COURSE SYLLABUS

1. Data about the program

1.1 Higher education institution	Babeș-Bolyai University
1.2 Faculty	Faculty of Biology and Geology
1.3 Doctoral school	Theoretical and Applied Geology
1.4 Field of study	Geology
1.5 Study cycle	Doctorate
1.6 Study program / Qualification	Doctoral training / PhD in Geology

2. Course data

2.1 Name of discipline	**Metallogeny models**						
2.2 Teacher responsible for lectures	Assoc. Prof. habil, PhD Călin Gabriel Tămaș						
2.3 Teacher responsible for seminars	Assoc. Prof. habil, PhD Călin Gabriel Tămaș						
2.4 Year of study	1	2.5 Semester	2	2.6. Type of evaluation	Exam	2.7 Course framework	Opt

3. Estimated total time of teaching activities (hours per semester)

3.1 Hours per week	4	Out of which: 3.2 Lectures	2	3.3 Seminars / Laboratory classes	2
3.4 Total hours in the curriculum	48	Out of which: 3.5 Lectures	24	3.6 Seminars / Laboratory classes	24

Allocation of study time:	hours
Study supported by textbooks, other course materials, recommended bibliography and personal student notes	30
Additional learning activities in the library, on specialized online platforms and in the field	20
Preparation of seminars / laboratory classes, topics, papers, portfolios and essays	15
Tutoring	2
Examinations	2
Other activities: -	

3.7 Individual study (total hours)	65
3.8 Total hours per semester	117
3.9 Number of credits	10

4. Preconditions (where applicable)

4.1 Curriculum	• Ore deposits
4.2 Competences	• Use of references data bases

5. Conditions (where applicable)

5.1 Conducting lectures	• Video support
5.2 Conducting seminars / laboratory classes	• Case studies • Attendance of at least 80% of laboratory classes

6. Specific competences acquired

Professional competences	• identification of ore deposit genetic types • control factors for ore deposit formation and their significance for exploration • use of theoretical knowledge to laboratory and field work • use of documentation sources in professional activity • petrography-metallogeny approach of the genetic process that control the formation of the ore deposits • skills to synthetise geology and ore deposit data and to create ore deposit models
Transversal competences	• ability to analyze and synthesize information about geological phenomena and processes • to acquire and apply an efficient approach in the individual and/or team scientific activity, by fulfilling the aims, respecting the terms and using the research results • the ability to routinely use analytical equipment and specialized software for data production, processing and interpretation • creation/writing of scientific / technical documentation • ccommunication skills and the ability to present the personal scientific achievements or geological data from literature/industry

7. Course objectives (based on the acquired competencies grid)

7.1 The general objective of the course	• metallogeny models - synthesis and tool in the knowledge of the ore deposits and exploration
7.2 Specific objectives	• knowledge of the genetic characters of the ore deposits • the content of a descriptive model: short description, host rocks, age, tectonic setting, ore body morphology, mineralogy, ore structure and texture, control factors, supergene alteration, geochemistry signature, examples, etc.

8. Content

8.1 Lectures	Teaching methods	Comments
The concept of ore deposit models, origin and evolution	Presentation, discussion, case studies, exercises	
Metallogeny models USGS 1986 and updated versions until 2017		
Case studies on ore deposit genetic types and correspondence with available models		
8.2 Seminars / laboratory classes	Teaching methods	Comments
Case studies prepared with the doctoral students, based on their individual doctoral research topics	Presentation, discussion, exercises	

Bibliography:

Bradley, D., Munk, L., Jochens, H., Hynek, S., Labay, K., 2013, A preliminary deposit model for lithium brines: U.S. Geological Survey Open-File Report 2013–1006, 6 p.

Cox, D.P., Singer, D.A. (eds.), 1986. Mineral Deposit Models. U.S. Geological Survey Bulletin 1693

Drew, L.J., 2005. A tectonic model for the spatial occurrence of porphyry copper and polymetallic vein deposits. Applications to central Europe: U.S. Geological Survey Scientific Investigations Report 2005–5272, 36 p.

John, D.A., Ayuso, R.A., Barton, M.D., Blakely, R.J., Bodnar, R.J., Dilles, J.H., Gray, F., Graybeal, F.T., Mars, J.C., McPhee, D.K., Seal, R.R., Taylor, R.D., Vikre, P.G., 2010, Porphyry copper deposit model, chap. B of Mineral deposit models for resource assessment: U.S. Geological Survey Scientific Investigations Report 2010–5070–B, 169 p.

Ludington, S., Barton, P.B., Johnson, K.M., 1985, Mineral deposit models: theory and practice, USGS Open-file report 85-391, 18 p.
Shanks, W.C. Pat, III, Thurston, R. (eds.), 2012, Volcanogenic massive sulfide occurrence model: U.S. Geological Survey Scientific Investigations Report 2010–5070–C, 345 p.
Taylor, C.D., Causey, J.D., Denning, P.D., Hammarstrom, J.M., Hayes, T.S., Horton, J.D., Kirschbaum, M.J., Parks, H.L., Wilson, A.B., Wintzer, N.E., Zientek, M.L., 2013, Descriptive models, grade-tonnage relations, and databases for the assessment of sediment-hosted copper deposits—With emphasis on deposits in the Central African Copperbelt, Democratic Republic of the Congo and Zambia: U.S. Geological Survey Scientific Investigations Report 2010–5090–J, 154 p. and data files.
Taylor, R.D., Hammarstrom, J.M., Piatak, N.M., Seal, R.R. II, 2012, Arc-related porphyry molybdenum deposit model, Chapter D of Mineral deposit models for resource assessment: U.S. Geological Survey Scientific Investigations Report 2010–5070–D, 64 p.

9. Aligning the contents of the discipline with the expectations of the epistemic community representatives, professional associations and standard employers operating in the program field

- Metallogenetic modeling is the purpose of a case study on an ore body/deposit and in the same time it is a working tool that facilitates exploration and evolves over time to comprise the newly acquired data obtained by field geological exploration and/or laboratory analysis, being for this reason an essential tool in geological activity.

10. Examination

Activity type	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final grade
10.4 Lectures	Assessment of knowledge	Oral examination	60%
	Assessment of knowledge	Ongoing evaluation	40%
10.5 Seminars / laboratory classes	Activity during seminars	Discussions, answers to questions	40%
	Assessment of knowledge	Oral examination	60%
10.6 Minimum performance standard			
• to pass the theoretical exam • to pass the examination concerning the geotectonic setting and the geochronology the area of interest for the PhD research topic			

Date of issue	Signature of the teacher responsible for lectures	Signature of the teacher responsible for seminars
11.02.2022	Assoc.Prof. habil, PhD Călin Gabriel Tămaș	Assoc.Prof. *habil*, PhD Călin Gabriel Tămaș

Date of approval by the doctoral school council

25.02.2022

Signature of the doctoral school director