ЦЕНТЪР ЗА ОБУЧЕНИЕ – БАН

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Basic Information:
Course Title: **Introduction to Free and Open Source GIS. Introduction to QGIS.**
Lecturer: Assoc. Prof. PhD. Emilia Tcherkezova
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Total Teaching Hours: 30

Annotation (up to 150 words)

In recent years, free and open source GIS software and tools are gaining as a real alternative to commercial software products. Programmers around the world are developing different free and open source GIS software and tools which find use in different scientific field applications. Their effective use requires profound knowledge of their functionality and integration.

The aim of this course is to provide an introduction to the concept of free and open source software, as well as basic GIS and spatial analysis using QGIS.

The course will be held in a mixed format: theoretical sessions - lectures, in combination with practical sessions. The contents, methods and techniques presented in the theoretical sessions will be applied in the practical sessions.

Practical training will be conducted on processing, management, analysis and visualisation of geospatial data in the QGIS environment.

Course content (brief description by topics or modules)

Topic / Module 1: A brief introduction to geographic information systems (GIS).
Topic / Module 2: Spatial analysis in GIS: a brief introduction.
Topic / Module 3: A brief introduction to remote sensing.
Topic / Module 4: Open source GIS. Freely available geospatial datasets and geodatabases.
Topic / Module 5: Introduction to QGIS.
Topic / Module 6: Working with vector and tabular data, including vector data analysis.
Topic / Module 7: Working with raster data. Processing and analysis of raster and DEM data.
Topic / Module 8: Working with tabular data: import and export text (.csv) files.
Topic / Module 9: Basemaps in QGIS.
Topic / Module 10: Working with plugins.
Topic / Module 11: Styling thematic layers and visualising geospatial Data in 2D and 3D.

Teaching and assessment methods

Forms of training:
1. Face-to-face training or
2. Online.

Forms of assessment:
1. Independent project
2. Exam (at the request of the PhD student).

Competencies acquired as a result of training (3–5 points)

1. Basic knowledge of geographic information systems (GIS).
2. Basic knowledge of remote sensing.
3. Basic knowledge of geospatial analysis.
4. Basic knowledge of free and open source GIS, as well as open geodata.
5. Basic knowledge of QGIS and skills in working with the software, map making.

Literature:

Popov, A. 2012. Geographic Information Systems. Fundamentals of Geoinformation Modeling. Publishing House "Anubis", 471 pp. [in Bulgarian].

Burrough, P.A., McDonnel, R.A., 2000. *Principles of Geographical Information Systems, Spatial Information Systems and Geostatistics*. Oxford, First published 1998, reprinted with corrections 2000, 327 pages.

De Smith, M., Goodchild, M., Longley, P.A. 2025. *Geospatial Analysis: A Comprehensive Guide to Principles, Techniques and Software Tools*. 7th Ed., Issue version: 2025-1, Web version, https://www.spatialanalysisonline.com/extractv7.pdf.

Ehlers, M., Woodgate, P., Annoni, A., Schade, S. 2014. Advancing digital earth: beyond the next generation. *Int J Digit Earth* 7(1): 3–16.

Goodchild, M. 1992. Geographical information science. Int. J. Geographical Information Systems, vol. 6, No 1, 31-45.

Goodchild, M. 2009. Geographic information systems and science: today and tomorrow, Annals of GIS, 15:1, 3-9, DOI: 10.1080/19475680903250715.

Goodchild, M. 2010. Twenty years of progress: GIScience in 2010. Journal of Spatial Information Science, Number 1 (2010), pp. 3–20, doi:10.5311/JOSIS.2010.1.2.

Guo, H., Goodchild, M., Annoni, A. 2020. (Eds). Manual of Digital Earth. Publisher Name Springer, Singapore, DOI https://doi.org/10.1007/978-981-32-9915-3, Print ISBN 978-981-32-9914-6, Online ISBN 978-981-32-9915-3, 852 pp.

Li, Z., Gui Z, Hofer, B., Li, Y., Scheider, S., Shekhar, S. 2020. Geospatial Information Processing. Manual of Digital Earth. International Society of Digital Earth, Springer, 191-227. ISBN 978-981-32-9914-6 ISBN 978-981-32-9915-3 (eBook), https://doi.org/10.1007/978-981-32-9915-3

Liu, Z., Foresman, T., Van Genderen, J., Wang, L. 2020. Understanding Digital Earth. Chapter 1. In: Guo, H., Goodchild, M., Annoni, A. (Eds.). Manual of Digital Earth. International Society of Digital Earth, Springer,1-21, ISBN 978-981-32-9914-6 ISBN 978-981-32-9915-3 (eBook), https://doi.org/10.1007/978-981-32-9915-3

Longley, P.A., Goodchild, M.F., Maguire, D.J., Rhind, D.W. 2015. Geographic information systems and science. 4th Edition, John Wiley and Sons, 495 pp, ISBN: 978-1-119-03130-7

Mark, D.M., 2003. Geographic information science: Defining the field. In *Foundations of Geographic Information Science*, M. Duckham, M. F. Goodchild, and M. F.Worboys, Eds. Taylor and Francis, New York, 2003, pp. 1–18. doi:10.1201/9780203009543.ch1.

Ramdani, F. 2023. *Introduction to QGIS*. In: Exploring the Earth with QGIS. Springer Remote Sensing/Photogrammetry. Springer, Cham. https://doi.org/10.1007/978-3-031-46042-5_1.

Sutton, T., Dassau, O., Sutton, M. 2009. *A Gentle Introduction to GIS. Brought to You with Quantum GIS, a Free and Open Source Software GIS Application for Everyone.* Chief Directorate: Spatial Planning & Information, Department of Land Affairs, Eastern Cape, 113 pp.

Additional information (optional) (e.g., special requirements, laboratory equipment, prior knowledge)

Special requirements:

Internet

Own laptops.

Basic knowledge:

Basic computer skills of course participants.

Basic knowledge of geographic information systems (GIS) (desirable).