



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Instrumental Analysis - The use of atomic spectrometry techniques in the pharmaceutical analysis

### Course

Field of study

Pharmaceutical 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

0

Tutorials

0

Laboratory classes

30

Projects/seminars

0

Other (e.g. online)

0

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

dr hab. inż. Mariusz Ślachcinski

email: Mariusz.Slachcinski@put.poznan.pl

tel. 616652314

Wydział Technologii Chemicznej

ul. Berdychowo 4 60-965 Poznań

Responsible for the course/lecturer:

### Prerequisites



Good knowledge of inorganic, analytical and instrumental chemistry, apparatus used in the chemical laboratory, mathematical tools used in the chemical calculations.

Usage of chemical apparatus and volumetric glassware.

### Course objective

The use of spectroscopic techniques (more detailed than in basic course): Absorption atomic spectrometry: atomization techniques, absorption interferences, quantitative analysis, special techniques in AAS. Optical emission spectrometry: theory of atomic spectra formation, modern excitation sources (inductively coupled plasma, microwave induced plasma, direct current plasma), quantitative analysis, qualitative and quantitative spectrographic technique. Assessment of the results of chemical analysis.

### Course-related learning outcomes

#### Knowledge

1. Student has good knowledge in the field of chemistry for the understanding of phenomena and processes occurring during analysis, K\_W4
2. Student has theoretically founded good knowledge in the field of analytical chemistry and instrumental analysis K\_W04
3. Knows classical and instrumental methods used in assessing the quality of substances for pharmaceutical purposes and in quantitative analysis in medicinal products K\_W7

#### Skills

1. Student can obtain relevant information from the literature to conduct the determination of an analyte in the real sample. K\_U01
2. Student is able to perform chemical analysis, interprets the results of analyzes and draw appropriate conclusions K\_U2, K\_U3, K\_U10
3. Student is able to correctly interpret the results of analyzes and draws the appropriate conclusions from them, K\_U5

#### Social competences

1. Students can understand the need for self-education and raising their competences in the field of instrumental analysis, K\_K1
2. Student is able to work both individually and in team during the laboratory work, K\_K2

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

A series of laboratory exercises of instrumental analysis is preceded by checking the theoretical foundations of the methods used (carried out in a stationary or remote mode via e-Kursy platform). Students prepare written reports on completed exercises.

### Programme content



The practical use of spectroscopic techniques - Absorption atomic spectrometry: atomization techniques, absorption interferences, quantitative analysis, special techniques in AAS; Optical emission spectrometry: theory of atomic spectra formation, modern excitation sources (inductively coupled plasma, microwave induced plasma, direct current plasma), quantitative analysis, qualitative and quantitative spectrographic technique; Absorption UV-Vis spectrophotometry: theory of molecular electronic transitions, instrumental design, quantitative spectrophotometric analysis. Assessment of the results of chemical analysis.

### Teaching methods

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, PWN, Warszawa, (1) 2006, (2)2007
2. J. Minczewski, Z. Marczenko, Chemia Analityczna. Analiza Instrumentalna T. 1-3, PWN, Warszawa, 1,2 (2007), 1(1985)
3. A. Cygański, Chemiczne metody analizy ilościowej, WNT Warszawa, 2019
4. A. Cygański, Metody spektroskopowe w chemii analitycznej, WNT, Warszawa, 2020
5. I. Baranowska (red.) Analiza śladowa – Zastosowania, Wydawnictwo MALAMUT, Warszawa, 2013
6. J. Namieśnik, P. Konieczka, B. Zygmunt, Ocena i kontrola jakości wyników analitycznych, WNT, 2014.
7. A. Cygański, B. Ptaszyński, J. Krystek, Obliczenia w chemii analitycznej, WNT Warszawa, 2004
8. M. Wesołowski, K. Szefer, D. Zimna, Zbiór zadań z analizy chemicznej, WNT Warszawa, 2002

#### Additional

1. J. Dojlido, J. Zerbe, Instrumentalne metody badania wody i ścieków, Arkady, Warszawa 1997
2. A. Cygański, Chemiczne metody analizy ilościowej, WNT Warszawa, 2019

### Breakdown of average student's workload

	Hours	ECTS
Total workload	60	2,0
Classes requiring direct contact with the teacher	40	1,3
Student's own work (literature studies, preparation for laboratory classes) <sup>1</sup>	20	0,7

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