University of Gdańsk

Subject card

Subject name and code	Advanced Phylogenetic Methods, PG_00191215		
Field of study	Bioinformatics		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2028/2029
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	3.0
Learning profile	academic	Assessment form	credit
Conducting unit	Laboratory of Molecular Evolution and Bioinformatics -> Department of Evolutionary Genetics and Biosystematics -> Faculty of Biology -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Marcin Górniak	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	0.0	0.0	30.0	0.0	0.0	30

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	30	0.0	45.0	75

Subject objectives

Introducing students to the evolution of life in light of molecular phylogenetics research, from the RNA world through the beginnings of cellular life to the contemporary diversity of organisms.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[BIOINL3_W02] Has advanced scientific knowledge necessary to understand the basic processes in living organisms.	The student knows the groundbreaking events in the history of life on Earth, the molecular methods used for reconstructing the phylogenetic tree of life, and the connections between molecular phylogenetics and taxonomy.	[SW1] oral statement/ conversation/discussion [SW2] presentation/project/paper/ report [SW3] text preparation/written work
[BIOINL3_U02] Graduate is able to apply knowledge of natural sciences and science to formulate, analyze and solve problems related to bioinformatics	The student applies molecular phylogenetics to describe the course of evolution and uses molecular phylogenetics to classify selected groups of organisms using bioinformatics tools.	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report [SU3] text preparation/written work

Subject contents	1. The RNA World, molecular fossils.2. The origins of life on Earth (LUCA).3. The emergence of the cell nucleus.4. The endosymbiosis theory.5. The tree of life (Eubacteria, Archaea, Eukaryota).6. The evolution of Eukaryotes.7. The history of organism classification.8. Classification and phylogeny (alpha taxonomy, numerical taxonomy, challenges in reconstructing phylogeny).9. Genetic distance, hybridization and horizontal gene transfer, gene tree, species tree.10. Mapping traits on phylogenetic trees - describing evolution.
Prerequisites and co-requisites	Completed cell biology and metabolism.Completed molecular biology and genetics.Completed molecular phylogenetics.Upon completing the mandatory courses in the first three semesters, the student has the knowledge and skills qualifying them to participate in and pass the subject.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Determining the final grade based on partial grades received during the semester.	51.0%	50.0%
Exam	51.0%	50.0%

Recommended reading

Basic literature	- D. Futuyama. *Ewolucja*. Wydawnictwo Uniwersytetu Warszawskiego.- J. Dzik. *Dzieje życia na Ziemi*. Wydawnictwo Naukowe PWN.- János Podani, "Different from Trees, More than Metaphors: Branching SilhouettesCorals, Cacti, and the Oaks," *Systematic Biology*, Volume 66, Issue 5, September 2017, Pages 737-753, https://doi.org/10.1093/sysbio/syx039- Tree of Life Web Project. (http://tolweb.org/tree/)
Supplementary literature	K. Darwin. *O powstawaniu gatunków drogą doboru naturalnego*. Wydawnictwo Uniwersytetu Warszawskiego.
eResources addresses	

Example issues/ example questions/ tasks being completed	None
Work placement	Not applicable

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