SYLLABUS

Tectonics of Sedimentary basins

University year 2025-2026

1. Information regarding the programme

1.1. Higher education institution	Universitatea Babeș-Bolyai din Cluj Napoca
1.2. Faculty	Biology and Geology
1.3. Department	Geology
1.4. Field of study	Geology/Resources
1.5. Study cycle	Master
1.6. Study programme/Qualification	Geology/Resources
1.7. Form of education	Învățământ cu frecvență

2. Information regarding the discipline

2.1. Name of the discipline	**Tectonics of sedimentary basins**					Discipline code	**BME1116**
2.2. Course coordinator						Conf. Univ. dr Sasaran Emanoil/ Lect. Univ. dr. Constantin Balica	
2.3. Seminar coordinator						Conf. Univ. dr Sasaran Emanoil/ Lect. Univ. dr. Constantin Balica	
2.4. Year of study	1	2.5. Semester	1	2.6. Type of evaluation	V	2.7. Discipline regime	Ob

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/laborator	**28**
Time allotment for individual study (ID) and self-study activities (SA)					**hours**
3.5.1. Learning using manual, course support, bibliography, course notes (SA)					10
3.5.2. Additional documentation (in libraries, on electronic platforms, field documentation)					15
3.5.3. Preparation for seminars/labs, homework, papers, portfolios and essays					5
3.5.4. Tutorship					10
3.5.5. Evaluations					4
3.5.6. Other activities:					
3.7. Total individual study hours	**44**				
3.8. Total hours per semester	**100**				
3.9. Number of ECTS credits	**6**				

4. Prerequisites (if necessary)

4.1. curriculum	Sedimentary Geology; Structural Geology; Geotectonics; Geophysics; Igneous and Metamorphic Petrology; Facies analysis; Stratigraphy; General Mathematics; General Physics
4.2. competences	Fieldwork skills (mapping, sampling, etc)

5. Conditions (if necessary)

5.1. for the course	Course room with modern presentation equipment, internet access
5.2. for the seminar /lab activities	Seminar room with IT equipment (laptops/desktop) and modern presentation equipment

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	▪ Sedimentary basin identification and classification based on geological and geophysical evidences; ▪ Identification of source, reservoir and cover rocks in depositional systems as well as of surface and burried depositional cycles ▪ Use of tectonic and sedimentologic analysis to basin reconstruction and modelling; ▪ Quantitative subsidence analysis based on depositional, diagenesis and tectonic data; ▪ Use of surface and seismic profiling data for stratigraphic correlation at regional scale and basin geometry;
Transversal competencies	• Useful in stratigraphy, mineral exploration, hydrocarbon exploration, etc

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

7.1 General objective of the discipline	• Understanding main sedimentary basin control mechanisms, processes and parameters as well as their evolution in time and space
7.2 Specific objective of the discipline	• Substantiate the direct link between sediment preservation and deep tectonic mechanisms; • Exemplify physical principles in controlling the topography of the Earth's surface at large scale; • Argue that the major tectonic settings are described by predictable sets of basinal features; • Explore the interactions between basement and surface processes create physical and chemical attributes of sedimentary rocks (stratigraphic sequences; sedimentary facies, etc); • Ascertain the timing of sedimentary basin evolution and temporal scales specific to various basins in different settings as well as timing of tectonic versus surface processes ; • Mastering of a systematic methodology for decoding sedimentary basin history and of their formation control mechanisms; • Recognition of sources of error in basin analysis and interpretation

8. Content

8.1 Course	Teaching methods	Remarks
1. Fundaments: definition, types of analysis, sedimentary basin clasification. Subsidence mechanisms	- Presentation combined with active-participative methods - Independent and systematic observation - Discussion/debate	
2. Plate tectonics: relationship between plate tectonics and sedimentary processes; tectonic settings	- Presentation combined with active-participative methods - Independent and systematic observation - Discussion/debate	
3. Dynamics of sedimentary basin formation	- Presentation combined with active-participative methods - Independent and systematic observation	

	- Discussion/debate	
4. Subsidence, denudation and sediment fluxes	- Presentation combined with active-participative methods - Independent and systematic observation - Discussion/debate	
5. Depositional systems: sedimentary basins and stratigraphy	- Presentation combined with active-participative methods - Independent and systematic observation - Discussion/debate	
6. Extensional and strike-slip basins: geometry, subsidence, accommodation, types of sedimentary sequences	- Presentation combined with active-participative methods - Independent and systematic observation - Discussion/debate	
7. Sedimentary basins in convergent tectonic settings: geometry, subsidence, accommodation, types of sedimentary sequences	- Presentation combined with active-participative methods - Independent and systematic observation - Discussion/debate	
8. Thermal history of sedimentary basins	- Presentation combined with active-participative methods - Independent and systematic observation - Discussion/debate	
9. Basins in divergent tectonic settings: examples and case study	- Presentation combined with active-participative methods - Independent and systematic observation - Discussion/debate	
10. Basins in intra-plate tectonic setting: examples and case study	- Presentation combined with active-participative methods - Independent and systematic observation - Discussion/debate	
11. Basins in convergent tectonic settings -1: examples and case study	- Presentation combined with active-participative methods - Independent and systematic observation - Discussion/debate	
12. Basins in convergent tectonic settings -2: examples and case study	- Presentation combined with active-participative methods - Independent and systematic observation - Discussion/debate	
13. Basins in transformant/transcurrent tectonic settings: examples and case study	- Presentation combined with active-participative methods - Independent and systematic observation - Discussion/debate	
14. Basins in hibrid tectonic settings: examples and case study	- Presentation combined with active-participative methods - Independent and systematic observation - Discussion/debate	

Bibliography

- Allen, P. A., Allen, J., 2005, Basin analysis: Principles and applications. Blackwell Publishing, 549 pp.
- Busby, C., Azor-Perez, A., 2011, Tectonics of sedimentary basins: Recent advances. Willey-Blackwell, 664 pp.
- Catuneanu, O., 2006, Principles of Sequence Stratigraphy. Elsevier, 375 pp;
- Posamentier, H. W., Walker , R. G., 2006, Facies Models Revisited. SEPM Special Publication, Vol. 84, 527 pp;

- Roberts, D. G., Bally, A. W, 2012, Regional Geology and Tectonics: Phanerozoic Passive Margins Cratonic Basins and Global Tectonic Maps. Volume 1C. Elsevier, 864 pp;
- Roberts, D. G., Bally, A. W, 2012, Regional Geology and Tectonics: Principles of Geologic Analysis. Volume 1A. Elsevier, 864 pp;
- Roberts, D. G., Bally, A. W, 2012, Regional Geology and Tectonics: Phanerozoic Rift Systems and Sedimentary Basins. Volume 1B. Elsevier, 528 pp;
- Kearey, P., Klepeis, K. A., Vine, F. J., 2009, Global tectonics. Willey-Blackwell, 482 pp

8.2 Seminar / laboratory	Teaching methods	Remarks
1. Sediment provenance and dispersion in relation with paleotectonics and paleogeography: case study	Presentation and individual work	
2. Isotopic features and provenance of siliciclastic and carbonatic deposits: case study	Presentation and individual work	
3. Facies architecture in clastic sedimentary basins: case study	Presentation and individual work	
4. Architecture of sedimentary basinsin Andean settings: case study	Presentation and individual work	
5. Origin, recognition and importance of erosional unconformities in sedimentary basins: case study	Presentation and individual work	
6. Fluids in sedimentary basins: case study	Presentation and individual work	
7. Thermal evolution of sedimentary basins and potential effects on hydrocarbon maturation: case study	Presentation and individual work	
8. Specific stratigraphic sequences in forearc/backarc settings in ocean-continent subduction: comparative case study	Presentation and individual work	
9. Relationship between foreland and piggy back basins: Himalayan foreland	Presentation and individual work	
10. Passive margins stratigraphy	Presentation and individual work	
11. Role of sedimentation, subsidence and eustatic level in foreland basins	Presentation and individual work	
12. Specific stratigraphic sequences in basins associated to transcurrent faults: Dead Sea - Red Sea system	Presentation and individual work	
13. Specific stratigraphic sequences in basins associated to intra-continental stretching: East African Rift System	Presentation and individual work	
14. Specific stratigraphic sequences in basins associated to intra-continental stretching: Rhine Graben	Presentation and individual work	

Bibliography:

- Allen, P. A., Allen, J., 2005, Basin analysis: Principles and applications. Blackwell Publishing, 549 pp.
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- Roberts, D. G., Bally, A. W, 2012, Regional Geology and Tectonics: Principles of Geologic Analysis. Volume 1A. Elsevier, 864 pp;
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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

- Course content is in accordance with similar courses elsewhere in Romania and abroad;
- Based on employers feedback on the preferential attributes of specialist training resulted a high degree of appreciation of their professionalism, which confirms that the structure and content of the educational curriculum built for this study program are correct, comprehensive and efficient.

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percentage of final grade
10.4 Course	- Understanding of basin analysis methods and the ability to use data to model geological processes; - The ability to extract, synthesize and interpret data in light of theoretical concepts regarding sedimentary basin dynamics	Writing an essay on a specific topic	50%
10.5 Seminar/laboratory	Practical determination of a geological section through a sedimentary basin	Preparing and presenting a project on a case study	50%
10.6 Minimum standard of performance			
• Attendance is mandatory for at least 80% of the activities. - Promotion is conditional on the presentation of the project within the established deadlines and the composition of the essay.			

11. Labels ODD (Sustainable Development Goals)[2]

	General label for Sustainable Development							
								
								

[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.*".

Date: 25.03.2025	Signature of course coordinator Conf. dr. Emanoil Săsăran/Șef lucr. dr. Balica Constantin	Signature of seminar coordinator Conf. dr. Emanoil Săsăran/Șef lucr. dr. Balica Constantin .....

Date of approval: 28.03.2025	Signature of the head of department Conf. Dr. Har Nicolae .....