

### COURSE OF DOCTORAL STUDIES

Course title	Field of science (branch) code	University / Faculty	Institute / Department
<b>Sequence Stratigraphy</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	<b>10</b>	Consultations	
Course annotation			
<p>The aim of the subject is to teach the doctoral student with the science of sequence stratigraphy, the basics of basin analysis and integrated stratigraphy. This course will enable the doctoral student to understand and analyze the architecture of the geological record of sedimentary rocks and the course of its formation, to apply this knowledge in the search for minerals, in the reconstruction of tectonic and paleogeographic changes of the Earth, other rocky planets and their satellites.</p> <p>The historical and conceptual context of sequence stratigraphy. Basic concepts of sequence stratigraphy.</p> <p>Geological, astronomical and biological mechanisms of relative and absolute sea level, climate and facies change. Hierarchical structure of sequence architecture. Methods of sequence stratigraphy: analysis of outcrops, boreholes and geophysical sections.</p> <p>Sources of sedimentary material, accommodation space for sedimentation, structure of sedimentary basins. The nature of stratigraphic surfaces. Discontinuities and facies contacts.</p> <p>Stratigraphic records of different sea-level states: high-level record, falling stage sea-level record, low sea-level record, rising (transgressive) sea-level record.</p> <p>Models of stratigraphic sequences. Types of stratigraphic sequences. Sequence stratigraphy of terrestrial environments: fluvial sedimentation systems, aeolian sedimentation systems. Sedimentation in siliciclastic water body systems. Sedimentation in carbonate dominated water body systems, sedimentation in mixed type settings.</p> <p>Reflection of regional and global sea-level changes in the stratigraphic record: survey methods and indicators.</p> <p>Isolation of stratigraphic sequences based on the analysis of lithofacies and geophysical facies. The use of paleoecological, ichnological, and taphonomic information in delineating and juxtaposing stratigraphic sequences across sections. Juxtaposition of information from sequence stratigraphy, and other branches of stratigraphy, and creation of composite time scales.</p> <p>Using sequence stratigraphic reconstructions to understand past sea-level, climate, tectonic and biotal changes.</p> <p>The doctoral student prepares a half-hour report on the sequence stratigraphic analysis of the selected geographical region (on Earth, Mars or another planets) and geological period, which should be based on the latest scientific literature.</p>			
Required readings			
Catuneanu, O., 2006. Principles of Sequence Stratigraphy. Elsevier, 388 p.			
Miall, A.D., 2010. The Geology of Stratigraphic Sequences. Springer Science & Business Media, 539 p			
Miall, A.D., 2014. Fluvial Depositional Systems. Berlin: Springer International Publishing, 325 p.			
Miall, A.D., 2013. Principles of Sedimentary Basin Analysis. Springer Science & Business Media, 637 p.			
Miall, A.D., 2016. Stratigraphy: the Modern Synthesis. In Stratigraphy: A modern synthesis. Springer, 471 p.			
Einsele, G., 2000. Sedimentary Basins: Evolution, Facies, and Sediment Budget. Springer Science & Business Media, 638 p.			
Holland, S., 2020. The Stratigraphic Paleobiology of Nonmarine Systems (Elements of Paleontology). Cambridge University Press, 88 p.			
Dalrymple, R.W. and James, N.P. eds., 2010. Facies models 4. Geological Association of Canada, 586 p.			
McIlroy, D., 2004. The application of ichnology to palaeoenvironmental and stratigraphic analysis: introduction.			

Geological Society, London, Special Publications, 490 p.

Loucks, R.G. and Sarg, J.F. eds., 1994. Carbonate Sequence Stratigraphy: Recent Developments and Applications.

AAPG Memoir 57, 545 p.

Consulting lecturers Name, surname	Degree	The most important works in the field of science (branch) have been published during the last 5 years
<b>Andrej Spiridonov</b>	<b>Dr.</b>	<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>

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