MISKOLCI EGYETEM

MŰSZAKI FÖLD- ÉS KÖRNYEZETTUDOMÁNYI KAR

MINERAL DEPOSITS

MSc in Earth Science and Engineering

2022/23 II. semester

MFFTT720021

COURSE COMMUNICATION FOLDER

University of Miskolc

Faculty of Earth and Environmental Sciences and Engineering
Institute of Exploration Geosciences

Datasheet of the course

Course title: Mineal deposits **Teacher:** Dr. Zajzon Norbert, associate professor	**Code of the course:** MFFTT720021 **Responsible institute:** Institute of Exploration Geosciences
	Type of course: C
Recommended semester: 2	**Pre-requisites:** MFFAT710005
No. of contact hours/week (sem.+lab.): 2+1	**Type of assessment (exam/pr. mark/other):** exam
Credit points: 4	**Course:** full-time

Task and target of the course: The key target of the course is to introduce the geology of raw material deposits, their spatial distribution, their quantity and quality for the different commodities.

Knowledge: Differentiates the processes described by the general and specific theories required for the practicising of the fields of earth science engineering, categorizes the internal connections between geological processes, and designs the planning and interpretation procedures. Combines the technical and scientific knowledge required for the high-level integration in earth sciences engineering disciplines, among others in numerical methods, technical physics and their contexts. Categorizes the components of the raw material extraction sector, the technologies used for the extraction and preparation of mineral raw materials, as well as the scope of geo-environmental tasks, their external socio-economic environment and regulatory system. Utilizes the best practices applied to earth science engineering tasks and the long-term development directions that can be expected in this field in the medium term. Chooses the geological and geophysical methods suitable for exploring natural resources. Distinguishes between the methods of exploring mineral deposits. Elaborates a sound application practice on the methods of acquisition and data collection in the applied earth sciences, and on their instrumental measurement and IT data processing procedures.

Ability: Applies general and specific scientific theories pf applied earth sciences, systematizes them, solves independent engineering tasks (mainly complex geological prospecting, final report summarizing exploration results, geological-geophysical parts of environmental impact assessments). Composes presentations and written documents in Hungarian or in a foreign language. Performs complex planning, construction, inspection and official licensing tasks (geological-geophysical exploration plans of natural resources, acquisition of environmental geology), innovatively uses the theories and terminology of applied earth science knowledge. Organizes, manages, and supervises complex activities based on or incorporating applied earth science tasks (especially mining, environmental technology investments, operations). Contributes to the solution of geological-geophysical tasks arising during the extraction of mineral raw materials (planning, investment, operation, closure) and to analyzes the possible solutions. Identifies the structure of the raw materials extraction sector, the technologies used for the extraction and processing of mineral raw materials, as well as the scope of geo-environmental tasks, their external socio-economic environment and regulatory system. Maximizes the cooperation with related disciplines and manages the (working) group within the framework of larger and more complex activities, based on or incorporating applied earth science tasks.

Attitude: Percieves the professional and technological methodological developments in the fields of applied earth sciences, participates in their development. Applies innovative skills and knowledge in solving professional problems in the fields of earth science engineering. Commits and convincingly demonstrates to knowing and adhering to the professional and ethical values. Maximizes professionalism and professional solidarity. Respects and follows the ethical principles and written rules of work and professional culture in activities, follows them when managing small workgroups. Has a sufficient motivation to carry out activities in often changing working, geographical and cultural circumstances.

Autonomy and responsibility: Plans the work independently, and rules on to lead workgroups. Takes responsibility and is accountable for the work processes carried out under his / her control. Makes decisions carefully, in consultation with representatives of other disciplines (primarily legal, economic, and environmental), independently, Takes responsibility for decisions. Develops professional decisions in the field of operation entrusted to him/her. Committed to the practice of sustainable natural resource management, occupational health and safety.

Thematic description of the course:

During the introduction the students get familiar with the different groups of commodities – ores, industrial minerals, solid fossil energy minerals, construction materials and their use and history. In the next period, the students will learn the ore forming geological processes and their appearances, which creates the different deposits. Also they will learn the genetic classification of the deposits with national and international examples. It prepares the students to be able to recognize the geological features of mineralizations, alterations and tectonic preformation. It covers all the important mines and ore districts in Europe and worldwide. During the laboratory classes the students can learn the natural occurrences of the ores, non-ores and industrial minerals. They will learn the physical and chemical properties, and texture of the different raw material types, and how to identify and distinguish them. To the proper use of geological maps and sections in 3D, the students will do exercises to develop their capabilities. During the related field trips the students will examine real deposits in the field.

Type of assessment during the semester:
1. Test about recognizing the different hand specimens of ores, raw materials (35%).
2. Written test about the classification of ores with examples (65%).

Grading limits:
> 80 %: excellent
70 – 80 %: good
60 – 70 %: average
50 – 60 %: satisfactory
< 50 %: unsatisfactory

Recommended literature:
Robb, L., (2005): Introduction to Ore-Forming Processes: Blackwell Publishing Co., 373 p. (ISBN 0-632-06378-5).
EVANS, A. M. 1993: Ore Geology and Industrial Minerals – An Introduction. *Blackwell Publishing*, ISBN 978-0632-02953-2
CRAIG, J. R. & Vaughan, D. J. 1994: Ore Microscopy & Ore Petrography. *John Wiley and Sons Inc.* ISBN 10158-0012
Dill H.G. (2010): The „chessboard" classification scheme of mineral deposits. Elsevier, 2010.
Cox, D.P. Singer D.E. (1992): Mineral Deposit Models, U.S.G.S. Bulletin 1993.

Description of the course

Mineral deposits

2022/23 year, II. semester
Time of lectures and laboratories: Thursday, 10-13

Week	Topic of the class
2023.03.02.	Overview of the main groups of commodities – ores, raw materials, industrial minerals, construction materials, their research and history
2023.03.09.	Overview of the main groups of commodities – ores, raw materials, industrial minerals, construction materials, their research and history
2023.03.16.	Main types and appearances of geological processes creating ore mineralizations
2023.03.23.	Genetic classification of ores
2023.03.30.	Detailed location examples of the different types
2023.04.06.	Recognition of the geological features of mineralizations, alterations and tectonic preformation related to ore deposits

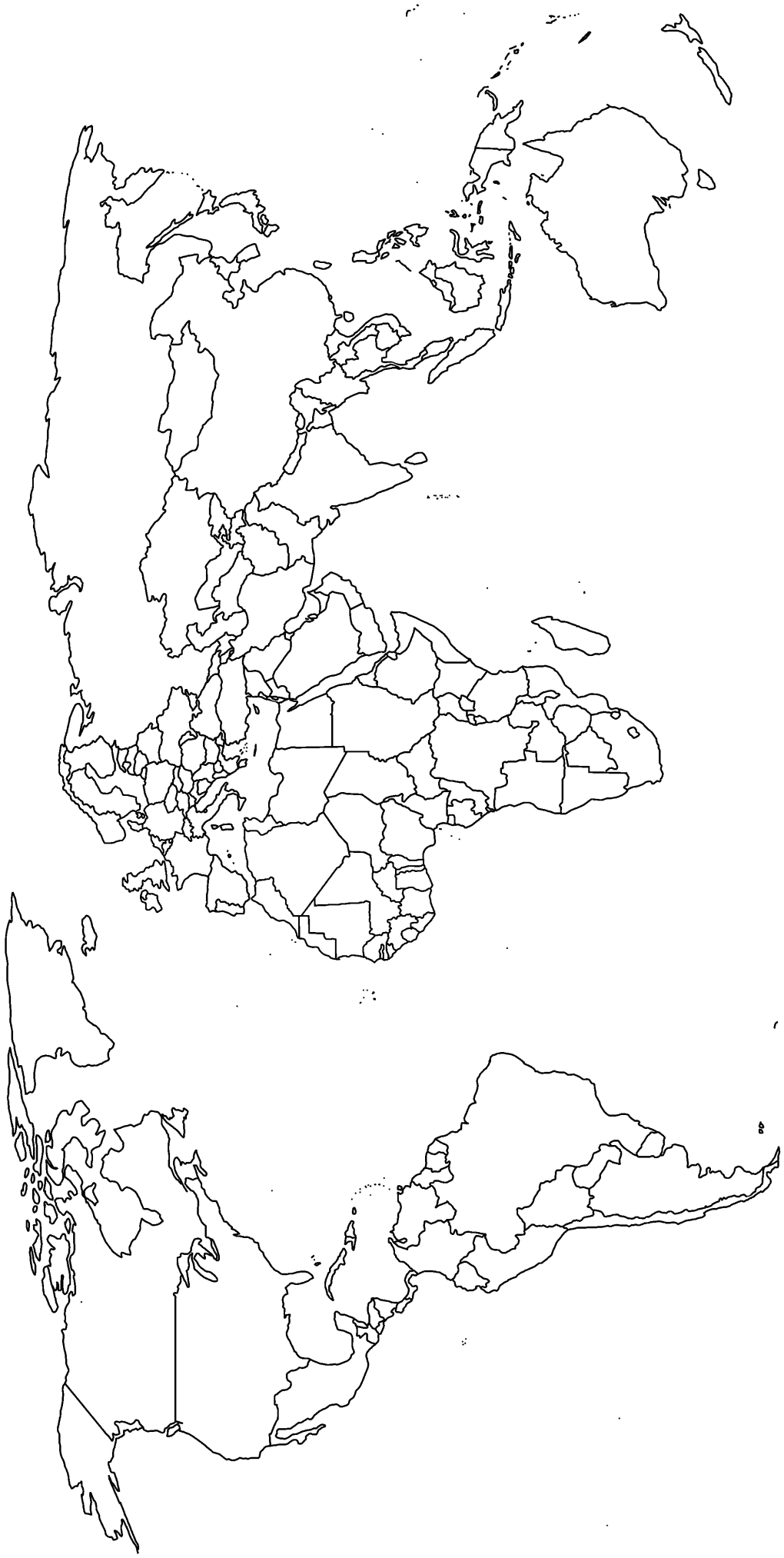
2023.04.13.	Economic relevance of the different commodities, deposits in Europe and worldwide
2023.04.22.	First test writing
2023.04.27.	Physical, chemical properties of the mineral commodities and how to identify the different minerals
2023.05.04.	Rector’s day
2023.05.11.	3D reading, constructing and interpretation of geological maps and sections related to ore deposits
2023.05.18.	3D reading, constructing and interpretation of geological maps and sections related to ore deposits
2023.05.27.	Studying of active ore deposits in the field. Consultation

Example of the written test

Written test of Mineral deposits

1) Fill the chart and mark the locations on the maps (European locations to the first): (40+20points)

	Deposit	Type	Elements / ore quality	Shape / texture
1	Kargoorlie			
2	Rössing Mine			
3	La Escondia			
4	Palabora			
5	Cornwall			
6	Navan			
7	Witwaterstrand			
8	Olympic Dam			
9	Magnitogorsk			
10	Grasberg			
11	Bushveld			
12	Kiruna			
13	Rio Tinto			
14	Úrkút			
15	Hamersley			
16	Atacama			
17	Sudbury			
18	Nikopol			
19	Butte			
20	Wieliczka			



2) Compare to the HS and LS deposits. Draw the gold solubility eH/pH diagram, and explain there the gold deposition. Give international and Hungarian examples. (8 points)

3) What kind of deposits you know in La Escondia? Draw a small section about that.
(5 points)

4) What is the difference between strata-bound and stratiform deposits? Give deposit types and examples. (7 points)

5) What kind of deposits can contain gold? Give examples to all. (10 points)

6) What kind of deposits can contain copper? Give examples to all. (10 points)