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 EnglishMethods in mineralogy, petrology and geochemistry/ Metody badań mineralogicznych, petrologicznych i geochemicznych |
|  | DisciplineEarth and Environmental Science |
|  | Language of instructionEnglish |
|  | Teaching unitFaculty of Earth Science and Environmental Management, Institute of Geological Sciences, Department of Mineralogy and Petrology |
|  | Course/module codeUSOS |
|  | 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 hoursLectures: 28Classes: 28Teaching methods:Multimedia lecture, practical exercises, individual work, preparation of reports. |
|  | Name, title/degree of the teacher/instructorCoordinator: dr hab. prof. UWr Marek AwdankiewiczLecturer: dr hab. prof. UWr Marek Awdankiewicz, dr Paweł Raczyński, staff of the department of Mineralogy and PetrologyClasses 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 objectivesThis 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 contentLectures: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 EnglishW\_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\_W02K2\_W03K2\_W04K2\_W06K2\_W08K2\_U01K2\_U04K2\_K01 |
|  | Required and recommended reading *(sources, studies, manuals, etc.)*Required readingGill 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 readingReed 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.
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|  | 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 |