

SYLLABUS

GIS applications

University year 2025-2026

1. Information regarding the programme

1.1. Higher education institution	Babeş-Bolyai University	
1.2. Faculty	Biology and Geology	
1.3. Department	Geology	
1.4. Field of study	Geology	
1.5. Study cycle	Master	
1.6. Study programme/Qualification	Geology of energy resources / Master	
1.7. Form of education	full-time	

2. Information regarding the discipline

2.1. Name of the discipline		GIS applications					Discipline code		BME1127		
2.2. Course coordinator					Conf. dr. ing. habil. Forray Ferenc Lázár						
2.3. Seminar coordinator					Conf. dr. ing. habil. Forray Ferenc Lázár						
2.4. Year of study		1	2.5. Semester		1	2.6. Type of evaluation		V	2.7. Discipline regime		Optional

3. Total estimated time (hours/semester of didactic activities)

3.1. Hours per week	4	of which: 3.2 course	2	3.3 seminar/laboratory	2
3.4. Total hours in the curriculum	56	of which: 3.5 course	28	3.6 seminar/l laboratory	28
Time allotment for individual study (ID) and self-study activities (SA)					hours
Learning using manual, course support, bibliography, course notes (SA)					30
Additional documentation (in libraries, on electronic platforms, field documentation)					10
Preparation for seminars/labs, homework, papers, portfolios and essays					18
Tutorship					9
Evaluations					2
Other activities:					0
3.7. Total individual study hours	69				
3.8. Total hours per semester	125				
3.9. Number of ECTS credits	7				

4. Prerequisites (if necessary)

4.1. curriculum	Not applicable
4.2. competencies	Not applicable

5. Conditions (if necessary)

5.1. for the course	<ul style="list-style-type: none"> • Computer, video projector • Online course (Microsoft Teams) (during pandemic conditions)
5.2. for the seminar /lab activities	Computers with specialized software, other additional materials (e.g. maps, GPS, etc.)

6.1. Specific competencies acquired ¹

¹ One can choose either competences or learning outcomes, or both. If only one option is chosen, the row related to the other option will be deleted, and the kept one will be numbered 6.

Professional/essential competencies	<ul style="list-style-type: none"> • Mastering GIS concepts • Editing thematic maps • Data management and their graphical representation
Transversal competencies	<ul style="list-style-type: none"> • Mastering specific training methods • Organizing teamwork

6.2. Learning outcomes

Knowledge	The student knows: the basics of GIS systems and data management.
Skills	The student is able to use GIS-based office and field software. May also use various programs for data management/processing (including artificial intelligence).
Responsibility and autonomy:	The student has the ability to work independently for the acquisition, management and processing of geological data.

7. Objectives of the discipline (outcome of the acquired competencies)

7.1 General objective of the discipline	Solving complex problems in the field of geology through the use of computers
7.2 Specific objective of the discipline	<ul style="list-style-type: none"> • Knowledge of GIS • Using vector and raster data • Using QGIS to create thematic maps • Using GIS applications in the field (e.g. QField) • Data management and graphical representation

8. Content

8.1 Course	Teaching methods	Remarks
1. Installing QGIS	interactive lecture	2 hours

2. QGIS interface, applications (plug-ins)	interactive lecture	2 hours
3. Georeferencing methods	interactive lecture	2 hours
4. Importing data	interactive lecture	2 hours
5. Drawing maps	interactive lecture	2 hours
6-7. Database management	interactive lecture	2 hours
8-10. Project and symbology management	interactive lecture	6 hours
11-12. Creating map sheets	interactive lecture	4 hours
13-14. Charts	interactive lecture	4 hours

Bibliography

1. QGIS development team (2022) QGIS Geographic Information System. Open-Source Geospatial Foundation Project. <http://qgis.osgeo.org>.
2. Graser Anita, Peterson Gretchen N. (2022) QGIS Map Design. Locate Press LLC, 208p.
3. Menke Kurt, Smith Richard Jr, Pirelli Luigi, Van Hoesen John (2016) Mastering QGIS. Packt Publishing, 457p.
4. Agrawal Abha, Rasouli Majid (2019) EndNote 1-2-3 Easy! Reference Management for the Professional. Springer International Publishing, 344p.
5. Kirking Donna (2022) EndNote20 user guide. Clarivate 586p.
6. Moon Keon-Woong (2017) Learn ggplot2 using Shiny App. Springer, 351p.
7. Murrell Paul (2012) R Graphics. CRC Press, 505p.

8.2 Seminar / laboratory	Teaching methods	Remarks
1. Installing QGIS	Exercises and individual work	2 hours
2. QGIS interface, applications (plug-ins)	Exercises and individual work	2 hours
3. Georeferencing methods	Exercises and individual work	2 hours
4. Importing data	Exercises and individual work	2 hours
5. Drawing maps	Exercises and individual work	2 hours
6-7. Database management	Exercises and individual work	2 hours
8-10. Creating map sheets	Exercises and individual work	6 hours
11-12. EndNote 20	Exercises and individual work	4 hours
13-14. Graphing in R. Graphing applications	Exercises and individual work	4 hours

Bibliography

1. QGIS development team (2022) QGIS Geographic Information System. Open Source Geospatial Foundation Project. <http://qgis.osgeo.org>.
2. Graser Anita, Peterson Gretchen N. (2022) QGIS Map Design. Locate Press LLC, 208p.
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7. Murrell Paul (2012) R Graphics. CRC Press, 505p.

9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations and representative employers within the field of the program

- Solving complex problems in the field of geology, using computers
- Knowledge of the GIS system and using QGIS to create thematic maps
- Using GIS applications in the field
- Knowledge of bibliography management programs for writing projects/research
- Data management and their graphical representation

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percentage of final grade
10.4 Course	Verification of acquired theoretical knowledge	Oral exam	50 %
10.5 Seminar/laboratory	Skills assessment (use of specialized software to solve geological problems)	Individual project	50 %
10.6 Minimum standard of performance			
<ul style="list-style-type: none"> Students must obtain at least 50% of the score in each category (exam and for the individual project). 			

11. Labels ODD (Sustainable Development Goals)²

	General label for Sustainable Development							
								
								

Date:
March 21, 2025

Signature of course coordinator

Signature of seminar coordinator

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Date of approval:
March 28, 2025

Signature of the head of department

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² Keep only the labels that, according to the [Procedure for applying ODD labels in the academic process](#), suit the discipline and delete the others, including the general one for *Sustainable Development* – if not applicable. If no label describes the discipline, delete them all and write „Not applicable.“.