

DOKTORANTŪROS STUDIJŲ DALYKO SANDAS

Course title	Field of science (branch) code	University / Faculty	Institute / Department
Geographic information systems (GIS)	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	9	Consultations	

Course annotation
The course is intended for PhD students to get acquainted with geographic information technology and the science of geoinformatics. In this course a PhD student will learn to apply geographic information systems for solving specific tasks: to collect spatial data, to design a geodatabase, to visualize and analyze spatial data. Definition, principals and applications of GIS. Web GIS. Spatial data, spatial data models and formats. Coordinate systems and projections. Collection of data, GPS, remote sensing, vectorization. Data quality. Data topology. Working with tables, queries, joining tables. Spatial databases and their design. Symbolization of layers and placement of labels. Principals of cartography and creation of map layout. Vector analysis of spatial data. Raster analysis of spatial data. 3D GIS and analysis. Spatial modelling and automations of workflows. A PhD student prepares a GIS analysis project on the topic of their dissertation or a GIS analysis project replicating research published in a selected scientific article and prepares a half-hour presentation to present the completed GIS project. The GIS project must use different spatial data models (vector, raster, etc.) and apply spatial analysis tools (e.g., interpolation, classification, mathematical calculations, etc.). During the exam, the PhD student must justify their chosen solutions and demonstrate knowledge of GIS theory. Assessment: 60% for the technical execution of the project, 40% for the presentation and answers to questions.
Required readings
DeMers, M.N. Fundamentals of Geographic Information Systems. <i>4th Edition</i> . Wiley, 2009
Longley, P.A., Goodchild, M.F., Maguire D.J., Rhind D.W. Geographic Information Science and Systems. <i>4th Edition</i> . John Wiley & Sons, 2015
Pinde Fu. Getting to Know Web GIS. Esri Press, 2015
De Smith, M.J., Goodchild, M.F., Longley, P.A. Geospatial Analysis – A Comprehensive Guide to Principles, Techniques and Software Tools. <i>5th Edition</i> . The Winchelsea Press, 2015
Mozgeris, G., Dumbrasukas, A., Jonikavičius, D. Geografinių informacinių sistemų pagrindai: studijų knyga. <i>Antrasis papildytas ir pataisytas leidimas</i> . Akademija (Kauno r.): Aleksandro Stulginskio universiteto Leidybos centras, 2015
https://www.esri.com/training/ https://learn.arcgis.com/ https://resources.arcgis.com/ https://www.esri.com/en-us/arcgis/products/arcgis-online/resources https://www.qgis.org/en/docs/index.html http://www.geoportal.lt/geoportal/web/geografines-informacijos-mokymu-medziaga/

Consulting lecturers	Degree	The most important works in the field of science (branch) have been
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Name, surname		published during the last 5 years
Lauras Balakauskas	PhD	Spiridonov, A., Balakauskas, L., Lovejoy, S., 2022. Longitudinal expansion fitness of brachiopod genera controlled by the Wilson cycle. <i>Global and Planetary Change</i> 103926, https://doi.org/10.1016/j.gloplacha.2022.103926 .
		Balakauskas, L., Gaižutytė, J., Valskys, V., Vaikutienė, G., 2022. Analysis of pollen across the surface sediments of Lake Imbradas, Lithuania. <i>Quaternary Research</i> 106, 113-128. doi:10.1017/qua.2021.51
		Balakauskas, L., Vaikutienė, G., Paškevičiūtė, M., Valskys, V., Spiridonov, A., 2021. Effects of spatial heterogeneity on the estimation of diatom assemblage composition: an example of Lake Imbradas (NE Lithuania). <i>Baltica</i> 34(1), 123-134.
		Daumantas, L. & Balakauskas, L., Spiridonov, A., 2020. Machine learning reveals the role of the landscape in the dynamics of human settlement rules between the Palaeolithic and Iron Ages in Lithuania. <i>Quaternary International</i> 565. 10.1016/j.quaint.2020.09.004.
		A. Spiridonov, L. Balakauskas, R. Stankevič, G. Kluczynska, L. Gedminienė, M. Stančikaitė 2019. Holocene vegetation patterns in the southern Lithuania indicate astronomical forcing on the millennial and centennial time scales. <i>Science of the Total Environment</i> . Scientific Reports 9, 14711.

Approved by the doctoral committee of Geology (N 005) on 26 of September 2024 (No. (7.17 E) 15600-KT-407).

Committee Chairman prof. dr. Sigitas Radzevičius