University of Gdańsk

Subject card

Subject name and code	Molecular Taxonomy of Marine Organisms - lecture, PG_00204910		
Field of study	Oceanography		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	Master's studies	Subject group	Obligatory subject group in the field of study 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	1	Language of instruction	Polish
Semester of study	1	ECTS credits	2.0
Learning profile	academic	Assessment form	exam
Conducting unit	Department of Marine Ecosystems Functioning -> Faculty of Oceanography and Geography -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Filip Pniewski	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	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	2.0	18.0	50

Subject objectives

Familiarize students with the basic issues of the origin of marine organisms and the relationship between them at different taxonomic levels.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[OCEANMU2-W01] knows and understands in-depth specialized terminology used in oceanography and related sciences (in Polish and a selected foreign language)	Knows, understands and correctly uses specialized terminology describing evolutionary processes and taxonomic diversity of living organisms in the marine environment (in Polish and a selected foreign language) (curriculum content: A.1-5)	[SW4] test/exam - oral or written

Subject contents

1. Species concept.
2. Features (at the morphological, anatomical, biochemical, and genetic levels) important in assessing the relatedness of species.
3. Phenetic and phylogenetic taxonomy.
4. Main assumptions of molecular evolution.
5. Origin of life and the theory of endosymbiosis.
6. Molecular phylogeny: selection of appropriate genetic markers and characterization of the main methods of constructing phylogenetic trees (distance methods, parsimony method and methods associated with the highest reliability).
7. Interpretation of phylogenetic trees, principles of formation of taxonomic units - operational taxonomic units [OTUs], the role of morphological data in justifying taxonomic units formed on the basis of molecular data, phylogenetic trees of genes versus phylogenetic trees of species.
8. Phylogeny of major groups of organisms in the marine environment.
9. Case studies - analysis of the taxonomic position of selected groups of organisms.

Prerequisites and co-requisites

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>written exam (1h)</td><td>51.0%</td><td>100.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>1. Arnason U., Gullberg A., Janke A., Kullberg M., Lehman N., Petrov E.A., Vainola R. 2006. Pinniped phylogeny and a new hypothesis for their
origin and dispersal. Molecular Phylogeny and Evolution. 41: 345-354.
2. Bourlat S.J., Nielsen C., Economou A.D., Telford M.J. 2008. Testing the new animal phylogeny: a phylum level molecular analysis of the animal
kingdom. Molecular Phylogenetics and Evolution. 49: 23-31.
3. Falkowski P.G., Katz M.E., Knoll A.H., Quigg A., Raven J.A., Schofield O., Taylor F.J.R. 2004. The evolution of modern eukaryotic phytoplankton.
Science. 305: 354-260.
4. Katz L.A., Grant J.R., Wegener Parfrey L., Burleigh J.G. 2010. Turning the crown upside down: gene tree parsimony roots the eukaryotic tree of
life. Systematic biology. DOI:10.1093/sysbio/sys026.
5. Keeling P.J. 2004. Diversity and evolutionary history of plastids and their hosts. American Journal of Botany. 91(10): 1481-1493.
6. Medina M., Collins A.G., Taylor J.W., Valentine J.W., Lipps J.H., Amaral-Zettler L., Sogin M.L. 2003. Phylogeny of Opisthokonta and the evolution
of multicellularity and complexity in Fungi and Metazoa. International Journal of Astrobiology. 2(3): 203-211.
7. Motani R. 2009. The evolution of marine reptiles. Evo Edu Outreach. 2: 224-235.
8. Penny D., Poole A. 1999. The nature of the last universal common ancestor. Current Opinion in Genetics & Development. 9: 672-677.
9. Rosslenbroich B. 2005. The evolution of multicellularity in animals as a shift in biological autonomy. Theory in Biosciences. 123: 243-262.
10. Russell M.J., Martin W. 2004. The rocky roots of the acetyl-CoA pathway. TRENDS in Biochemical Sciences. doi:10.1016/j.tibs.2004.05.007.
11. Uhen M.D. 2007. Evolution of marine mammals: back to the sea after 300 million years. The anatomical record. 290: 514-522.
12. Yoon H.Y., Hackett J.D., Ciniglia C., Pinto G., Bhattacharya D. 2004. A molecular timeline for the origin of photosynthetic eukaryotes. Molecular
Biology and Evolution. 21(5): 809-818.</td></tr>
<tr><td>Supplementary literature</td><td>1. Ansorge J.W. 2009. Next-generation DNA sequencing techniques. New Biotechnology. 25(4): 195-203.
2. Kircher M., Kelso J. 2010. High-throughput DNA sequencing concepts and limitations. Bioessays. 32: 524-536.
3. Spalik K., Piwczyński M. 2009. Rekonstrukcja filogenezy i wnioskowanie filogenetyczne w badaniach ewolucyjnych. Kosmos. Problemy nauk
biologicznych. 58(3-4): 485-498.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2"></td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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