



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Analytical chemistry and instrumental analysis (analytical and instrumental chemistry in food analysis)

### Course

Field of study

Chemical and Process Engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/4

Profile of study

general academic

Course offered in

Polish

Requirements

elective

### Number of hours

Lecture

Laboratory classes

Other (e.g. online)

30

Tutorials

Projects/seminars

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

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### Prerequisites

The student has general knowledge in the field of analytical chemistry and instrumental analysis gained during the classes in analytical and instrumental chemistry. The student uses basic chemical equipment and laboratory glassware.

### Course objective

The aim of this course is to familiarize students with the practical use of basic instrumental techniques and analytical methods used in food analysis.



### Course-related learning outcomes

#### Knowledge

1. K\_W03 The student distinguishes and is able to assess the possibility of using a given analytical method and / or instrumental technique.
2. K\_W07 The graduate knows the operation principles of the measurement systems. The graduate understands the operation principle of the apparatus used in instrumental techniques..

#### Skills

1. K\_U08 The graduate can plan and conduct simple experiments, interpret the results and perform conclusions. Selects and applies analytical methods and techniques in quantitative analysis. Has the ability to perform quantitative analysis.
2. K\_U05 The graduate has the ability to self-study.
3. K\_U12 The graduate applies WHS (Work Health and Safety ) principles in the analytical laboratory.

#### Social competences

1. K\_K01 The graduate understands the need to develop and improve his/her professional competency.
2. K\_K03 The graduate is aware of the importance of professional conduct and respect for professional ethics.
3. K\_K04 The graduate is aware of the responsibility for his/her own work and the willingness to comply and responsibility for tasks carried out as a team.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Verbal and written control of the student's knowledge prior to the commencement of laboratory classes (carried out in a stationary or remote mode (e-Kursy platform), depending on the situation). Written reports on the exercises performed.

### Programme content

The laboratory classes includes six exercises in the field of food analysis (two exercises in volumetric analysis and four in instrumental analysis):

1. Determination of calcium in drinking water by the manganometric method.
2. Determination of phenol by bromometric method.
3. Determination of acetic acid by the acidimetric potentiometric titration method.
4. Spectrophotometric determination of orthophosphates and polyphosphates using the molybdate method.
5. Photometric determination of sodium and potassium in food samples.



6. Voltammetric determination of cadmium in herbal tea extracts.

Before the series of laboratory classes, students are familiarized with the general principles of safety work in the chemical laboratory, during the classes health and safety instructions regarding a given workplace are given.

### Teaching methods

Performing experiments in accordance with the schedule of the subject and a written report including the appropriate chemical reactions along with mathematical calculations.

### Bibliography

#### Basic

1. A. Cygański, Metody spektroskopowe w chemii analitycznej, WNT, Warszawa 1995
2. D.A. Skoog, D.M. West, F.J.Holler, S.R. Crouch, Podstawy chemii analitycznej. Tom 1 i 2, PWN, Warszawa 2006
3. A. Cygański, Podstawy metod elektroanalitycznych, WNT, 1999
4. J. Minczewski, Z. Marczenko, Chemia Analityczna. Tom 1, 2 i 3, PWN, Warszawa 1985
5. A. Cygański, Chemiczne metody analizy ilościowej, WNT, Warszawa 2005

#### Additional

1. J. Dojlido, J. Zerbe, Instrumentalne metody badania wody i ścieków, Arkady, Warszawa 1997
2. W. Szczepaniak, Metody instrumentalne w analizie chemicznej, PWN, Warszawa 2002
3. H. Elbanowska, J. Zerbe, J. Siepak, Fizyczno – chemiczne badania wód, Wydawnictwo Naukowe UAM, Poznań 1999

### Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,0
Classes requiring direct contact with the teacher	30	1,2
Student's own work (literature studies, preparation for laboratory classes, reports preparation) <sup>1</sup>	20	0,8

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