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 EnglishInterpretacja danych izotopowych w geologii stosowanej/Interpretation of isotopic data in applied geosciences |
|  | DisciplineEarth and Environmental Science |
|  | Language of instructionEnglish |
|  | Teaching unitFaculty of Earth Sciences and Environmental Management, Institute of Geological Science, Department of Experimental Petrology. |
|  | Course/module codeUSOS |
|  | Type of course/module *(mandatory or optional)*optional |
|  | Field of studies (major, if applicable)Geological Engineering |
|  | 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 hoursLectures: 18Classes: 12Teaching methodsMultimedia lecture, presentation, practical exercises, individual work, group work, preparation of reports |
|  | Name, title/degree of the teacher/instructorCoordinator: dr hab., prof. UWr Anna PietranikLecturer: dr hab., prof. UWr Maciej Górka, dr hab., prof. UWr Anna PietranikClasses instructor: dr hab., prof. UWr Maciej Górka, dr hab., prof. UWr Anna Pietranik |
|  | Course/module prerequisites, in terms of knowledge, skills, social competences Basic knowledge and skills in the field of mineralogy, petrology, geology, chemistry and geochemistry |
|  | Course objectivesStudents are familiarized with:- the basic rules of the distribution and fractionation of different isotopes within the major parts of the Earth (mantle, crust, hydrosphere, biosphere, atmosphere); - methods of dating of rocks, minerals and artefacts;- isotope geothermometry  |
|  | Course contentLectures:1. Basic information on isotopes and their application to solving environmental problems.
2. Mass dependent and mass independent isotope fractionation.
3. Isotopic diversity of the Earth and its interpretation: mantle, crust, critical zone, hydrosphere, atmosphere, biosphere and their interactions.
4. Isotope geothermometry and how to use it in geoloegical and environmental sciences.
5. How to date a rock? Different approaches to measuring ages of materials.

Classes:1. Sr isotopes as the tool to reconstruct sources of groundwaters. Mass balance models.
2. Pb isotopes as the tool to detect pollution in soils. Mass blance models.
3. Cr isotopes as the tool to estimate Cr+6 reduction
4. Isotope geothermometry – calculations using Alpha-Delta database
5. Binary mixing model – Keeling plot to estimate components in atmospheric particulate matter
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|  | Intended learning outcomes:W\_1 Knows the isotopic diversity of the Earth and its componentsW\_2 Knows how to use isotope techniques to solve problems related to geological problems, dating and environmental investigations.U\_1 Knows how to perform a basic calculation / normalization applied in isotope geology and geochemistry.K\_1 Is aware of the role and importance of modern analytical techniques in the geological and geochemical sciences.K\_2 Is capable of reliable sample preparation of geological and environmental isotopic analyzes and understands the social responsibility resulting from presented on the basis of the results, reports and conclusions. | Symbols of learning outcomes for particular fields of studies:K2\_W01, K2\_W03, K2\_W05K2\_W03, K2\_W05, InżK2\_W02K2\_U01, K2\_U02, K2\_U04InżK2\_U01K2\_K01K2\_K01, K2\_K02 |
|  | Required and recommended reading *(sources, studies, manuals, etc.)*Recommended literature:1. Dickin A.P., Radiogenic Isotope Geology, Cambridge University Press, 19952. Allegre C. J., Isotope Geology, Cambridge University Press, Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, São Paulo, 20083. Hoefs J., Stable Isotope Geochemistry, Springer-Verlag, Berlin Heidelberg, 20094. Wada E., Yoneyama T., Minagawa M., Ando T., Fry B.D., Stable Isotopes in the biosphere, Kyoto University Press Japan, 19955. Michener R., Lajtha K., Stable Isotopes in Ecology and Environmental Science, Blackwell Publishing Ltd., 20076 . Selected publications from the Web of Science – available at lecturers |
|  |  Assessment methods for the intended learning outcomes:- Lectures: written test: InżK2\_W02; K\_K01; K\_W01; K\_W03; K\_W05; - Reports based on calculations learnt during classes: InżK2\_U01; K2\_K01; K2\_K02; K2\_U01; K2\_U02; K2\_U04;  |
|  | Credit requirements for individual components of the course/module:Lecture: : 1-hour written test, passed if 60% answered correctlyClasses: mean mark of two based on two reports from the classesClasses – presence obligatory, possibility to attend consultations if absent |
|  | 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:- lecture:18- classes:12- exam: 1- consultations:8 | 39 |
| student's own work (including group-work):- preparation to the classes (lecture, etc.): 6- reading set literature:10- writing course report:10- preparing for exam:10 | 36 |
| Total number of hours | 75 |
| Number of ECTS credits | 3 |