Annex No. 5
to Ordinance No.
21/2019

COURSE/MODULE SYLLABUS FOR UNIVERSITY COURSES/PhD STUDIES

1.	Course/module name in Polish and English Methods in mineralogy, petrology and geochemistry/ Metody badań mineralogicznych, petrologicznych i geochemicznych
2.	Discipline Earth and Environmental Science
3.	Language of instruction English
4.	Teaching unit Faculty of Earth Science and Environmental Management, Institute of Geological Sciences, Department of Mineralogy and Petrology
5.	Course/module code USOS
6.	Type of course/module *(mandatory or optional)* optional
7.	Field of studies (major, if applicable) Geology
8.	Level of higher education *(undergraduate (I cycle), Master's (II cycle), 5 year uniform Master's studies)* Master's (II cycle)
9.	Year of studies *(if applicable*) I/II
10.	Semester *(winter or summer)* winter/summer
11.	Form of classes and number of hours Lectures: 28 Classes: 28 Teaching methods: Multimedia lecture, practical exercises, individual work, preparation of reports.
12.	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
13.	Course/module prerequisites, in terms of knowledge, skills, social competences

	Knowledge in chemistry, physics, mineralogy and geochemistry at the level of BSc studies.	
14.	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).	
15.	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.	
16.	Intended learning outcomes in English	Symbols of learning outcomes for particular fields of studies:
	W_1 Student has knowledge in science linked to selected aspects of geological sciences and technology, in particular in instrumental analytical methods.	K2_W02
	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.	K2_W03
	W_3 Student constantly uses the rule of rigorous interpretation of natural and technical phenomena and processes, based on empirical data.	K2_W04
	W_4 Student knows general rules of research planning, using techniques and tools of geology, environmental sciences and related branches of technical sciences.	K2_W06

	W_5 Student has deep knowledge in selected disciplines of geological sciences (in particular in application of analytical methods).	K2_W08
	U_1 Student is able to apply advanced techniques and research tools in selected disciplines of geological sciences (instrumental chemical analysis, phase analysis).	K2_U01
	U_2 Students is able to plan and carry on research tasks or expertise under scientific supervision.	K2_U04
	K_1 Students understands the need of constant learning and raising professional competences, as well as inspiration and organization of learning for other people.	K2_K01

17.	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.
18.	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
19.	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. - Final mark is the mean of the lecture and classes, weight 50% each.
20.	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