

## **COURSE/MODULE SYLLABUS FOR UNIVERSITY COURSES/PhD STUDIES**

1.	Course/module name in Polish and English Geographic Information Systems in Geology/ Komputerowe systemy informacji przestrzennej (GIS) w geologii
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 Applied Geology, Geochemistry and Environmental Management
5.	Course/module code USOS
6.	Type of course/module ( <i>mandatory or optional</i> ) optional
7.	Field of studies (major, if applicable) Geology
8.	Level of higher education ( <i>undergraduate (I cycle), Master's (II cycle), 5 year uniform Master's studies</i> ) Master's (II cycle)
9.	Year of studies ( <i>if applicable</i> ) I/II
10.	Semester ( <i>winter or summer</i> ) winter/summer
11.	Form of classes and number of hours Lectures: 20 Lab classes: 39 Teaching methods: Multimedia lecture, practical exercises, individual work.
12.	Name, title/degree of the teacher/instructor Coordinator: Łukasz Pleśniak, PhD Lecturer: Łukasz Pleśniak, PhD Classes instructor: Łukasz Pleśniak, PhD
13.	Course/module prerequisites, in terms of knowledge, skills, social competences Knowledge and skills: Basics of statistics and geostatistics; basics of cartography, including geological and zoological cartography; the basis of remote sensing; advanced

	internet use (search on geoportals)	
14.	<p>Course objectives</p> <p>The aim of education is to introduction students with the possibilities of geographical information systems (GIS) in the field of visualization and analysis of spatial data and examples of practical applications of this domain of knowledge. Classes (lecture and classes) are aimed at a thorough understanding and acquire of basic concepts and processes related to GIS and the efficient use of tools offered by exemplary specialized software and a global internet network.</p> <p>Students acquire theoretical knowledge by attending lectures and the skills of using the QGIS system by performing individual projects under the supervision of the tutor. Classes are an introduction to potential professional work with the use of GIS systems, inter alia in institutions dealing with sozologic cartography, in state administration, e.g. in the elaboration of maps regarding natural resources of counties and others.</p>	
15.	<p>Course content</p> <p>Lectures:</p> <p>Introduction to the GIS structure. Geographical information systems. Applications of GIS systems. Cartographic projections, conversion between systems. Databases and data structure. GIS as operations on databases. Calibration of maps as an introduction to the geospatial. Transformation of point, line and surface data. Functions of spatial analysis: search, classification, measurements, neighborhood, merging. Data generalization. Interpolation - principles and methods. Digital data sources and remote sensing. Satellite images of the Earth's surface. Processing of digital remote sensing images and spatial data analysis. Numeric terrain model. Examples of the dissemination of GIS systems, i.e. where you can find free and fully usable data for GIS - Geoportals. Review of the most important GIS systems and their application in geology and environmental protection. Introduction to modeling of geodynamic, hydrological and hydrogeological processes. The role of GIS in natural sciences.</p> <p>Lab classes:</p> <p>Introduction to the QGIS systems. The QGIS system and its basic tools - preliminary exercises. Cartographic projections, conversion between geographic coordinate systems. Calibration of raster layers. Execution of links between layers of geographic information for the selected region. Learning the basic functions of the software. QGIS system - advanced tools - individual projects. Performing an individual project including maps based on cartographic materials in raster and vector version and other databases. The design of the resulting map windows as a preparation for the professional use of GIS software and the creation of map printouts. Learning advanced functions of the QGIS system.</p>	
16.	<p>Intended learning outcomes</p> <p>W_1 Knows the procedures in geological cartography and knows the principles of creating environmental maps.</p> <p>W_2 Knows the principles of analysis and interpretation of geological data.</p> <p>W_3 Knows the methodology and tools necessary to carry out tasks in the field of cartography of the surface area and the limitations resulting from the use of specified methods.</p>	<p>Symbols of learning outcomes for particular fields of studies:</p> <p>K2_W02, K2_W03, K2_W05,</p> <p>K2_W03, K2_W04, K2_W05</p> <p>K2_W01, K2_W05, K2_W06</p>

	<p>U_1 Has the ability to acquire, analyze and interpretation geological data for the construction of thematic maps.</p> <p>U_2 Can use cartographic archival documentation.</p> <p>U_3 Has the ability to document the acquired geological data and interpret the geological structure on by own observations.</p> <p>U_4 Has the ability to make cartographic elaborations based on the obtained data, including archival elaborations and data.</p> <p>K_1 Is aware of the necessity of self-education in the application of digital research methods and computer techniques for the needs of geological and environmental cartography.</p> <p>K_2 Is able to critically evaluate the possessed data, prioritize the significance of facts and geological data and to plan activities in the field of geological and environmental cartography.</p>	<p>K2_U03, K2_U05,</p> <p>K2_U03</p> <p>K2_U01, K2_U03, K2_U05</p> <p>K2_U01, K2_U03, K2_U04</p> <p>K2_K01, K2_K03</p> <p>K2_K03, K2_K04,</p>
17.	<p>Required and recommended reading (<i>sources, studies, manuals, etc.</i>)</p> <p>Required reading</p> <p>Campbell J. E., Shin M. 2012.Geographic Information System Basics.</p> <p>Recommended reading</p> <p>Huisman O., de By R., A. 2009. Principles of geographic information systems. An Introductory text book.</p>	
18.	<p>Assessment methods for the intended learning outcomes:</p> <ul style="list-style-type: none"> <li>- written examination: K2_W01K2_W02, K2_W03, K2_W04, K2_W05, K2_W06.</li> <li>- preparation and implementation of an individual project: K2_U01, K2_U03, K2_U04, K2_U05, K2_K01, K2_K03, K2_K04.</li> </ul>	
19.	<p>Credit requirements for individual components of the course/module:</p> <ul style="list-style-type: none"> <li>- Lecture - written exam - open test, 50% to pass</li> <li>- Exercises - monitoring attendance and progress on the course subject matter,</li> <li>- preparation and implementation of an individual project - printout of a thematic map, 50% to pass.</li> <li>- 2 unjustified absences allowed, no possibility to making up for classes</li> </ul>	
20.	Total student effort	
	form of student activities	number of hours for the implementation of activities
	<p>classes (according to the plan of studies) with a teacher/instructor:</p> <ul style="list-style-type: none"> <li>- lectures: 20</li> <li>- lab classes: 39</li> </ul>	59
	<p>student's own work (including group-work) such as:</p> <ul style="list-style-type: none"> <li>- being prepared for classes: 5</li> </ul>	41

	<ul style="list-style-type: none"> <li>- reading the suggested literature: 5</li> <li>- preparing projects: 10</li> <li>- writing a class report: 15</li> <li>- preparing for exam: 6</li> </ul>	
	Total number of hours	100
	Number of ECTS credits	4