



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Application of biological methods for removal of pollutants

Course

Field of study

Environmental Protection Technologies

Area of study (specialization)

Ecotechnology

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

Other (e.g. online)

Tutorials

Projects/seminars

Number of credit points

1

Lecturers

Responsible for the course/lecturer:

dr inż. Wojciech Smułek

Responsible for the course/lecturer:

dr inż. Agata Zdarta

Prerequisites

The student should have basic knowledge of biology, chemistry and ecology. He/she can acquire information from indicated sources, interpret it properly and draw conclusions.

Course objective

The aim of the course is to familiarise students with the use of biological methods and biotechnological processes in the remediation and purification of soil and aquatic environments. They will be presented various methods of wastewater and waste treatment, as well as removal of chemical pollutants from the environment. Students will learn about biological methods for soil and plant protection. The advantages and disadvantages of biological methods will be presented, with particular emphasis on solutions that have already been applied in pollution removal. Problems connected with the use of biological techniques and possibilities of their solution will be indicated.

Course-related learning outcomes

Knowledge

1. Has elementary knowledge in selected basic areas of biotechnology and understands relations and relationships between various natural disciplines. K_W01



2. Has extended and deepened knowledge in the field of technologies of purification and neutralization of industrial waste and water and sewage management; is able to use properly selected methods and devices which enable to measure basic quantities characterizing technological processes and the condition of the environment. K_W04

3. has knowledge about using technical and technological aspects of biotechnology in environmental protection. K_W05

Skills

1. Uses basic biotechnological techniques applied in environmental protection. K_U01

2. Shows the ability to make correct inferences on the basis of data from different sources. K_U02

3. Uses with understanding indicated academic textbooks on biotechnology, ecology and other fields of biological sciences. K_U08

4. Understands selected excerpts of specialist scientific texts, also those in English, K_U09, K_U10

Social competences

1. Demonstrates the need for constant updating of knowledge on biotechnology. K_K01

2. Demonstrates caution and criticism in the reception of information available in the mass media with reference to life sciences and achievements of biotechnology. K_K04

3. Is aware of the negative impact of human activity on the environment and actively counteracts its degradation - K_K10

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The lectures end with credit test including open and closed questions. Credit in a stationary form:

written test with 8 questions, including 5 closed and 3 open questions. Credit in the form of on-line:

credit test on the e-course platform including 5 closed and 3 open questions.

Programme content

The lecture will discuss a variety of biological methods that can be used in removal of pollutants from different places of their occurrence. The course covers the following topics:

1. Environmental pollution with anthropogenic contaminants.
2. Phytoremediation.
3. Bacteria, microalgae and fungi used in bioremediation.
4. Biological methods coupled with physical-chemical ones.
5. Enzymatic bioremediation.



Teaching methods

Lecture supported by multimedia presentation and group discussion

Bibliography

Basic

Biologiczne przetwarzanie odpadów. Andrzej Jędrzak, Warszawa: Wydawnictwo Naukowe PWN 2008

Mikroorganizmy w ochronie środowiska. Mieczysław K. Błaszczyk. Warszawa : Wydawnictwo Naukowe PWN 2007

Biotechnologia w ochronie środowiska. Ewa Klimiuk, Maria Łebkowska. Warszawa : Wydawnictwo Naukowe PWN 2005

Additional

Advances in Applied Bioremediation. Singh, Ajay ; Kuhad, Ramesh C ; Ward, Owen P. Berlin, Heidelberg: Springer-Verlag 2009

Wybrane metody bioremediacji in situ z wykorzystaniem mikroorganizmów. Waraczewska, Z.; Niewiadomska, A.; Grzyb, A. Woda-Środowisko-Obszary Wiejskie 2018, T. 18, z. 3, 65-78

Biodegradacja odpadów niebezpiecznych. Fecko, P.; Pertile, E.; Lyckova, B.; Vojtkova, H.; Janakova, I.; Tora, M. 2010, Inżynieria Mineralna, R. 11, nr 1-2, 41-48

Problemy z biodegradacją tworzyw sztucznych w środowisku. Stachurek, I. Zeszyty Naukowe Wyższej Szkoły Zarządzania Ochroną Pracy w Katowicach, 2012, Nr 1(8), 71-108

Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,0
Classes requiring direct contact with the teacher	15	0,6
Student's own work (literature studies, preparation for tests/exam) ¹	10	0,4

¹ delete or add other activities as appropriate