University of Gdańsk

Subject card

Subject name and code	The role of the microbiome in shaping adaptations, PG_00198106						
Field of study	Natural Resources Conservation						
Date of commencement of studies	October 2026		Academic year of realisation of subject	2027/2028			
Education level	Bachelor's studies		Subject group	Obligatory subject group in the field of study 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	2		Language of instruction	Polish			
Semester of study	3		ECTS credits	1.0			
Learning profile	academic		Assessment form	credit			
Conducting unit	Department of Evolutionary Genetics and Biosystematics -> Faculty of Biology -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Agnieszka Kaczmarczyk-Ziemba				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	E-learning hours included: 0.0						
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		3.0		7.0	25
Subject objectives	The main objective of the course is to familiarise students with the role of microorganisms permanently associated with eukaryotic host organisms in shaping their adaptations to specific environmental conditions. Students will be introduced to basic methods of analysing microbiome profiles, including applied bioinformatics analyses.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[OZPL3_W11] The graduate have an advanced knowledge and understanding of the concepts and terminology of natural science, as well as knowledge of the evolution of natural sciences and the research methods employed in them. They are also cognizant of the potential for practical application	the student is familiar with the concept of the microbiome, recognises microbiome-host interactions and have knowledge of the characteristics of groups of microorganisms enabling host adaptation to environmental conditions	[SW4] test/exam - oral or written
[OZPL3_U07] The graduate is able to draw correct conclusions on the basis of analysis and synthesis of data from various sources	based on available sources of biological information, the student is able to solve problems of microbiome-host interactions	[SU4] test/exam - oral or written
[OZPL3_W12] The graduate possesses knowledge of statistical methods and IT tools relevant to the field of study.	the student describes the principles of using statistical methods and bioinformatics tools to analyse metagenomic data and understand their importance in the interpretation of biological phenomena and processes	[SW4] test/exam - oral or written
[OZPL3_K08] The graduate is ready to systematically update his/her natural knowledge and to apply it in practice	the student understands the need for systematic self-directed learning and practical application of acquired knowledge of life sciences	[SK6] demonstration of practical skills [SK8] observation of student's independent or team work
[OZPL3_U03] The graduate is able to search for and use available sources of biological information, including electronic sources, and critically analyse them	the student uses available sources of biological information, including electronic sources	[SU1] oral statement/conversation/discussion

Subject contents

Bacterial biodiversity. Next Generation Sequencing techniques. Microbiome-host interactions in shaping host adaptations: a case study. The human-associated microbiome and its role in maintaining homeostasis. Basic bioinformatics tools used in the analysis of microbiome profiles.

Prerequisites and co-requisites

For the realization of the content it is necessary to previously pass the "Basics of biology".

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
colloquium	51.0%	100.0%

Recommended reading

Basic literature

1. used in class

Douglas A.E. Fundamentals of Microbiome Science. How Microbes Shape Animal Biology. Princeton University Press 2018. Pal Singh R., Kothari R., Koringa P.G., Singh S.P. (ed.) Understanding Host-Microbiome Interactions An Omics Approach. Omics of Host-Microbiome Association. Springer 2017.

2. studied independently by the student

Baj J., Markiewicz Z. Biologia molekularna bakterii. Wyd. 2. PWN, Warszawa 2015.

	Supplementary literature	• Fiedurek J. Mikrobiom a zdrowie człowieka. Wyd. 1. UMCS, Lublin 2017. Gerardo N.M., Hoang K.L., Stoy K.S. 2020. Evolution of animal immunity in the light of beneficial symbioses. Phil. Trans. R. Soc. B. 375: 20190601. • Kaczmarczyk A., Kucharczyk H., Kucharczyk M., Kapusta P., Sell J., Zielińska S. 2018. First insight into microbiome profile of fungivorous thrips Hoplothrips carpathicus (Insecta: Thysanoptera) at different developmental stages: molecular evidence of Wolbachia endosymbiosis. Scientific Reports, 8: 14376. • Kaczmarczyk-Ziemba A., Wagner G.K., Grzywnowicz K., Kucharczyk M., Zielińska S. 2019. The microbiome profiling of fungivorous black tinder fungus beetle Bolitophagus reticulatus reveals the insight into bacterial communities associated with larvae and adults. PeerJ, 7: e6852. • Kaczmarczyk-Ziemba A., Zagaja M., Wagner G.K., Pietrykowska-Tudruj E., Staniec B. 2020. First insight into mocrobiome profiles of myrmecophilous beetles and their host, ret wood ant Formica polyctena (Hymenoptera: Formicidae) - a case study. Insects, 11(2): 134. • Kaczmarczyk-Ziemba A., Zagaja M., Wagner G.K., Pietrykowska-Tudruj E., Staniec B. 2020. The microbiota of the Lasius fuliginosus Pella laticollis myrmecophilous interaction. The European Zoological Journal, 87(1): 754-769. • Knight R., Buhler B. Na tropie mikrobiomu. Ogromny wpływ tycich mikrobów. Grupa Wydawnicza Relacja, Warszawa 2015. • Young E. Mikrobiom. Najmniejsze organizmy, które rządzą światem. Wyd. 1. Wydawnictwo Uniwersytetu Jagiellońskiego, Kraków 2018. • Zschocke A.K. Mikrobiom - sposób na pokonanie chorób. Zdrowe bakterie jako medycyna przyszłości. Wyd. 1. Wydawnictwo Vital, Białystok 2018.
	eResources addresses	
Example issues/ example questions/ tasks being completed	The total microorganisms present in the host gut are: • intestinal microbiota; • the intestinal metagenome; • the intestinal microbiome; • intestinal metabolome;	
Work placement	Not applicable	

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