



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Combined techniques in environmental and food analysis

Course

Field of study

Environmental Protection Technologies

Area of study (specialization)

-

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

I/2

Profile of study

general academic

Course offered in

Polish

Requirements

elective

Number of hours

Lecture

15

Laboratory classes

Tutorials

0

Projects/seminars

0

Other (e.g. online)

0

Number of credit points

1

Lecturers

Responsible for the course/lecturer:

dr hab. inż. Joanna Zembrzuska

email: joanna.zembrzuska@put.poznan.pl

tel. 0616652015

Wydział Technologii Chemicznej

ul. Berdychowo 4, 60-965 Poznań

Responsible for the course/lecturer:

Prerequisites

Knowledge of the basic analytical techniques used for identification and determination of analytes

Student should be able to use English.

Student should be able to self-educate.

Student should understand the need to supplement her/his education and increasing personal and professional competences.



Course objective

The aim of the course is to introduce the possibility of using combined techniques in the determination of analytes in food and environmental samples

Course-related learning outcomes

Knowledge

- 1 The graduate has a knowledge of techniques and methods of characterizing and identifying chemicals which are typical environmental pollutants and food samples. [K_W01, K_W15, K_W09]
2. The graduate has a knowledge of the risks associated with the implementation of chemical processes and risk assessment principles, knows international conventions and EU technical safety directives, and knows the rules governing the organization of the market in chemical products (REACH). [K_W05]

Skills

1. The graduate selects analytical methods for qualitative and quantitative analysis of chemical compounds [K_U07]
2. The graduate can estimate the suitability and select the tools and methods to solve the problem in determination of real samples [K_U03]
3. The graduate acquires information from literature, databases and other sources related to chemical sciences, integrates, interprets and draws conclusions and formulates opinions.[K_U01]
4. The graduate uses correct terminology and nomenclature in the field of mass spectrometry, also in English [K_U18]

Social competences

1. The graduate understands the need to develop and improve his/her professional and personal competencies [K_K01]
2. The graduate is aware of the importance and understanding of non-technical aspects and effects of engineering activities, including its environmental impact and the resulting responsibility for his/her decisions [K_K05]
3. The graduate can cooperate and work in a group, accepting various roles in it [K_K04]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Oral or written control of the student's knowledge before the laboratory classes. Written reports of the performed exercises.

Programme content

During the course the following issues will be discussed:

1. Introduction to mass spectrometry - basic concepts



2. The importance of vacuum, resolution, mass accuracy, ...
3. Mass spectra and their interpretation
4. Ionization methods
5. Mass analyzers
6. Tandem mass spectrometry - measuring modes in MS and MS / MS
7. LC-MS - methods of dosing samples to MS
8. Buffers and phase additives in the LC-MS technique
9. Preparation of food and environmental samples in the LC-MS (LC-MS / MS) analysis
10. Quantitative analysis in mass spectrometry for low molecular weight compounds
11. Application of ESI and APCI techniques in food analysis
12. MS in environmental analysis - practical aspects

Teaching methods

Lecture: multimedia presentation, illustrated with examples on the board

Bibliography

Basic

1. E. de Hoffmann, J. Charette, V. Stroobant „Spektrometria mas” Wydawnictwo NT , Warszawa 1994
2. R. A.W. Johnstone, M. E. Rose „Spektrometria mas” Wydawnictwo PWN, Warszawa 2001
3. R. M. Silverstein, F. X. Webster, D. J. Kiemle ”Spektroskopowe metody identyfikacji związków organicznych, Wydawnictwo PWN, Warszawa 2007
4. A. S. Płaziak, K. Golankiewicz „Wprowadzenie do spektrometrii masowej związków organicznych”
Wydawnictwo ISAT, Poznań 1992
5. P. Suder, A. Bodzoń-Kułakowska, J. Silberring „ Spektrometria Mas” Wydawnictwo AGH, Kraków 2016

Additional

Publications



Breakdown of average student's workload

	Hours	ECTS
Total workload	20	1,0
Classes requiring direct contact with the teacher	15	0,7
Student's own work (literature studies, preparation for tests/exam) ¹	5	0,3

¹ delete or add other activities as appropriate