



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Analytical chemistry [S1TCh2E>CA]

### Course

Field of study	Year/Semester
Chemical Technology	1/2
Area of study (specialization)	Profile of study
–	general academic
Level of study	Course offered in
first-cycle	English
Form of study	Requirements
full-time	compulsory

### Number of hours

Lecture	Laboratory classes	Other
30	45	0
Tutorials	Projects/seminars	
0	0	

### Number of credit points

7,00

### Coordinators

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### Lecturers

### 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 conventional (volumetric) techniques and methods used in analytical chemistry. To teach the proper way of conducting (methodology, preparation of standard solutions, titration, weighing, precipitation and filtration, washing, drying) the determinations carried out in the laboratory (acid-base titration, oxidation-reduction titrations, complexometric titration, precipitation techniques) as well as gaining proficiency in analytical calculations. Thus it will boost the Student's confidence in their own skills at performing the analytical procedures.

### 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 as a part of the lecture is verified during the exam at the end of the semester (carried out in a stationary or remote mode (e-Kursy platform), depending on the situation). The exam covers main branches of analytical chemistry (acid-base reactions, redoximetry, complexometry, precipitation and gravimetric analysis). Passing threshold: 50% of points.

Skills acquired as a part of the laboratory exercises are verified on the basis of four final tests (carried out in a stationary or remote mode (e-Kursy platform), depending on the situation). Each colloquium consists of 4-10 tasks/questions, differently scored depending on their level of difficulty. Passing threshold: 50% of points.

After each completion of the laboratory exercise, Student is required to make a written report.

### Programme content

Issue related to analytical chemistry.

### Course topics

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 REACTIONS. Examples of alkacymetric determinations.
  - OXIDATION-REDUCTION REACTIONS. Applications of redox titrations.
  - COMPLEX FORMATION REACTIONS. Examples of complexometric titrations.
  - PRECIPITATE-FORMATION REACTIONS. Precipitation Titrations

### Teaching methods

1. Lecture: multimedia presentation, discussion.
2. Laboratory exercises: performing practical exercises (determinations) in accordance with the schedule of the subject and written reports including the appropriate chemical reactions together with mathematical calculations.

### 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.

2. R. Kellner, J.M. Mermet, M. Otto, H.M. Widmer, Analytical Chemistry, Wiley-VCH, Weinheim.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	175	7,00
Classes requiring direct contact with the teacher	88	3,50
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation)	87	3,50