NON-METALLIC INDUSTRIAL MINERALS

Earth Sciences Engineering MSc course

2020/21 1. Semester

MFFTT730030

COURSE COMMUNICATION FOLDER

University of Miskolc
Faculty of Earth Science and Engineering
Institute of Mineralogy and Geology

Course datasheet

Course Title: Non-metallic industrial minerals **Instructor:** Dr. Kristály Ferenc, senior research fellow	**Code:** MFFTT730030 **Responsible department/institute: ÁFI**
Position in curriculum (which semester): 3	**Pre-requisites (if any): -**
No. of contact hours per week (lecture + seminar): 2+2	**Type of Assessment (examination/ practical mark / other):** examination
Credits: 4	**Course:** full time

Competencies to evolve:
Knowledge: T1, T2, T3, T4, T5, T7, T8, T9
Ability: K1, K2, K3, K5, K6, K7, K8, K9, K11, K12, K13
Attitude: A1, A2, A3, A4, A5, A7
Autonomy and responsibility: F1, F2, F3, F4, F5

Acquired store of learning:

Study goals: The course will allow students to gather knowledge on the non-metallic mineral resources, geological characteristics of the deposits, type and mode of the accumulations, spatial distribution and quality-quantity data of the mineral types, technological requirements, exploration, exploitation and beneficiation techniques.
The introductory part is a short review on the geological settings and related petrological-geochemical knowledge, related non-metallic resources, industrial mineral groups. The first part dissects the grouping on genetical and industrial-application point of view mineral resources. During the semester detailed knowledge is offered on 1) native element, 2) sulphide, 3) halogenide, 4) oxide/hydroxide, 5) carbonate/nitrate, 6) borate, 7) sulphate, 8) phosphate and 9) silicate types of industrial minerals. Students get familiar with their mineralogy, deposits and formation, extraction and uses based on detailed international data. We also study the rock type industrial minerals, their generating and applications. In the case of silicates emphasis is put on clay minerals, feldspars and zeolites. Separate lecture+laboratory visit discusses the exploitation and beneficiation techniques. During the laboratory exercises and field trips students learn to recognize industrial minerals, to give mineralogical characterization, exploration and quality remarks, their natural types of occurrence.

Education method: Lectures with .ppt presentation, laboratory exercises for sample and specimen preparation, fieldtrips, methods for data validation and documentation.

Type of Assessment (exam. / pr. mark. / other): **exam**

Short written test. Individual data research + presentation (60-40%) in an assay. Oral examination.

Grading limits:
>90%: excellent,
76-90%: good,
60-76%: medium,
50-60%: satisfactory,
<50%: unsatisfactory.

Compulsory or recommended literature resources:

EVANS A.M. (1993) Ore Geology and Industrial Minerals: an Introduction. Blackwell Publishing, 379 p ISBN 978-0-632-02953-2
Ciulo P. A. (1996) Industrial minerals and their uses. Noyes Publication, New Jersey, 607 p
https://minerals.usgs.gov/minerals/pubs/myb.html
https://www.ima-europe.eu/

Syllabus of the semester

Non-metallic industrial minerals

Lecture: Thursday, 08:00 – 10:00
Practical: Thursday, 10:00 – 12:00

Week	Thematics
2020.09.10.	Introduction, geological and petrological-geochemical review
2020.09.17.	General introduction to industrial minerals and their importance
2020.09.24.	Native element type industrial minerals
2020.10.01.	Sulfide and halogenide type industrial minerals
2020.10.08.	Oxide and hydroxide type industrial minerals
2020.10.15.	Carbonate and nitrate type industrial minerals
2020.10.22.	Borate type industrial minerals
2020.10.29.	Sulphate type industrial minerals
2020.11.05.	Phosphate type industrial minerals
2020.11.12.	Silicate type industrial minerals
2020.11.19.	Silicates: clay minerals, deposits and applications
2020.11.26.	Silicates: zeolites, deposits and applications
2020.12.03.	Rock type as industrial mineral
2020.12.10.	Extractive and beneficiation techniques

Example of short test

Give the correct answers
1. Graphite deposits are formed by
a) sedimentary-organic processes only
b) burial and regional metamorphism
c) sedimentary, metamorphic and hydrothermal reactions also

2. The main hydrothermal source of carbon for graphite is:
a) detrital organic matter
b) carbonate reduction in solutions
c) dissolution of diamond

3. Diamonds are formed at:
a) subduction slabs and deep mantle
b) continental hot-spot magmatism
c) mid-ocean ridge basaltic volcanism

4. The primary use of graphite is:
a) pencils and crayons
b) light-weight aggregates
c) heat insulating materials

5. Sulphur is essential for:
a) acid production
b) insecticides
c) bitumen production

6. Major source of sulphur is
a) volcanic-exhalative
b) by-product of hydrocarbon refinery
c) biogenic-sedimentary

7. Telluriun and selenium are used as
a) metal alloying
b) catalyzers
c) semiconductor elements for solar panels

8. The use of molybdenite is favored due to:
a) low economic value
b) unique lubricating capacity
c) large primary deposits

9. The major use of NaCl is
a) table salt and food industry
b) rubber conditioning
c) source of Cl for polymer industry

10. Halite deposits are generated by
a) low temperature fluid migration

b) post-volcanic brines
c) oversaturated salt precipitation

Answers: 1a, 2a, 3a, 4c, 5a, 6b, 7c, 8b, 9c, 10c