

Subject card

Subject name and code	Pharmaceuticals in the water environment - origin, transformation, threats, PG_00154468						
Field of study	Biology						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2026/2027		
Education level	undergraduate studies		Subject group		Optional subject group		
Mode of study	full-time studies		Mode of delivery		at the university		
Year of study	3		Language of instruction		Polish		
Semester of study	6		ECTS credits		1.0		
Learning profile	academic		Assessment form				
Conducting unit	Katedra Biologii Eksperymentalnej i Biotechnologii Roślin -> Faculty of Biology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Anna Aksmann				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	15.0	0.0	0.0	0.0	15
	E-learning hours included: 0.0						
	Additional information: • Text analysis with discussion • Lecture with multimedia presentation • Multimedia presentations prepared by students • Part of classes in the form of e-learning						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	15		2.0		8.0	25
Subject objectives	Presenting to the student selected aspects of environmental pollution with pharmaceuticals. Indication of the sources of these pollutants and discussion of possible transformations that pharmaceuticals may undergo in the cells of living organisms and in the environment. Drawing attention to the threats associated with the presence of pharmaceuticals in the environment and the possibilities of preventing their effects.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[BIOLL3_W10] The graduate is familiar with the development and current state of knowledge and the latest trends in biology, as well as their relationship with other natural disciplines	The graduate knows and understands the development and current state of knowledge as well as the latest trends in the field of threats resulting from the presence of pharmaceuticals in the aquatic environment and indicates their relationship with other natural disciplines.	[SW1] oral statement/ conversation/discussion [SW2] presentation/project/paper/ report [SW3] text preparation/written work
	[BIOLL3_W16] The graduate knows and understands the relationship between the achievements of the chosen field of science and discipline of natural sciences and the possibilities of their use in socio-economic life, taking into account the sustainable use of biodiversity	The graduate knows and understands the connections between scientific achievements in the field of threats resulting from the presence of pharmaceuticals in the aquatic environment and the possibilities of their use in socio-economic life, taking into account the sustainable use of biological diversity.	[SW1] oral statement/ conversation/discussion [SW2] presentation/project/paper/ report [SW3] text preparation/written work
	[BIOLL3_U07] The graduate should be able to independently search for and use available sources of biological information, including electronic sources	The graduate is able to independently search for and use available sources of scientific information, including electronic sources.	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report [SU3] text preparation/written work
	[BIOLL3_U08] The graduate is able to learn independently, in a focused manner	The graduate learns independently, in a directed way.	[SU1] oral statement/conversation/ discussion [SU3] text preparation/written work
	[BIOLL3_U10] The graduate will be able to prepare oral presentations in Polish and a foreign language on specific topics in the field of biology	The graduate has the ability to give oral presentations in Polish on the studied issues in the field of threats resulting from the presence of pharmaceuticals in the aquatic environment.	[SU2] presentation/project/paper/ report
	[BIOLL3_K01] The graduate is prepared to evaluate their own knowledge, understand the need for continuous learning and development, and is open to new ideas	The graduate is ready to assess his or her own knowledge and understands the need for constant learning and development, and is open to new ideas.	[SK1] oral statement/conversation/ discussion
Subject contents	Sources of contamination of the aquatic environment with pharmaceuticals. Pharmaceuticals found in the largest quantities in the environment. Transformations of pharmaceuticals in the cells of living organisms and in the environment - selected issues. Effects of environmental pollution with pharmaceuticals. Ways to prevent environmental contamination with pharmaceuticals.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	essay	51.0%	50.0%
	multimedia presentation prepared by a student	51.0%	50.0%

Recommended reading	Basic literature	Kümmerer, K. (Ed.). (2008). Pharmaceuticals in the environment: sources, fate, effects and risks. Springer Science & Business Media. Aga, D. S. (Ed.). (2007). Fate of pharmaceuticals in the environment and in water treatment systems. CRC Press. Brooks, B. W., & Huggett, D. B. (Eds.). (2012). Human pharmaceuticals in the environment: current and future perspectives (Vol. 4). Springer Science & Business Media. Harshkova D., Aksmann A. Zanieczyszczenie środowiska niesteroidowymi lekami przeciwzapalnym na przykładzie diklofenaku przyczyny, skutki, biodykacja. Kosmos (2019) 322, 185÷194 Hejna, M., Kapuścińska, D., & Aksmann, A. (2022). Pharmaceuticals in the aquatic environment: A review on eco-toxicology and the remediation potential of algae. International Journal of Environmental Research and Public Health, 19(13), 7717. Selected articles from scientific journals.
	Supplementary literature	Karthikeyan, O. P., Mehariya, S., & Bhatia, S. K. (Eds.). (2022). Algal Biorefineries and the Circular Bioeconomy: Industrial Applications and Future Prospects. CRC Press. Selected articles from scientific journals.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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