



Subject card

Subject name and code	Classification Methods of Geoinformation Data, PG_00048296						
Field of study	Informatics, Biomedical Engineering, Biomedical Engineering, Biomedical Engineering						
Date of commencement of studies	February 2022	Academic year of realisation of subject			2022/2023		
Education level	second-cycle studies	Subject group			Optional subject group Subject group related to scientific research in the field of study		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Geoinformatics -> Faculty of Electronics, Telecommunications and Informatics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Zbigniew Łubniewski				
	Teachers		dr hab. inż. Zbigniew Łubniewski				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	15.0	0.0	30
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	30		6.0		39.0	75
Subject objectives	Learning by students on basic knowledge and practical skills on geodata processing methods for their classification, with examples of underwater acoustic surveys data and satellite Earth observation data						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_U04] can apply knowledge of programming methods and techniques as well as select and apply appropriate programming methods and tools in computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, making assessment and critical analysis of the prepared software as well as a synthesis and creative interpretation of information presented with it	Student can develop software and is able to apply appropriate solutions and tools in developing software for geodata classification.	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
	[K7_K02] is ready to provide critical evaluation of received content and to acknowledge the importance of knowledge in solving cognitive and practical problems	Student recognizes the importance of knowledge in solving problems in geodata classification.	[SK5] Assessment of ability to solve problems that arise in practice [SK2] Assessment of progress of work
	[K7_U09] can carry out a critical analysis of the functioning of existing technical solutions and assess these solutions, as well as apply experience related to the maintenance of advanced technical systems, devices and facilities typical for the field of studies, gained in the professional engineering environment	Student is able to evaluate critically and to improve the existing IT solution of a given classification issue.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject
	[K7_W08] Knows and understands, to an increased extent, the fundamental dilemmas of modern civilisation, the main development trends of scientific disciplines relevant to the field of education.	Student knows the development trends in geodata classification.	[SW1] Assessment of factual knowledge
	[K7_W02] Knows and understands, to an increased extent, selected laws of physics and physical phenomena, as well as methods and theories explaining the complex relationships between them, constituting advanced general knowledge in the field of technical sciences related to the field of study	Student knows applications of raster images and underwater acoustic data classification. He knows sample descriptors used in classification. He knows the selected methods of data processing used within the classification process.	[SW1] Assessment of factual knowledge
Subject contents	1. Sample applications of automatic data classification algorithms in geoinformatics 2. Types of data sources in classification tasks: raster data (airborne and satellite imagery, sonar data), acoustical echo signals 3. Data pre-processing 4. Selection of input features for classification procedure 5. Types of data features and parameters used in classification (for signals and/or images): statistical, geometrical, physical, parameters describing data after transformations 6. Examples of features extracted for images and signals 7. Image segmentation 8. Time-frequency analysis. Wavelet transforms 9. Introduction to texture analysis 10. Reducing the dimension of input parameter space. Principal Component Analysis 11. Independent Component Analysis 12. Distance in parameter space. Used definitions of distance 13. Selected classification algorithms. Unsupervised and supervised classification. Selected decision rules 14. Examples of soft computing applications in data classification		
Prerequisites and co-requisites	The student should possess the knowledge and skills obtained within the subject: Acquisition and analysis of data in GIS (semester 1 of specialisation: Geoinformatic and Mobile Technologies).		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written exam	50.0%	30.0%
	Project	50.0%	50.0%
	Midterm colloquium	50.0%	20.0%
Recommended reading	Basic literature	1. E. Chuvieco, "Fundamentals of Satellite Remote Sensing: An environmental approach", CRC Press, Taylor & Francis Group, 2016 2. Stepnowski A. "Systemy akustycznego monitoringu środowiska morskiego" (in Polish), Gdańskie Towarzystwo Naukowe, Gdańsk 2001	

	Supplementary literature	<p>1. B. Jaehne, "Digital Image Processing. Concepts, Algorithms, and Scientific Applications", Springer, 1995</p> <p>2. J. A. Richards, "Remote Sensing Digital Image Analysis. An Introduction", Springer-Verlag, 1995</p>
Example issues/ example questions/ tasks being completed	Not specified.	
Work placement	Not applicable	