

MODULE INFORMATION SHEET

Name of Module Unit	Biological Techniques for Environmental Monitoring
Name in polish language	Techniki Biologiczne w Monitoringu Środowiska
Module type	compulsory / elective
Form of studying	full-time day courses
Level of study	graduate course (M.Sc. level)
Type of study (for extra-mural courses)	-
Programme	Environmental Engineering
Speciality	Environment Protection Engineering
Responsible department	Department of Biology
Responsible person	Prof. Ewa Karwowska

Semester	Lectures(E)	Tutorials	Laboratory	Computer Exercises	Projects	ECTS
2	30		15			3

Learning outcomes (knowledge, skills, competences)

After completing the course student has practical knowledge on the various methods used in microbiological studies on the air, water and soil environment. Moreover, has a broaden knowledge of development trends in the field of biology regarding techniques and methods used in environmental research as part of environmental engineering.

Student is able to analyse and assess the quality and effectiveness of the treatment of the air and water as well as soil remediation and speaks correctly nomenclature used in environmental engineering.

Student understands the need for constant training in the use of biological methods and techniques in environmental engineering and also can work and solve the problems not only individually but also in a team.

Prerequisites

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Rules for integrated grade setting

0.5 x lecture + 0.5 x laboratory

Recommended readings

E. Miaśkiewicz-Pęska, K. Affek, E. Zborowska. Biology and ecology : a laboratory manual. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, 2020.

N. Sherman, J.G. Cappuccino. Microbiology. A laboratory manual, Pearson Education, Boston, 2014.

A.J. Baeumner, R.A. Durst. (Eds) Biosensors and biological techniques in environmental analysis. Elsevier Science, Amsterdam 2003.

C.J. Hurst, R.L. Crawford. Manual of environmental microbiology. ASM Press, Washington, 2007

Contents of lectures (syllabus)

	Topics	Time (hrs.)	Scope (S / Ex)
1	Methods used in the quantitative and qualitative analysis of microorganisms, methods of cultivation of microorganisms and types of cultivation media. Detection and identification of microorganisms. Optical equipment used in environmental research. Microbiological techniques for isolating microorganisms from water, sediment/soil and air samples. Methods of sanitary analysis of environmental samples. Assessment of the ecological state of the environment using biological methods. Biological monitoring in bioremediation processes. TEST	30	S
Total		30	hours

S – topics listed in the legal study programme standards from 12.07.2007

Ex – extended topics

Lecturers

Prof. Ewa Karwowska

Assessment method

Written test

Contents of laboratory

	Topics	Time (hrs.)	Scope (S / Ex)
1	Introduction - safety rules. Bright field microscopy. Bacterial staining	3	Ex
2	Basic laboratory techniques and pure cultures isolation	2	Ex
3	Enumeration of microorganisms and identification of bacteria (culture-based methods)	2	Ex
4	Qualitative and quantitative water analysis	2	S
5	Estimation of MPN and coliform/ <i>Escherichia coli</i> index to assess drinking and surface water quality.	2	S
6	Microbiological air analysis.	2	S
7	Estimation of the microbial air contamination. TEST	2	S
Total		15	hours

S – topics listed in the legal study programme standards from 12.07.2007

Ex – extended topics

Persons responsible for laboratory

Dr Ewa Miaśkiewicz-Pęska

Assessment method for laboratory

Reports, discussion, test
