

Subject card

Subject name and code	Pharmaceuticals in the water environment - origin, transformation, threats, PG_00079435						
Field of study	Medical Biology						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2025/2026		
Education level	Bachelor's studies	Subject group			Optional subject group Subject group related to scientific research in the field of study		
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			credit		
Conducting unit	Department of Experimental Biology and Plant Biotechnology -> Faculty of Biology -> Rector						
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: <ul style="list-style-type: none"> • 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		0.0		0.0	15
Subject objectives	<p>Presenting to the student selected aspects of environmental pollution with pharmaceuticals.</p> <p>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.</p> <p>Drawing attention to the threats associated with the presence of pharmaceuticals in the environment and the possibilities of preventing their effects.</p>						

Learning outcomes	Course outcome	Subject outcome	Method of verification
		<p>The graduate reads with understanding scientific texts in Polish and simple texts in English regarding the hazards resulting from the presence of pharmaceuticals in the aquatic environment; independently searches for and uses available sources of information, including electronic sources.</p> <p>The graduate understands the need for lifelong learning and updating knowledge in the field of studied topics and related disciplines.</p> <p>The graduate is familiar with the development and current state of knowledge, as well as the latest trends in the area of hazards resulting from the presence of pharmaceuticals in the aquatic environment; indicates their relationship to other disciplines of natural or medical sciences.</p> <p>The graduate has the ability to deliver oral presentations in Polish on issues related to the hazards resulting from the presence of pharmaceuticals in the aquatic environment. The graduate is able to identify problems related to pollution of the aquatic environment by pharmaceuticals and undertake basic educational activities appropriate for the profession of medical biologist.</p>	<p>[SK1] oral statement/conversation/discussion</p> <p>[SK2] presentation/project/paper/report</p> <p>[SK3] text preparation/written work</p> <p>[SK8] observation of student's independent or team work</p>
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	<p>Kümmerer, K. (Ed.). (2008). Pharmaceuticals in the environment: sources, fate, effects and risks. Springer Science & Business Media.</p> <p>Aga, D. S. (Ed.). (2007). Fate of pharmaceuticals in the environment and in water treatment systems. CRC Press.</p> <p>Brooks, B. W., & Huggett, D. B. (Eds.). (2012). Human pharmaceuticals in the environment: current and future perspectives (Vol. 4). Springer Science & Business Media.</p> <p>Harshkova D., Aksmann A. Zanieczyszczenie środowiska niesteroidowymi lekami przeciwzapalnym na przykładzie diklofenaku przyczyny, skutki, bioidnykacja. Kosmos (2019) 322, 185+194</p> <p>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.</p> <p>Selected articles from scientific journals.</p>	

	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	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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