

COURSE OF DOCTORAL STUDIES

Course title	Field of science (branch) code	University / Faculty	Institute / Department
Investigation methods of crystalline rocks	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	11	Consultations	
Course annotation			
<p>A great variety of methods is applied for investigation of crystalline rocks (igneous and metamorphic). Identification of rocks (mineral composition and textures) under a polarizing microscope. And Scanning Electron Microscope (SEM). Basics of microscopy and application in igneous and metamorphic petrology. Mineral composition at a point, identification of obtained spectra and usage for different tasks. Optimal characteristics for the SEM application and sample preparation.</p> <p>Whole rock chemical analysis: “wet chemistry”, X-ray fluorescence (XRF), Inductively coupled plasma mass-spectrometry (ICP-MS), atomic absorption (AA) methods. Presentation of results and their interpretation. Data analysis and application for rock classification and discrimination.</p> <p>Radioactive and radiogenic isotope systems used for age determination of crystalline rocks. Samarium and neodymium (Sm/Nd) ratios for dating of crustal and metamorphic ages, determining the mantle type. $^{87}\text{Sr}/^{86}\text{Sr}$ ratios for source rock determination. U-Pb for rock and geological process dating. Equipment used for isotopic investigations: conventional mass-spectrometry, Secondary Ion Mass-spectrometry (SIMS), Laser ablation ICP-MS (LA-ICP-MS) etc. $^{40}\text{Ar}/^{39}\text{Ar}$ ratio for timing of mineral (process) closure. Applications of other methods, such as Re-Os, Lu-Hf etc.</p> <p>Stable isotopes (O, S, C) and possibilities of their application for evolution of igneous and metamorphic rocks. Student can choose only part of the above methods.</p>			
Required readings			
Winter, John D., 2014. Principles of Igneous and Metamorphic Petrology. PEARSON, UK. 739 p.			
Philpotts, Anthony R., 2003. Petrography of igneous and metamorphic rocks. Waveland Press. 179 p.			
Rollinson, H.R., 1993. Using geochemical data: evaluation, presentation, interpretation. 352 p.			
Reed, S.J.B., 2005. Electron Microprobe Analysis and Scanning Electron Microscopy in Geology. Cambridge University press.			
Faure, G. and Mensing T.M., 2005. Isotopes: principles and applications (Third Edition). John Willey & Sons, Inc., Hoboken, New Jersey.			
Motuza, G., 2006. Magminių ir metamorfinių uoliučių petrologija. Vilniaus universiteto leidykla.			
Rollinson H. R., 2007. Early Earth Systems. A Geochemical Approach. Blackwell Publishing. 285 psl.			
Consulting lecturers Name, surname	Degree	The most important works in the field of science (branch) have been published during the last 5 years	
Gražina Skridlaitė	Dr., assoc. prof.	Skridlaitė G., Bogdanova S., Taran L. and Baginski B., 2014. Recurrent high grade metamorphism recording a 300 Ma long Proterozoic crustal evolution in the western part of the East European Craton. <i>Gondwana Research</i> , V 25 (2), 649-667	

		<p>Vejelyte, I., Bogdanova, S., Skridlaite, G., 2015. Early Mesoproterozoic magmatism in northwestern Lithuania: a new U-Pb zircon dating. <i>Estonian Journal of Earth Sciences</i>, 64, 3, 189-198.</p> <p>Bogdanova, S., Gorbatshev, R., Skridlaite, G., Soesoo, A., Taran, L., Kurlovich, D., 2015. Trans-Baltic Palaeoproterozoic correlations towards the reconstruction of supercontinent Columbia/Nuna. <i>Precambrian Research</i>, 259, 5-33</p> <p>Grazina Skridlaite, Laurynas Siliauskas, Martin J. Whitehouse, Åke Johansson, Andrius Rimsa, 2021. On the origin and evolution of the 1.86–1.76 Ga Mid-Baltic Belt in the western East European Craton. <i>Precambrian Research</i>, V. 367, https://doi.org/10.1016/j.precamres.2021.106403</p>
--	--	--

Laurynas Šiliauskas	Dr.	<p>Prusinskiene, S., Siliauskas, L., Skridlaite, G., 2017. Varieties and chemical composition of magnetite in the Varėna Iron Ore deposits. <i>Chemija</i>, Vol. 28. No. 1, p. 39–57</p> <p>Siliauskas, L., Skridlaite, G., Baginski, B., Whitehouse M. & Prusinskiene, S., 2018. What the ca. 1.83 Ga gedrite-cordierite schists in the crystalline basement of Lithuania tell us about the late Palaeoproterozoic accretion of the East European Craton, <i>GFF</i>, 140:4, 332-344,</p>
---------------------	-----	--

--	--	--

Approved by the doctoral committee of Geology (N 005) on 1st of December 2022 (No. (7.17 E) 15600-KT-467).

Committee Chairman prof. dr. Sigitas Radzevičius