Annex No. 5
to Ordinance No.
21/2019

COURSE/MODULE SYLLABUS FOR UNIVERSITY COURSES/PhD STUDIES

1.	Course/module name in Polish and English Analiza strukturalna/ Structural analysis
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
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 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: 20 Classes: 20 Teaching methods Multimedia lecture, presentation, discussion, practical exercises, individual work, group work.
12.	Name, title/degree of the teacher/instructor Coordinator: prof. dr hab. Paweł Aleksandrowski Lecturer: prof. dr hab. Paweł Aleksandrowski Classes instructor: prof. dr hab. Paweł Aleksandrowski
13.	Course/module prerequisites, in terms of knowledge, skills, social competences Knowledge and skills covered by programme of lectures and classes of physical geology, physics and mathematics as well as of structural geology and tectonics of 1st cycle studies (basic knowledge on and skills concerning tectonic structures, stereographic projection techniques and geological map interpretation)

14.	Course objectives The course acquaints students with the theoretical basis and practical application of selected up-to-date research methods of structural geology. It is also intended to prepare and train students to undertake self-studies in this domain in case it should be necessary in their future professional activities	
15.	Course content Lectures: Methods of morphological and geometrical analysis of folds. Basics of balanced cross-sections contruction. Structural analysis of metamorphic terranes. Kinematic and dynamic analysis of faults and joints. Basics of strain analysis. Geometrical analysis of folds. Elements of analysis of large-scale structures (tectonic analysis). Classes: Analysis of morphological elements and of orientation of folds using stereographic projection methods. Folds – important notions, definitions, morphology, folding mechanisms. Geometry and classification of folds. Delineating fold axial surfaces on map and in outcrop. Restoring the geometry of major folds based on assymetry of lower-order folds. Fold classification using Hudlestone and Ramsay's methods– theoretical basis and practical applications. Arc (Busk) method, dip izogon (Ramsay) and kink fold (Suppe) methods. Determination of strain and of palaeostresses form patterns of kink bands. Development of thrust systems and application in balanced-cross sections. Foliations and lineations and their attitude with respect to the axes of strain ellipsoid. Superposition of deformation structures in time and space. Progressive deformation. Analysis of faults, determination of stress tensor for fault populations. Coaxial and non-coaxial deformation. Basic methods of strain analysis. Descriptive and dynamical analysis of joints. Interpretation of large-scale tectonic structures.	
16.	Intended learning outcomes	Symbols of learning outcomes for particular fields of studies:
	W_1 shows knowledge on current problems of Earth and environmental sciences and their contemporary research methods.	K2_W03
	W_2 in his/her research and practice consistently applies principles of rigorous interpreting tectonic phenomena and processes, based on empirical data.	K2_W04
	W_3 shows knowledge on statistics that enables him/her forecasting (modelling) geological phenomena and processes.	K2_W05
	W_4 knows general principles of planning research activities, using techniques and research tools specific of geological sciences.	K2_W06
	W_5 shows advanced knowledge of structural geology and tectonics.	K2_W08
	W_6 shows deepened knowledge of English-language terminology of structural geology and tectonics.	K2_W09

	U_1 is able to apply selected advanced techniques and research tools of structural geology.	K2_U01
	U_2 employs Polish- and English-language geoscience literature in their learning activities.	K2_U02
	U_3 is able to employ statistical methods and specialist techniques and informatic tools in description of structural phenomena and data analysis, as well as to collect empirical data coming from various sources.	K2_U05
	K_1 understands the need of continuous learning and improving professional competencies, as well as of inspiring others in undertaking those tasks.	K2_K01
	K_2 is able to work in a team as well as to manage the works of a team.	K2_K02

17.	Required and recommended reading *(sources, studies, manuals, etc.)* Required reading: S.M. Rowlands & E.M. Duebendorfer, 2007, Structural Analysis and Synthesis, 3rd Ed, Blackwell, Oxford. J.G. Ramsay & M. Huber, 1983, 1987, The Techniques of Modern Structural Geology, Vol. 1 i 2, Academic Press, London. Recommended reading: S. Marshak & G. Mitra, 1988, Basic Methods of Structural Geology, Prentice Hall, Englewood Cliffs, New Jersey Groshong S.H., 2006. 3-D Structural Geology. Springer, Berlin - Heidelberg. Ragan D.M., 2009, Structural Geology - an introduction to geometrical techniques, 4th Ed, Cambridge University Press. Fossen H., 2010, Structural Geology, Cambridge University Press. Twiss R.J. & Moores E.M., 2006, Structural Geology, 2nd Ed., Freeman & Co., New York Price N.J. & Cosgrove J.W, 1990, Analysis of Geological Structures, Cambridge University Press.
18.	Assessment methods for the intended learning outcomes: - written examination: K2_W03 K2_W04 K2_W05 K2_W06 K2_W08 K2_W09 K2_K02 - assessment of successive tasks results: K2_W03 K2_W04 K2_W05 K2_W06 K2_W08 K2_W09 K2_U01 K2_U02 K2_U05 K2_K01 K2_K02 - assessment of individual oral presentations: K2_K01, K2_W03 K2_W04 K2_W08 K2_W09 K2_U02 K2_K01.
19.	Credit requirements for individual components of the course/module: - exam – written. Positive result – after aquisition of minimum 60% score. - at least 85% of required structural analysis tasks completed - final grade based on exam (50%), practical tasks (50%)
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: 22	

	- classes: 22 - consulting: 6	50
	student's own work (including group-work) such as: - preparing for classes: 10 - completing structural tasks: 10 - reading the suggested literature: 10 - preparing presentations: 10 - preparing for exam: 10	50
	Total number of hours	100
	Number of ECTS credits	4