



# Applied petrology

MFFAT710008

Szénhidrogén-kutató földtudományi mérnöki mesterszak

2020/21 I. félév

TANTÁRGYI KOMMUNIKÁCIÓS DOSSZIÉ

**Miskolci Egyetem**  
**Műszaki Földtudományi Kar**  
**Ásványtani-Földtani Intézet**

<b>Course Title: Applied petrology</b>	<b>Credits: 3</b>
Type (lec. / sem. / lab. / consult.) and Number of Contact Hours per Week: <b>lec.2, sem. 1</b>	
Neptun code: MFFAT710008	
<p><b>Type of Assessment</b> (exam. / pr. mark. / other):<b>exam</b></p> <p>Two exercises and their reports have to be made during the semester, which are based on complex instrumental evaluation of rock samples as self-sufficient tasks. These exercises return the 40% of the grade at the end of the semester. The other 60% can be acquired at the written examination at the end of semester.</p> <p><b>Grading limits:</b></p> <p>&gt; 80%: excellent,  70-80%: good,  60-70%: medium,  50-60%: satisfactory,  &lt;50%: unsatisfactory.</p>	
Position in Curriculum (which semester): <b>first</b>	
Pre-requisites ( <i>if any</i> ):	
<b>Course Description:</b>	
<p><b>Acquired store of learning:</b></p> <p><u>Study goals:</u> Indepth introduction to texture analysis of different rock types with special emphasis on reservoir properties of porous and fractured rocks, using different analytical techniques.</p> <p><u>Course content:</u> Analytical techniques used in petrographic research - optical microscopy, XRPD, cathod luminescence microscopy, electron microprobe analysis, digital image analysis. Main rock forming minerals and their identification with different analytical techniques. Definition of rock texture, texture elements in different rock types. Magmatic and metamorphic rocks – compositional and texture types, classification systems. Deformation of crystalline rocks, main deformation mechanisms, Deformational texture elements. Fractured reservoirs - types (fracture or reservoir); fracture appearance in different scales (micro, macro, mega); matrix block (fracture density) and idealized modelling; importance of orientation. Alteration of rocks, alteration textures. Clastic sedimentary rocks - compositional and texture types, texture elements, system of classification. Carbonate rocks - compositional and texture types, texture elements, system of classification. Pore and pore geometry – origin of pores, scale of pore geometry. Pore types (siliciclastic, carbonate), (macro-micro) descriptions, porosity, permeability properties. Capillary pressure - seal capacity; saturations (<math>S_w</math>, <math>S_o</math>, <math>S_g</math>) with depth; transitional zone thickness; recovery efficiency. Main differences between matrix porosity and fractured reservoir properties.</p> <p><u>Education method:</u> Lectures with ppt presentation, laboratory exercises in optical microscopy, XRPD, electron microscopy, digital image analysis, field exercise.</p> <p><b>Competencies to evolve:</b></p> <p>T1, T4, T5, T6, T8, T12, K2, K4, K5, K6, K7, A1</p>	
The 3-5 most important compulsory, or recommended <b>literature</b> (textbook, book) <b>resources:</b>	
<ul style="list-style-type: none"> <li>• Folk R.L. Petrology of sedimentary rocks, Hemphill Publ. Co., 1980.</li> <li>• Scholle P.A. &amp; Ulmer-Scholle D.S.: A Color Guide to the Petrography of Carbonate Rocks: Grains, textures, porosity, diagenesis (AAPG Memoir 77; AAPG Tulsa, Oklahoma, 2003).</li> <li>• Adams A.E.; Mackenzie W.S.; Guilford C.: Atlas of sedimentary rocks under the microscope</li> <li>• J. Pápay, 2003: Development of Petroleum Reservoirs, Akadémiai K., Budapest 2003.</li> <li>• M. D. Zoback, 2007: Reservoir Geomechanics, Cambridge UP.</li> <li>• T.D. Van Golf-Racht, 1982: Fundamentals of Fractured Reservoir Engineering, Elsevier S. P. C., 1982. Development Geology (Jegyzet, 2003, HOT Engineering &amp; Shell Iran Offshore B.V.).</li> <li>• R.F. Aguilera, 1980, 1995: Naturally Fractured Reservoirs, PennWell Books, Tulsa.</li> </ul>	
<b>Responsible Instructor</b> ( <i>név, beosztás, tud. fokozat</i> ):	

**Ferenc Má dai Dr., associate professor, PhD**

**Other Faculty Member(s) Involved in Teaching**, if any (*name, position, scientific degree*):

**Hámorné Vidó Mária Dr. honoured associate professor, PhD habil**

**Norbert Zajzon Dr., associate researcher, PhD**

**Ferenc Kristály Dr., research engineer, PhD**

## Féléves órabeosztás

2020/21 1. félév

Csütörtök, 11-14 Pettkó terem

dátum	foglalkozás témája
2020.09.10	Hallgatók beérkezési nehézségei miatt elmarad
2020.09.17	Introduction, competence check, rock forming minerals
2020.09.24	System of magmatic, metamorphic classification, rock description standards
2020.10.01	Introduction into organic petrology & geology- Macerals – optical changes, measurements
2020.10.08	Basics of organic matter formation
2020.10.15	Basics of organic matter formation practical
2020.10.22	Organic petrology – maceral types, Recognition of maceral types under microscope
2020.10.29	Recognition of maceral types under microscope, practical
2020.11.05	System of sedimentary rock classification, clastic sedimentary rock components
2020.11.12	Diagenesis of sandstones
2020.11.19	Deformation regimes, fracture characterization
2020.11.26	Classification schemes of organic matter, thermal maturity of organic matter
2020.12.03	Use of image analysis in quantitative microscopy and fracture characterization
2020.12.10	final test

A tárgyhoz kapcsolódó előadás anyagok, tananyagok és a szükséges háttér információ (cikk sablon stb.) letölthető a tantárgy Moodle oldaláról:

Moodle: <http://edu.uni-miskolc.hu/edu/> Műszaki Földtudományi Kar ⇨ Ásványtani-Földtani Intézet  
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**A**

1A Please give the definition of coal and the main parameters of its quality considered in UN-ECE classification system.

2A Give a short generalized model of organic matter rich sediments in stagnant, silled basin. Productivity of OM and the dispersed organic matter in sedimentary rocks; preservation, accumulation.

3A Please give a list of maceral groups accepted by TSOP-ICCP in 2003 for dispersed organic matter. Give an example of group, which is typical for dispersed organic matter (DOM) and its origin.

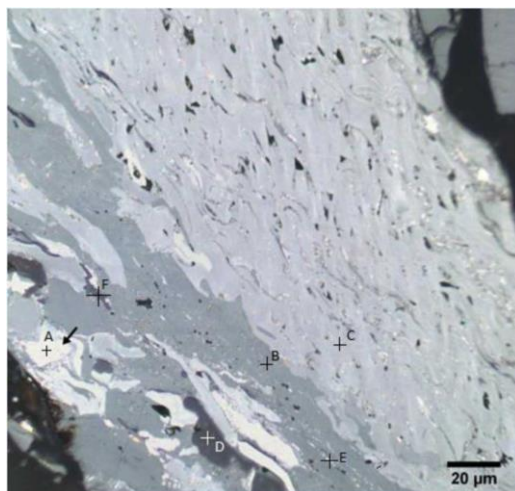
4A Please give a short description why we use the vitrinite macerals and especially telinite for the determination of thermal history analysis or for coal rank determination in hydrocarbon exploration and coal studies. What are the limits?

5A Please give the name of rock type; coal/DOM, coalification/thermal maturity stage or rank, the macerals group and maceral names at the crosshairs in the photomicrograph.

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A..... ; B ....., C.....

D..... ; E ....., F .....



**B**

1B Please give the definition of source rock and relation to the dispersed organic matter and embedding lithotypes (siliciclasts, carbonates).

2B Give a short generalized model of organic matter rich sediments in upwelling, productivity model. Productivity of OM and the dispersed organic matter in sedimentary rocks; preservation, accumulation.

3B Please give the definition of maceral; primary and secondary macerals. Give an example of secondary macerals in coal and its origin.

4B Please give a short description of the optical property changes of macerals groups of coal from the lignite to anthracite coalification stage or rank.

5B Please give the name of rock type; coal/DOM, coalification/thermal maturity stage or rank, the macerals group and maceral names at the crosshairs in the photomicrograph.

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A..... ; B ....., C.....

D ..... ; E....., F.....

