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 w mineralogii, petrologii i geochemii | | |
|  | Discipline  Earth and Environmental Science | | |
|  | Language of instruction  English | | |
|  | Teaching unit  Faculty of Earth Science and Environmental Management, Institute of Geological Sciences, Department of Experimental Petrology, Department of Mineralogy and Petrology | | |
|  | Course/module code  USOS | | |
|  | Type of course/module *(mandatory or optional)*  Mandatory | | |
|  | Field of studies (major, if applicable)  Geology (spec. Applied Geoscience) | | |
|  | 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 | | |
|  | Semester *(winter or summer)*  winter | | |
|  | Form of classes and number of hours  Lectures: 14  Classes: 24  Field classes: 6  Teaching methods  Multimedia lecture, practical exercises, individual work, group work, preparation of reports | | |
|  | Name, title/degree of the teacher/instructor  Coordinator: Dr Wojciech Bartz  Lecturer: Dr Wojciech Bartz, Dr hab. Marek Awdankiewicz Prof. UWr, Dr hab. Piotr Gunia Prof. UWr, Dr hab. Maciej Górka Prof. UWr, Dr hab. Jakub Kierczak Prof. UWr, Dr Magdalena Matusiak-Małek, Dr hab. Anna Pietranik Prof. UWr, Dr Adam Szuszkiewicz, Dr Krzysztof Turniak.  Classes instructor: Dr Wojciech Bartz, Dr hab. Marek Awdankiewicz Prof. UWr, Dr hab. Piotr Gunia Prof. UWr, Dr hab. Maciej Górka Prof. UWr, Dr hab. Jakub Kierczak Prof. UWr, Dr Magdalena Matusiak-Małek, Dr hab. Anna Pietranik Prof. UWr, Dr Adam Szuszkiewicz, Dr Krzysztof Turniak. | | |
|  | Course/module prerequisites, in terms of knowledge, skills, social competences  General knowledge and skills acquired during bachelor degree studies in geology or related fields. | | |
|  | Course objectives  The primary objective of the course is to familiarize students with the theoretical basis of analytical methods used in mineralogy, petrology and geochemistry. Furthermore, students learn the practical use of the laboratories and the equipment available in the Institute of Geological Sciences. | | |
|  | Course content  Lecture:  Presentation of the theoretical basis of selected analytical methods used in mineralogy, petrology and geochemistry. A detailed characterization of selected methods of sample preparation of rocks and minerals (e.g., preparation of samples for chemical and phase analysis, various methods of separation of minerals) and methods of determination of the chemical composition of rocks and minerals (AAS, ICP-MS, LA-ICP-MS, EMPA, XRF, etc.). A detailed characterization of methods used to determine the phase composition of geological and environmental materials (XRD, Raman spectroscopy, SEM-EDS, DTA-TG-DTG, cathodoluminescence, infrared spectroscopy). Applications of presented methods, both in basic research and in applied mineralogy and geochemistry.  Laboratory:  During the class, students will learn in practice the principles of use of the equipment available in laboratories of the Inst. Geol Sci. (e.g. in the rock preparation lab, mineral separation lab, X-ray diffraction lab, and others). Students prepare samples for further research and carry out microscopic observations. In addition, they perform simple analyses using X-ray diffractometer, thermal analyzer and a scanning electron microscope with an EDS system. During the class, students also learn how to interpret the obtained results, or analyzes provided by the teacher.  Field course:  The field course enables students to learn about the possibilities of the newest analytical equipment in one of leading commercial laboratories specialized in chemical and phase analysis of geological and environmental specimens. | | |
|  | Intended learning outcomes  P\_W01 Student knows the theoretical basis of the methods used in mineralogy, petrology and geochemistry, and knows the purpose of these methods.  P\_U01 Student is able, under the guidance of teacher to perform research tasks related to the preparation of geological samples and to perform simple analysis using the available laboratory equipment and interpret the results of these analyzes.  P\_U02 Student has the ability to plan and conduct studies of rocks and minerals, using advanced techniques applied in mineralogical sciences.  P\_K01 Student is aware of the constant development of the analytical techniques used in mineralogy, petrology and geochemistry, and of need to update their knowledge.  P\_K02 Student can work in groups of several people with the principles of health and safety. | Symbols of learning outcomes for particular fields of studies, *e.g. K\_W01\**, *K\_U05,K\_K03*  K2\_W02, K2\_W04, K2\_W06, K2\_W08  K2\_U01  K2\_U03, K2\_U04  K2\_K01, K2\_K06  K2\_K02, K2\_K05 | |
|  | Required and recommended reading *(sources, studies, manuals, etc.)*  Required reading  Chisholm E.-K., Sircombe K. and DiBugnara D., 2014. Handbook of Geochronology Mineral Separation Laboratory Techniques. Record 2014/46 | GeoCat 78527, 45pp  Gill R., 1997. Modern analytical geochemistry: an introduction to quantitative chemical analyses for earth, environmental and material scientists. Longman, 1997.  Mange, M.A. and Maurer, H.F.W., 1992. Heavy Minerals in Colour. Chapman and Hall, London, 147pp  Marshall D.J., 1988. Cathodoluminescence of Geological Materials.Unwin Hyman, Boston.  Milburn G.H., 1990. X-ray Crystallography. An introduction to the theory and practice. Butterworths, London.  Pagel M., Barbin V., Blanc P., Ohenstetter D. (Eds) 2000. Cathodoluminescence in Geosciences. Springer, 514pp.  Reed S.J.B., 1996. Electron microprobe analysis and scanning electron microscopy in geology. Cambridge University Press.  Wendlandt W.W,. 1986. Thermal Analysis. Wiley, New York. | | |
|  | Assessment methods for the intended learning outcomes:  Lecture: written test. K2\_W02, K2\_W04, K2\_W06, K2\_W08, K2\_K01, K2\_K06.  Classes and field classes: preparation of a set of written reports describing tasks given on classes. K2\_U01, K2\_U03, K2\_U04, K2\_K02, K2\_K05. | | |
|  | Credit requirements for individual components of the course/module:  Lecture:  - written test, a positive result after obtaining at least 50% of the points.  Classes and field classes:  - monitoring attendance, preparing and implementing a project (individual and group),  - attendance is obligatory,  - the opportunity to make up for an absence as part of an individual work. | | |
|  | 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: 14  - classes: 24  -field classes: 6 | | 44 |
| student's own work (including group-work) such as:  - consultation: 11  - being prepared for classes: 10  - reading the suggested literature: 10  - writing a class report: 15  - preparing for tests and exam: 10 | | 56 |
| Total number of hours | | 100 |
| Number of ECTS credits | | 4 |