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  Groundwater resource assessment/Ocena zasobów wód podziemnych/ | | |
|  | Discipline  Earth and Environmental Sciences | | |
|  | Language of instruction  English | | |
|  | Teaching unit  Faculty of Earth Science and Environmental Management, Institute of Geological Sciences, Department of Applied Hydrogeology | | |
|  | 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: 20  Classes: 10  Teaching methods  Multimedia lecture, discussion, practical exercises, individual work, preparation of reports | | |
|  | Name, title/degree of the teacher/instructor  Coordinator: Dr hab. Henryk Marszałek, Prof. UWr  Lecturer: Dr hab. Henryk Marszałek, Prof. UWr  Classes instructor: Dr hab. Henryk Marszałek, Prof. UWr | | |
|  | Course/module prerequisites, in terms of knowledge, skills, social competences  Basic knowledge and skills in the field of filtration parameters of rocks, groundwater dynamics, interaction between surface and groundwater. | | |
|  | Course objectives  The main objective of the course is to acquaint the student with the basic knowledge on prospecting, exploration and assessment of groundwater resources using different methods. The emphasis will be placed on the presentation of the processes occurring in the rocks environment, influencing the amount of the resources. | | |
|  | Course content  Lectures:  1. Groundwater as a component of the hydrological cycle.  2. Law regulations regarding groundwater resource evaluation.  3. Types of hydrogeological structures.  4. Classifications of groundwater resources.  5. The hydrogeological parameters of rocks.  6. Methods of water-bearing capacity estimation.  7. Methods for assessing of renewable groundwater resources.  7.1. Hydrograph separation.  7.2. Other methods: groundwater level fluctuations, hydrodynamic, infiltration rate.  8. Principle of disposable and exploitable resources assessment.  9. Protection of groundwater resources.  Classes:  Assessment of renewable groundwater resources using different methods: Wundt and Kille methods, hydrograph separation, hydrodynamic and infiltration rate methods. | | |
|  | Learning outcomes  P\_W01 Student knows the basic hydrogeological terminology in the field of water resources and processes forming the amount of groundwater resources in rock environment.  P\_W02 Student has knowledge about the applicability of selected methods for assessing the amount of groundwater resources.  P\_U01 He can apply the variety of research methods to calculate groundwater resources depending on the hydrogeological conditions.  P\_U02 He can prepare hydrogeological documentation (project) with results of groundwater resources estimation.  P\_K01 He understands the need to increase knowledge and improving professional skills. He is aware of the need for reasonable management of water resources.  P\_K02 He appreciates the role of communication in the work team. | Symbols of learning outcomes for particular fields of studies, *e.g. K\_W01\**, *K\_U05,K\_K03*  K2\_W01, K2\_W03, K2\_W09  K2\_W03, K2\_W08  K2\_U01, K2\_U03  K2\_U01, K2\_U04, K2\_U06  K2\_K01, K2\_K03  K2\_K02 | |
|  | Required and recommended reading *(sources, studies, manuals, etc.)*  Required reading  Downing R.A. & Wilkinson W.B., 1991. Applied groundwater hydrology. Clarendon Press, Oxford.  Freeze R.A., Cherry J.A. - Groundwater. Prentice Hall Inc. 1979,  Fetter C, W. – Applied hydrogeology, Pearson Education, 2013  Recommended reading  Chapellier D., 1992. Well logging in hydrogeology. Balkema, Rotterdam/Brookfield.  Domenico P.A. & Schwartz F.W., 1990. Physical and chemical hydrogeology. John Wiley & Sons. New York.  Gilli E., Mangan Ch., Mudry J. 2013 - Hydrogeology - Objectives, Methods, Applications, CRC Press, Taylor and Francis Group, Boca Raton:367  Papers in Hydrogeology Journal | | |
|  | Assessment methods for the intended learning outcomes:  Lecture: written examination. K2\_W01, K2\_W03, K2\_W08, K2\_W09, K2\_U01, K2\_U03, K2\_K01, K2\_K02, K2\_K03.  Classes: writing a class report. K2\_U01, K2\_U03, K2\_U04, K2\_U06. | | |
|  | Credit requirements for individual components of the course/module:  Lecture:  - written exam,: a positive result - obtaining at least 51% of points.  Classes:  - monitoring attendance and progress on the course subject matter,  - writing a class report (groundwater resources documentation) evaluated positively. | | |
|  | 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: 20  - classes: 10 | | 30 |
| student's own work (including group-work) such as:  - consultations: 10  - being prepared for classes: 5  - reading the suggested literature:5  - preparing papers/presentations/projects: 5  - writing a class report: 10  - preparing for tests and exam: 10 | | 45 |
| Total number of hours | | 75 |
| Number of ECTS credits | | 3 |