Academic course description – METAMORPHIC PETROLOGY

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| BACHELOR’s DEGREE**Geochemistry** 3rd YEAR OF STUDY, 1st SEMESTER |

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| **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, quartzite, marble | Video projection, observation/analysis of thin sections and samples | 2 hours; electron microscope 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 |