



COURSE DESCRIPTION CARD - SYLLABUS

Course name

BIOAVAILABILITY OF XENOBIOTICS - ENVIRONMENTAL AND TOXICOLOGICAL ASPECTS

Course

Proposed by Discipline

chemical sciences

Type of studies

Doctoral School

Form of study

full-time

Year/Semester

II/3, III/5

Course offered in

English

Requirements

elective

Number of hours

Lecture

4

Tutorials

Projects/seminars

Number of credit points

1

Lecturers

Responsible for the course/lecturer:

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Poland

Responsible for the course/lecturer:



Prerequisites

Knowledge: General information on organic chemistry, biochemistry, biotechnology and ecotoxicology. General knowledge on microbiology and its practical aspects.

Skills: Ability of the student to provide information from suggested literature sources. Ability of the student to use information obtained from the scientific literature to solve the problems related to biotechnology and toxicology. Ability of the student to plan, design and develop basic solutions to regulate bioavailability efficiency and its application.

Social competencies: Thinking and critical assessment of the students' knowledge. Understanding of the need for training, supplementing of the knowledge and improving students professional competences. Ability to work to collaborative solve the problems.

Course objective

The aim of the course is to provide doctoral students with a concise and coherent introduction to issues relating to the bioavailability of chemical compounds for cells, in particular microorganisms. Bioavailability will be discussed from the perspective of the physical-chemical and biological phenomena determining it. Bioavailability will be explored in terms of the toxicity of chemicals to other organisms, the toxicity of pollutants in the environment, and the cellular response to toxins. Issues related to the role of bioavailability of molecules in nature, and factors affecting its increase or decrease will also be discussed.

Course-related learning outcomes

Knowledge

A PhD student who graduated from doctoral school knows and understands:

- 1) to the extent that it is possible to revise existing paradigms, the worldwide knowledge base, including theoretical foundations and general and selected specific issues, appropriate to the scientific disciplines in which the doctoral studies takes place, [P8S_WG/SzD_W01]
- 2) the main trends in the development of the scientific disciplines in which the doctoral studies takes place, [P8S_WG/SzD_W02]
- 3) fundamental dilemmas of modern civilisation, [P8S_WK/SzD_W05]

Skills

A PhD student who graduated from doctoral school can:

- 1) use knowledge from different fields of science to creatively identify, formulate and innovatively solve complex problems or carry out tasks of a research nature, and in particular to make inferences on the basis of scientific findings, [P8S_UW/SzD_U01]
- 2) communicate in specialist areas to the extent necessary for active participation in the international scientific community, [P8S_UK/SzD_U04]
- 3) participate in scientific discourse, [P8S_UK/SzD_U07]

Social competencies

A PhD student who graduated from doctoral school is ready to:

- 1) critically assess achievements within a given scientific discipline, [P8S_KK/SzD_K01]
- 2) acknowledge the importance of knowledge in solving cognitive and practical problems, [P8S_KK/SzD_K03]
- 3) initiate actions in the public interest, [P8S_KO/SzD_K05]



Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

PQF code	Methods for verification of learning outcomes	Assessment criteria
W01, W02, W05	Test - exam (colloquium) in writing	3.0 -> 50.1%-60.0% 3.5 -> 60.1%-70.0% 4.0 -> 70.1%-80.0%, 4.5 -> 80.1%-90.0%, 5.0 -> from 90.1%
U01, U04, U07,	Test - exam (colloquium) in writing	3.0 -> 50.1%-60.0% 3.5 -> 60.1%-70.0% 4.0 -> 70.1%-80.0%, 4.5 -> 80.1%-90.0%, 5.0 -> from 90.1%
K01, K03, K05	Test - exam (colloquium) in writing	3.0 -> 50.1%-60.0% 3.5 -> 60.1%-70.0% 4.0 -> 70.1%-80.0%, 4.5 -> 80.1%-90.0%, 5.0 -> from 90.1%

Programme content

1. Different ways of defining and determining bioavailability.
2. Factors affecting biodegradability - physical and chemical aspects.
3. Factors affecting biodegradability - biological aspects.
4. Toxicity of chemical compounds.
5. Environmental and health aspects of bioavailability.

Course topics

- Threats to human health and the environment from xenobiotics
- Migration of chemical molecules in water solvents
- Chemical and physical processes of adsorption
- Mass transfer across a biological membrane
- Environmental detoxification processes (biotic and abiotic)

Teaching methods

Lecture: multimedia presentation including illustrations and examples.

Bibliography

Basic

- H. van de Waterbeemd, H. Lennernäs, P. Artursson, "Drug Bioavailability: Estimation of Solubility, Permeability, Absorption and Bioavailability", Wiley-VCH, 2003
- J.R. Dean, "Bioavailability, Bioaccessibility and Mobility of Environmental Contaminants", Wiley-VCH, 2007
- J. Armstrong, O. Pascu, "The Toxicology Handbook", Elsevier, 2022



Additional

- G. F. M. Ball, “Bioavailability and Analysis of Vitamins in Foods”, Springer, 2013

Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,0
Classes requiring direct contact with the teacher	4	0
Doctoral student's own work (literature studies, preparation for tutorials, project preparation) ¹	21	1,0

¹ delete or add other activities as appropriate