ACADEMIC COURSE DESCRIPTION – METAMORPHIC PETROLOGY

BACHELOR's DEGREE
GEOCHEMISTRY
3RD YEAR OF STUDY, 1ST SEMESTER

COURSE TITLE	METAMORPHIC PETROLOGY
COURSE CODE	31020030020SL1113131
COURSE TYPE	full attendance
COURSE LEVEL	1st cycle (bachelor's degree)
YEAR OF STUDY, SEMESTER	3rd year of study, 1st semester
NUMBER OF ECTS CREDITS	6
NUMBER OF HOURS PER WEEK	4 (2 lecture hours + 2 seminar hours)
NAME OF LECTURE HOLDER	Professor Ovidiu Gabriel Iancu
NAME OF SEMINAR HOLDER	Assistant Lecturer Iuliana Buliga
PREREQUISITES	Mineralogy, Igneous Petrology

A GENERAL AND COURSE-SPECIFIC COMPETENCES

General competences:

→ Developing students' interest for consulting relevant national and international sources in order to devise a research paper on a topic pertaining to the academic discipline

Course-specific competences:

→ Defining the main types of metamorphic rocks
→ Corroborating geological knowledge with information from related fields so as to identify metamorphic rocks and explain the geological phenomena through which they are generated
→ Knowing the methodology required in the complete investigation of metamorphic terrains

B LEARNING OUTCOMES

Upon successfully completing the discipline, students become capable of:

→ describing the main types of metamorphic rocks and their mineralogy
→ explaining the genesis of metamorphic rocks
→ using petrogenetic diagrams
→ analyzing metamorphic rocks both macroscopically and microscopically
→ calculating the ACF, A'KF and AFM parameters based on chemical analyses of major elements, so as to use ternary diagrams
→ understanding P-T-t paths and their role in the study of metamorphic rocks

C LECTURE CONTENT

Week	Title of lecture	Teaching methods	Duration
1	Units of measurement used in Petrology. Metamorphism – definition and types	Lecture based on video projection	2 hours
2	Nomenclature and classification of metamorphic rocks	Lecture based on video projection	2 hours

3	Rock deformation. Structural elements in metamorphic rocks. The structures of metamorphic rocks. The microstructures of metamorphic rocks.	Lecture based on video projection	2 hours
4	The physico-chemical agents of metamorphism. The limits of metamorphism. Fluid phases in metamorphism. Chemical reactions in metamorphic rocks. Petrogenetic grids.	Lecture based on video projection	2 hours
5	Metamorphic facies. Index minerals. Metamorphic facies series. Contact metamorphism.	Lecture based on video projection	2 hours
6	Cataclastic metamorphism. Shock metamorphism. Regional metamorphism. Occurrences, general characteristics, gradients of prograde metamorphism.	Lecture based on video projection	2 hours
7	The regional metamorphism of ultramafic rocks. The regional metamorphism of granitoids. The regional metamorphism of limestones and dolomites. The regional metamorphism of arenaceous rocks	Lecture based on video projection	2 hours
8	The regional metamorphism of pelites. Migmatites; Granulites.	Lecture based on video projection	2 hours
9	The regional metamorphism of mafic rocks. Eclogites. High-pressure metamorphism. Seafloor metamorphism.	Lecture based on video projection	2 hours
10	The geothermometry and geobarometry of metamorphic rocks	Lecture based on video projection	2 hours
11	The geochronology and thermochronology of metamorphic rocks	Lecture based on video projection	2 hours
12	P-T-t metamorphic paths	Lecture based on video projection	2 hours

13	Metamorphic rock occurrences in Romania	Lecture based on video projection	2 hours
14	The economic significance of metamorphic rocks and minerals	Lecture based on video projection	2 hours

D RECOMMENDED READING FOR LECTURES

Main references:

1. BUCHER K. & GRAPES R. (2011) Petrogenesis of metamorphic rocks. (8th edition). Springer-Verlag, Berlin, 428 p.;
2. KORNPROBST J. (2003) Metamorphic rocks and their geodynamic significance. A petrological handbook, Kluwer Academic Publisher, 208 p.;
3. IANCU.O.G. (2007) Petrologie metamorfică. Ed. Sedcom Libris Iași, 190 p.;
4. MIYASHIRO A. (1994) Metamorphic petrology. UCL press, London.

Additional references:

1. RĂDULESCU D. (1981) Petrologie magmatică şi metamorfică. Ed. Did. şi Pedag. Bucureşti.;
2. SPEAR F.S. (1993) Metamorphic phase equilibria and pressure-temperature-time paths. Mineralogical Soc. of America, Monograph, Washington, D.C., 799 p.;
3. YARDLEY B. W. D. (1989) An introduction to metamorphic petrology. Longman, New York, 248 p.

E SEMINAR CONTENT

Week	Title of seminar	Teaching methods	Duration
1	Minerals in the composition of metamorphic rocks	Video projection, observation/analysis of thin sections	2 hours; electron microscope
2	The fabric of metamorphic rocks	Video projection, observation/analysis of thin sections	2 hours; electron microscope
3	Rocks typical for regional metamorphism from the sanidinite facies, the zeolite facies and the facies of corneans with pyroxenes	Video projection, observation/analysis of thin sections and samples	2 hours; electron microscope and samples
4	Rocks typical for regional metamorphism: slate, phyllite	Video projection, observation/analysis of thin sections and samples	2 hours; electron microscope and samples
5	Rocks typical for regional metamorphism: schist, mica schist	Video projection, observation/analysis of thin sections and samples	2 hours; electron microscope and samples
6	Synthesis of the rocks and facies studied	Assessment based on thin sections and samples	2 hours; electron microscope and samples
7	Rocks typical for regional metamorphism: gneiss,	Video projection, observation/analysis of thin	2 hours; electron microscope and samples

		quartzite, marble	sections and samples	
	8	Rocks typical for regional metamorphism: amphibolite, granulite	Video projection, observation/analysis of thin sections and samples	2 hours; electron microscope and samples
	9	Rocks typical for regional metamorphism: glaucophane schist, eclogite	Video projection, observation/analysis of thin sections and samples	2 hours; electron microscope and samples
	10	Rocks typical for contact metamorphism: limestone, skarn	Video projection, observation/analysis of thin sections and samples	2 hours; electron microscope and samples
	11	Calculating the ACF parameters based on chemical analyses of major elements so as to use ternary diagrams	Lecture; case studies	2 hours; geochemical diagrams
	12	Calculating the A'KF parameters based on chemical analyses of major elements so as to use ternary diagrams	Lecture; case studies	2 hours; geochemical diagrams
	13	Calculating the AFM parameters based on chemical analyses of major elements so as to use ternary diagrams	Lecture; case studies	2 hours; geochemical diagrams
	14	Oral exam	Assessment of the studied rocks based on thin sections, samples and ternary diagrams	2 hours, geochemical diagrams, thin sections and samples

F	RECOMMENDED READING FOR SEMINARS
	1. BARD J.P. (1986) Microstructures of igneous and metamorphic rocks. Reidel Publ.Comp., Dordrecht, 264 p.; 2. YARDLEY B. W. D. (1990) Atlas of metamorphic rocks and their textures. Longman, New York, 120 p.
G	EDUCATION STYLE

LEARNING AND TEACHING METHODS	Lecture based on video projection; observation/analysis of thin sections and samples; case studies
ASSESSMENT METHODS	Written examination and continuous assessment (lecture) – 57.5%; research paper and tests (seminar) – 42.5%
LANGUAGE OF INSTRUCTION	English