Academic course description – basic MINERALOGY

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| Bachelor’s DEGREE**GEOCHEMISTRY** 1st YEAR OF STUDY, 2nd SEMESTER |

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| **Course title** | | **basic MINERALOGY** |
| Course code | | 31020030020SL1111201 |
| Course type | | full attendance |
| Course level | | 1ST cycle (bachelor’s degree) |
| Year of study, semester | | 1st year of study, 2nd semester |
| Number of ECTS credits | | 6 |
| Number of hours per week | | 4 (2 lecture hours + 2 seminar hours) |
| Name of lecture holder | | Assistant Professor Andrei Buzatu |
| Name of seminar holder | | Assistant Professor Andrei Buzatu |
| Prerequisites | | Crystallography, Crystallographic Systems |
| A | **General and course-specific competences** | |
|  | **General competences**:   * Effectively using additional scholarly sources and assisted learning resources in order to devise a research paper on a topic pertaining to the academic discipline   **Course-specific competences**:   * Identifying, describing and defining the mascroscopic and microscopic properties of minerals * Properly using specific instrumental methods for the identification and analysis of minerals * Using the knowledge acquired so as to explain and interpret the processes responsible for the genesis and properties of minerals | |
| B | **Learning outcomes** | |
|  | Upon successfully completing the discipline, students become capable of:   * describing the main physico-chemical characteristics of a crystalline structure * explaining the macroscopic properties of minerals * using polarized optical microscopy * analyzing an unknown mineral macroscopically and microscopically * understanding the chemistry and properties of minerals | |
| C | **Lecture content** | |
|  | |  |  |  |  | | --- | --- | --- | --- | | Week | Title of lecture | Teaching methods | Duration | | 1 | Introduction. History of Mineralogy | Lecture based on video projection, heuristic conversation | 2 hours; Deer et al., 1992; Wenk and Bulakh, 2004. | | 2 | The crystallographic basis of Mineralogy (types of lattices, Pauling’s rules, coordination theory, crystal field theory, crystal solutions, crystallochemical formula) | Lecture based on video projection, heuristic conversation | 6 hours; Deer et al., 1992; Wenk and Bulakh; 2004, Mureșan and Benea, 2001 | | 3 | Macroscopic properties of minerals (form and habit, cleavage and fracture, color, luster, transparency, specific gravity, hardness, tenacity) | Lecture based on video projection, heuristic conversation | 8 hours; Deer et al., 1992; Wenk and Bulakh; 2004, Mureșan and Benea, 2001 | | 4 | Electrical and magnetic properties of minerals. Mineral radioactivity. | Lecture based on video projection, heuristic conversation | 2 hours; Deer et al., 1992; Wenk and Bulakh; 2004, Mureșan and Benea, 2001 | | 5 | The polarizing microscope. Optical properties of minerals. | Lecture based on video projection, heuristic conversation | 6 hours; Deer et al., 1992; Wenk and Bulakh; 2004, Mureșan and Benea, 2001 | | 6 | Mineral genesis | Lecture based on video projection, heuristic conversation | 2 hours; Kerr Paul Francis (1977) *Optical mineralogy*. McGraw-Hill Inc., 492 p; Deer et al., 1992; Wenk and Bulakh, 2004, Mureșan and Benea, 2001 | | |
| D | **Recommended reading for lectures** | |
|  | **Main references:**   * **Deer W. A., Howie R. A., Zussman J. (1992)** *An introduction to the rock-forming minerals*, 2nd edition. Longman Scientific and Technical, London, 696 p. * **Kerr P. F. (1977)** *Optical mineralogy*. McGraw-Hill Inc., 492 p.; * **Mureșan I., Benea M. (2000)** *Mineralogie sistematică. Partea I-a.* Ed. ETA Cluj-Napoca**.** * **Mureșan I., Benea M. (2001)** *Mineralogie sistematică. Silicați naturali. Partea a II-a.* Ed. Casa Cărții de Știință, Cluj-Napoca. * **Wenk Hans Rudolf, Bulakh Andrei (2004**) *Minerals. Their constitution and origin.* Cambridge University Press, 646 p.   **Additional references:**  **Websites:** www.webmineral.com; www.ima-mineralogy.org;  **Journals: *Americal Mineralogist*; *Canadian Mineralogist*; *Elements*, *Mineralogical Magazine, European Journal of Mineralogy*, *Mineralogy and Petrology*, *Physics and Chemistry of Minerals*, *Reviews in Mineralogy*** | |
| E | **Seminar content** | |
|  | |  |  |  |  | | --- | --- | --- | --- | | Week | Title of seminar | Teaching methods | Duration | | 1. | Form and habit. Cleavage and fracture. Color and streak. | Observation/sample analysis | 2h; Wenk and Bulakh, 2004 | | 2. | Specific gravity, hardness, magnetic and electrical properties. Mineral radioactivity. | Observation/sample analysis. Physical measurements (pycnometer, Geiger-Muller counter) | 4h; Wenk and Bulakh, 2004 | | 3. | The polarizing microscope | Observing and carrying out a microscope adjustment | 2h; Wenk and Bulakh, 2004 | | 4. | Properties of minerals with parallel nicols – PPL (form and habit, cleavage, color and pleochroism, relief, inclusions) | Observation/analysis of thin sections and observation of samples | 8h; Kerr, 1977; Fleischer et al., 1984. | | 5. | Properties of minerals with crossed nicols – CPL (isotropy and anisotropy, interference colors, extinction angle, maclas) | Observation/analysis of thin sections and observation of samples | 8h; Kerr, 1977; Fleischer et al., 1984. | | 6. | Calculating the crystallochemical formula | Presenting the steps involved în calculating a crystallochemical formula  Exercises | 4h; Deer et al., 1992 | | |
| F | **Recommended reading for seminars** | |
|  | **Fleischer M., Wilcox R. E., Matzko J. J. (1984)** *Microscopic Determination of the Nonopaque Minerals.* U. S. Geol. Survey Bull., 1627, Washington, 453 p.  **Deer W. A., Howie R. A., Zussman J. (1992)** *An introduction to the rock-forming minerals*, 2nd edition. Longman Scientific and Technical, London, 696 p.  **Kerr P. F. (1977)** *Optical mineralogy*. McGraw-Hill Inc., 492 p;  **Wenk Hans Rudolf, Bulakh Andrei (2004)** *Minerals. Their constitution and origin.* Cambridge University Press, 646 p. | |
| G | **Education style** | |
| learning and teaching methods | | Lecture based on video projection, heuristic conversation, observation, analysis |
| assessment methods | | Written exam (35%) and continuous assessment (35%) (lecture-70%), oral exam and continuous assessment (seminar) – 30% |
| Language of instruction | | English |