical use of the techniques and methods



used in volumetric analysis. Teaching the correct way to conduct the standardization process in volumetric analysis.

### Course-related learning outcomes

#### Knowledge

1. The student has a systematized, general theoretical knowledge of basic and analytical chemistry. Acquires the ability to plan chemical experiments and develop results [K\_W08]
2. The student has the necessary knowledge of analytical chemistry to understand chemical phenomena and analytical processes. [K\_W03]

#### Skills

1. The student can assess the suitability of analytical methods and techniques appropriate for solving engineering tasks of a practical nature in analytical chemistry. [[K\_U14]
2. The student can use the correct chemical terminology and nomenclature of chemical compounds [K\_U17]
3. The student can select analytical methods for determination of chemical compounds. [K\_U21]
4. The graduate can implement the process of self-learning. [K\_U05]

#### Social competences

1. The student understands the need to develop and improve their professional competences [K\_K01]
2. The student can cooperate and work on a team [K\_K03]
3. The student can appropriately determine the priorities for accomplishing the assigned task. [K\_K04]

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Skills acquired in the course of the laboratory exercises are verified on the basis of a final test (carried out in a stationary or remote mode (e-Kursy platform), depending on the situation). The colloquium consists of 5-8 tasks/questions, differently scored depending on their level of difficulty. Passing threshold: 55% of points. After each experiment, Student is required to make a written report.

### Programme content

The following analytical tasks will be performed during the laboratory classes:

1. Preparation of the standard solution of 0.1 M hydrochloric acid (standardization with using of anhydrous sodium carbonate).
2. Preparation of the 0.1 M sodium hydroxide standard solution (standardization with using of the previously prepared standard solution of hydrochloric acid).
3. Simultaneous determination of hydrochloric acid and phosphoric acid (V).



#### 4. Calculating and interpreting the results.

Before the cycle of laboratory classes, students are acquainted with the general principles of safety work in a chemical laboratory.

#### Teaching methods

Performing determinations based on knowledge gained during lectures in analytical chemistry and discussions with the laboratory teacher - practical classes

#### Bibliography

##### Basic

1. Analytical Chemistry; G.D. Christian, P.K. (Sandy) Dasgupta, K. A. Schug; John Wiley & Sons, Inc.
2. Modern Analytical Chemistry; D. Harvey; The McGraw-Hill Companies.
3. Quantitative Chemical Analysis; D.C. Harris; W.H. Freeman and Company, NY.

##### Additional

1. D.A. Skoog, D.M. West, F.J. Holler, S.R. Crouch, Fundamentals of Analytical Chemistry vol. 1, Brooks/Cole, USA, 2004.
2. R. Kellner, J.M. Mermet, M. Otto, H.M. Widmer, Analytical Chemistry, Wiley-VCH, Weinheim, 1998.
3. R. H. Hill, Jr., D C. Finster, Laboratory Safety for Chemistry Students, John Wiley & Sons, Inc., 2010.

#### Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	25	1,0
Student's own work (literature studies, preparation for laboratory classes, preparation of reports, preparation for test) <sup>1</sup>	25	1,0

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