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
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| 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
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| C | **Lecture content** |
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| 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 |

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| 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** |
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| 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 formulaExercises  | 4h; Deer et al., 1992 |

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| 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  |