

Sylabus przedmiotu

Course name:

ECOLOGY OF MICROORGANISMS

ECTS	3
Course status	<i>facultative</i>
Course final assesement/evaluation of outcomes	<i>pass with grade</i>
Prerequisites	<i>Completed course of microbiology</i>

Kierunek studiów:

AGRICULTURE

Profile of study	<i>general academic</i>
The code of studies (education level)	<i>bachelor / engineer (SI)</i>
Semester of studies	2
Language of instruction	<i>English</i>

Course offered by:

Name of faculty offering the course	<i>Department of Microbiology and Biomonitoring</i>
Course coordinator	<i>prof. dr hab. inż. Anna Lenart-Boroń</i>

Learning outcomes of the course:

Symbol of outcome	Description of learning outcome	Reference to	
		main field of study outcomes	area symbol*
KNOWLEDGE -knows and understands:			
EM_W1	the most important processes and relationships in the natural environment with the participation of microorganisms	RO1_W11	RR
EM_W2	the role and importance of microorganisms in the environmental protection and reclamation of degraded areas	RO1_W11	RR
EM_W3	the role of microorganisms in nutrient metabolism, and in pathogenesis of different groups of organisms	RO1_W11	RR
SKILLS - can:			
EM_U1	assess the microbial population in different environments, both natural and anthropogenically amended	RO1_U10	RR
EM_U2	plan and apply biological tests to understand the reactions of environmental microorganisms to different growth conditions	RO1_U06 RO1_U13	RR
EM_U3	collect and interpret data obtained from experiments conducted on living organisms	RO1_U06 RO1_U18	RR

SOCIAL COMPETENCES - is ready to:

EM_K1	using knowledge and capabilities to assess and understand the risk associated with the modifications of the natural environment	RO1_K03	RR
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Teaching content:

Lectures	15	godz.
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Topics of classes	<ol style="list-style-type: none"> 1. Diversity of microorganisms in the environment, major groups of microorganisms, relations between microorganisms and their environment, the impact of environmental conditions on microbial growth 2. Species biodiversity, the concept of species in microorganisms. Systematics of prokaryotic organisms and environmental microorganisms based on the 16S and 18S rRNA sequences 3. Microorganisms typical of various habitats, extreme environments and mechanisms of adaptation 4. Inter and intra-species relations 5. Culturable and unculturable environmental microorganisms and techniques of their studies 6. Spread of information between microorganisms. Horizontal gene transfer 7. Bioremediation and biodeterioration 8. Microorganisms and agriculture; infection control
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Learning outcomes achieved	EM_W1, EM_W2, EM_W3
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Verification methods and evaluation principles and criteria	<p><i>Written test (single choice questions) + participation in the discussion and Students' activity during classes.</i></p> <p><i>The condition for taking the exam is to obtain a positive grade from laboratory classes.</i></p> <p><i>To obtain a positive grade, at least 60% of correct answers must be given.</i></p> <p><i>Final grade of the course = 0.5 x grade from lectures + 0.5 x grade from laboratory classes.</i></p>
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Laboratory classes	15	godz.
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Topics of classes	<ol style="list-style-type: none"> 1. The occurrence of microorganisms in natural environments – soil – natural and anthropogenically changed; water – spring water and wastewater; 2. Airborne microorganisms 3. Microbial growth (bacteria, fungi, actinomycetes) in various environmental conditions 4. The effect of pollutants on selected microorganisms. The effect of antibiotics, pesticides and heavy metals on the growth of selected environmental microorganisms 5. Interactions between various group of microorganisms. Antibiosis – tests using actinomycetes, fungi and bacteria isolated from various environments 6. Extraction of soil DNA; electrophoresis
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Learning outcomes achieved	EM_U1, EM_U2, EM_U3, EM_K1
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Verification methods and evaluation principles and criteria	<p><i>Methods of verifying learning outcomes:</i></p> <ul style="list-style-type: none"> - report of experiments (3-person groups), - active participation in laboratory classes, - observation of Student behavior in terms of social competences. <p><i>The student's activity and involvement in creating the project at each stage, the quality of the prepared project and presentation are assessed.</i></p> <p><i>The share of laboratory classes in the final grade 50%.</i></p>
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Literature:	
Basic	Nakatsu C.H i in. 2019. Manual of Environmental Microbiology, Wyd. John Wiley and Sons
	Paul A., Frey S.2024. Soil Microbiology, Ecology and Biochemistry, Elsevier
	Barton L.L., McLean R.J.C. 2019. Environmental Microbiology and Microbial Ecology, Wiley-Blackwell
Supplementary	Stankiewicz K. i in. 2024. Second life of water and wastewater in the context of circular economy – Do the membrane bioreactor technology and storage reservoirs make the recycled water safe for further use?; Science of the Total Environment; DOI:10.1016/j.scitotenv.2024.170995
	Kulik K., Lenart-Boroń A., Wyrzykowska K. 2023. Impact of Antibiotic Pollution on the Bacterial Population within Surface Water with Special Focus on Mountain Rivers; Water DOI:10.3390/w15050975
	Lenart-Boroń i in. 2022. Anthropogenic pollution gradient along a mountain river affects bacterial community composition and genera with potential pathogenic species. Scientific Reports DOI:10.1038/s41598-022-22642-x

Structure of learning outcomes:

Area of academic study: agriculture and horticulture (RR)	3,0	ECTS*
Discipline:	0,0	ECTS*

Structure of student activities:

Contact hours	36	hours	1,4	ECTS*
w tym:				
lectures	15	hours		
classes and seminars	15	hours		
consultations	2	hours		
participation in research	2	hours		
mandatory traineeships		hours		
participation in examinations	2	hours		
e-learning				ECTS*
student's own work	40	hours	1,6	ECTS*

*areas of academic study in the fields of: RR – agriculture and horticulture