

### COURSE OF DOCTORAL STUDIES

Course title	Field of science (branch) code	University / Faculty	Institute / Department
<b>Palaeontology</b>	Natural Sciences (Geology) N 005	Vilnius University / Faculty of Chemistry and Geosciences	Institute of Geosciences /
Study methods	Number of credits allocated	Study methods	Number of credits allocated
Lectures		Seminars	
Individual work		Consultations	<b>11</b>
Course annotation			
<p>Paleontology as an integrative science of all manifestations of the past life. Methodological foundations of paleontology, substantive and methodological uniformitarianism, limits of uniformitarianism and actualism in the knowledge of past life. The method of multiple working hypotheses in geology and paleontology, selection criteria for the best hypotheses. The Role of Historicity, Circumstance and Chance in the Evolution of Life.</p> <p>Paleontology and the theory of evolution. Foundations of Hierarchy and Multilevel Causation Theory. Ecological and genealogical hierarchies. Bretsky's ecological-evolutionary units. Sepkoski's great evolutionary faunas. Species sorting and species selection: concepts of emergent trait and emergent fitness. Price's equation, contextual analysis, and analysis of evolutionary causality. The relationship between microevolution and macroevolution. The concept of major evolutionary transitions and paleontological evidence. Evolution of individuality: adaptive transitions from colony to higher level unit and back; Darwinization and de-Darwinization of evolutionary systems.</p> <p>Causes of evolutionary trends: i) passive and ii) driven trends. Patterns of body size evolution. The zero force evolutionary law, its significance for the hierarchical understanding of life and its evolution. The importance of biologically endogenous and exogenous factors for the functioning of evolution, paleontological evidence. Paleoclimate, evolution and macroecology. Organismic evolution as a reflection of environmental factors (Fisher's information accumulation). The use of adaptations of organisms for the reconstruction of paleoenvironments.</p> <p>Formation of paleobiogeographical structures. The relationship between evolution and tectonic processes. Implications of Provinciality/Cosmopolitanism for Stratigraphic Analysis and Global Event Synchronization. Integrated phylogenetic-paleobiogeographical analysis and the reconstruction of speciation modes.</p> <p>Paleontological evidence of individual development of organisms (evo-devo). Organisms as four-dimensional objects in relation to the evolutionary processes. Methods of sclerochronology. Allometric analysis.</p> <p>Principles of paleontological taxonomy: taxa, form taxa, ichnotaxa. Principles of taxonomy and disintegrated remains - paleontological taxa as models (examples of multielement taxon analyses).</p> <p>The doctoral student delves into one of the selected conceptual topic groups and/or a specific taxon, relating information about it to the solution of given conceptual problems in paleontology. When examining a selected taxonomic group, its entire evolutionary history is presented, and what is currently known about the macroevolutionary factors of this history. The anatomical overview of the considered group is presented, paleoecological characteristics are analyzed, and their role in stratigraphy.</p>			
Required readings			
Foote, M., Miller, A.I., Raup, D.M. and Stanley, S.M., 2007. Principles of paleontology. Macmillan. 480 p.			
Turner, D., 2011. Paleontology: A philosophical introduction. Cambridge University Press. 240 p.			
Eldredge, N., Pievani, T., Serrelli, E. and Tëmkin, I. eds., 2016. Evolutionary theory: a hierarchical perspective. University of Chicago Press. 384 p.			
Gould, S.J., 2002. The structure of evolutionary theory. Harvard University Press. 1433 p.			
Okasha, S., 2006. Evolution and the levels of selection. Oxford University Press. 263 p.			
Consulting lecturers Name, surname	Degree	The most important works in the field of science (branch) have been published during the last 5 years	

<p><b>Andrej Spiridonov</b></p>	<p><b>Dr.</b></p>	<p><b>Spiridonov A</b>, Balakauskas L, Lovejoy S. 2022. Longitudinal expansion fitness of brachiopod genera controlled by the Wilson cycle. <i>Global and Planetary Change</i>, 103926</p> <p><b>Spiridonov A</b> , Lovejoy S. 2022. Life rather than climate influences diversity at scales greater than 40 million years. <i>Nature</i>, 607, 307–312</p> <p><b>Spiridonov A</b> , Stankevič R, Gečas T, Brazauskas A, Kaminskas D, Musteikis P, Kaveckas T, Meidla T, Bičkauskas G, Ainsaar L, Radzevičius S. 2020. Ultra-high resolution multivariate record and multiscale causal analysis of Pridoli (late Silurian): implications for global stratigraphy, turnover events, and climate-biota interactions. <i>Gondwana Research</i>, Volume 86, 222-249</p> <p><b>Spiridonov A.</b>, Samsonė J, Brazauskas A, Stankevič R, Meidla T, Ainsaar L, Radzevičius S. 2020. Quantifying the community turnover of the uppermost Wenlock and Ludlow (Silurian) conodonts in the Baltic Basin. <i>Palaeogeography, Palaeoclimatology, Palaeoecology</i>, Volume 549, 109128</p> <p><b>Spiridonov A</b>, Balakauskas L, Stankevič R, Kluczynska G, Gedminienė L, Stančikaitė M. 2019. Holocene vegetation patterns in the southern Lithuania indicate astronomical forcing on the millennial and centennial time scales. <i>Scientific Reports</i>, 9, 14711</p>
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Approved by the doctoral committee of Geology (N 005) on 1<sup>st</sup> of December 2022 (No. (7.17 E) 15600-KT-467).

Committee Chairman prof. dr. Sigitas Radzevičius