

Syllabus of the doctoral examination course

STUDY PROGRAM: PHYSICAL GEOGRAPHY, GEOECOLOGY AND GEOINFORMATICS

Geographical Information Systems

1. Geographical information system as a tool for a geographical task solution.

- Identification of key GIS functions and tools relevant to the given geographic task.
- Analysis of requirements for processing input data, availability of analytical functions, capabilities, and accessibility of tools in GIS.
- Characterization of tool usage, especially those requiring original methodological contributions and not limited to standard procedures.

2. Data model design of a geographic database for the geographic task.

- Selection of a data model for the given task based on its ability to effectively represent spatial data.
- Design of the data model structure, specifically for vector and raster data.
- Implementation into the geographic database and data population.
- Verification of functionality and operational capabilities of the data model for the given task.

3. Geographical information sources: standardization, harmonization, distribution, and integration.

- Identification of relevant spatial data sources for the given task.
- Harmonization of data from different sources to ensure consistency and compatibility.
- Selection of distribution format for output spatial data (e.g., map products, file formats, online services).
- Integration of data from various sources into a single information system.

Recommended literature:

BOLSTAD, P., MANSON, S., 2019. *GIS Fundamentals: A First Text on Geographic Information Systems (7th ed.)*. Eider Press. ISBN 978-0-9717647-6-7.

GOODCHILD, M. F., 1996. *GIS and Environmental Modeling: Progress and Research Issues*. Wiley, ISBN 978-0-470-23677-2.

BOSSOMAIER, T., HOPE, B. A., 2015. *Online GIS and Spatial Metadata (2nd ed.)*. CRC Press, ISBN 9780429159817.

ALBRECHT J., 2007. *Key Concepts & Techniques in GIS*. Sage, ISBN 9781412910163.

LONGLEY, P.A., GOODCHILD, M. F., MAGUIRE, D. J., RHIND, D.W., 2015. *Geographic Information Systems and Science (4th ed.)*. Wiley. ISBN 978-1-119-12845-8.

DATE, C.J., 2003. *Introduction to Database Systems (8th ed.)*. Addison-Wesley, ISBN 0321197844.

GROOT R. (ed.), MCLAUGHLIN, J. (ed.), 2000. *Geospatial data infrastructure: concepts, cases, and good practice*. Oxford University Press. ISBN 9781383011708.