Annex No. 5

to Ordinance No. 21/2019

**COURSE/MODULE SYLLABUS FOR UNIVERSITY COURSES/PhD STUDIES**

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|  | Course/module name in Polish and English  Methods in mineralogy, petrology and geochemistry/ Metody badań mineralogicznych, petrologicznych i geochemicznych | | |
|  | Discipline  Earth and Environmental Science | | |
|  | Language of instruction  English | | |
|  | Teaching unit  Faculty of Earth Science and Environmental Management, Institute of Geological Sciences, Department of Mineralogy and Petrology | | |
|  | Course/module code  USOS | | |
|  | Type of course/module *(mandatory or optional)*  optional | | |
|  | Field of studies (major, if applicable)  Geology | | |
|  | Level of higher education *(undergraduate (I cycle), Master’s (II cycle), 5 year uniform Master’s studies)*  Master’s (II cycle) | | |
|  | Year of studies *(if applicable*)  I/II | | |
|  | Semester *(winter or summer)*  winter/summer | | |
|  | Form of classes and number of hours  Lectures: 28  Classes: 28  Teaching methods:  Multimedia lecture, practical exercises, individual work, preparation of reports. | | |
|  | Name, title/degree of the teacher/instructor  Coordinator: dr hab. prof. UWr Marek Awdankiewicz  Lecturer: dr hab. prof. UWr Marek Awdankiewicz, dr Paweł Raczyński, staff of the department of Mineralogy and Petrology  Classes instructor: dr hab. prof. UWr Marek Awdankiewicz, dr Paweł Raczyński, staff of the Department of Mineralogy and Petrology | | |
|  | Course/module prerequisites, in terms of knowledge, skills, social competences  Knowledge in chemistry, physics, mineralogy and geochemistry at the level of BSc studies. | | |
|  | Course objectives  This course concentrates on methods that are of key importance in mineralogical and related sciences (mineral resources, environmental sci., etc.). Lectures provide theoretical background for many instrumental methods of chemical and phase analysis. Laboratory classes demonstrate a selection of instruments (in action), provide opportunity for students to carry out some practical analytical work and following interpretation of results.  After this course, students have theoretical and basic practical skills to select and apply proper analytical techniques in chemical, mineralogical and materials investigations, which are in use in geological, environmental and materials sciences (e.g. ceramics, glasses, concrete industry, metallurgy, mineral resources, mining and industrial wastes, environmental sciences). | | |
|  | Course content  Lectures:  Overview of chemical and phase analysis of minerals, rocks & related materials. Sample preparation and mineral separation for chemical and phase analysis in Earth sciences – selected issues. Classical chemical analysis (“wet analysis”) vs. instrumental chemical analysis. Selected instrumental methods and their application (XRF, INAA, ICP-MS). Electron microprobe (EMPA) and Scanning Electron Microscope (SEM). SHRIMP – Sensitive High-Resolution Ion Microprobe. Phase analysis of minerals, rocks and other materials. X-ray diffraction XRD. Thermal analysis (DTA, DTG, TG). Review of spectroscopic techniques (IR, RS). Cathodoluminescence CL.  Classes:  In classes, we present practical aspects of sample preparation and selected instrumental techniques used in chemical and phase analysis of geological and materials science samples, in particular thin sections preparation, mineral separation, XRD, SEM, CL, RS. | | |
|  | Intended learning outcomes in English  W\_1 Student has knowledge in science linked to selected aspects of geological sciences and technology, in particular in instrumental analytical methods.  W\_2 Student has knowledge on current problems in Earth sciences and material sciences as well as modern research methods, including chemical determination and phase analysis.  W\_3 Student constantly uses the rule of rigorous interpretation of natural and technical phenomena and processes, based on empirical data.  W\_4 Student knows general rules of research planning, using techniques and tools of geology, environmental sciences and related branches of technical sciences.  W\_5 Student has deep knowledge in selected disciplines of geological sciences (in particular in application of analytical methods).  U\_1 Student is able to apply advanced techniques and research tools in selected disciplines of geological sciences (instrumental chemical analysis, phase analysis).  U\_2 Students is able to plan and carry on research tasks or expertise under scientific supervision.  K\_1 Students understands the need of constant learning and raising professional competences, as well as inspiration and organization of learning for other people. | Symbols of learning outcomes for particular fields of studies:  K2\_W02  K2\_W03  K2\_W04  K2\_W06  K2\_W08  K2\_U01  K2\_U04  K2\_K01 | |
|  | Required and recommended reading *(sources, studies, manuals, etc.)*  Required reading  Gill R. (ed.), 1997. Modern analytical geochemistry. Longman.  Potts P.J., Bowles J.F.W, Reed S.J.B.,Cave M.R. (eds.), 1995. Microprobe techniques in the Earth sciences, The Mineralogical Society Series 6, Chapman & Hall.  Recommended reading  Reed S.J.B.1996. Electron microprobe analysis and scanning electron microscopy in geology, Cambridge University Press, 1996. | | |
|  | Assessment methods for the intended learning outcomes:  - written colloquim from lectures: K2\_W02, K2\_W03, K2\_W04, K2\_W06, K2\_W08,  - preparation of written reports from practicals: K2\_U01, K2\_U04, K2\_K01 | | |
|  | Credit requirements for individual components of the course/module:   * Lectures: written colloquium, passed if min. 50% of correct answers are given. * Classes: written reports from practicals, assessment method depends on type of exercise. Classes are obligatory, according to the general rules of study. | | |
|  | Total student effort | | |
| form of student activities | | number of hours for the implementation of activities |
| classes (according to the plan of studies) with a teacher/instructor:  - lectures: 28  - classes: 28 | | 56 |
| student's own work (including group-work) such as:  - preparation for classes: 15  - reading the suggested literature: 10  - preparation of results: 10  - writing a class report: 10 | | 45 |
| Total number of hours | | 101 |
| Number of ECTS credits | | 4 |