

**DOCTORAL SCHOOL OF WROCLAW UNIVERSITY OF SCIENCE AND
TECHNOLOGY**

SUPERVISOR DECLARING/CONDUCTING COURSE: Kazimierz Bęcek
DEPARTMENT: Faculty of Mining Geoengineering and Geology W6
SCIENTIFIC DISCIPLINE: Environmental Engineering, Mining and Energy

COURSE CARD

Course name in Polish: Pozyskiwanie, przetwarzanie i modelowanie geodanych

Course name in English: Exploration and Modelling of Geodata

Course language Polish / ~~English~~*

University-wide general course type*:

The course is intended for all PhD students: YES / NO

~~1) BASIC COURSE~~

2) SPECIALIST COURSE

~~3) SEMINAR~~

~~4) HUMANISTIC COURSE~~

~~5) LANGUAGE~~

Subject code: IGQ100010W

* delete as applicable

	Lecture	Foreign language course	Seminar	Mixed forms
Number of hours of organized classes in university (ZZU)	30			
Grading	Exam	Exam	Oral presentation	Exam, inspection, evaluation classes

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge and skills in applied physics and statistical methods
2. Basic skills in Python or „R” scripts.
3. Basic knowledge of the intellectual property rights law.

COURSE OBJECTIVES

C1. To convey basic knowledge on the contemporary methods of geodata acquisition.

C2. To convey basic knowledge on the exploration and modelling of natural and anthropogenic system using geodata.

PROGRAM CONTENTS

Form of classes – lecture (Lec)		Number of hours
Lec1	Contemporary <i>in situ</i> methods of geodata acquisition	2

DOCTORAL SCHOOL OF WROCLAW UNIVERSITY OF SCIENCE AND TECHNOLOGY

Lec2	The „signal of opportunity” type of methods for geodata acquisition.	2
Lec3	GNSS technology in geodata acquisition: the-state-of-the-art and the future	2
Lec4	Current and planned satellite systems for geospatial data acquisition	2
Lec5	Multiregression for exploration of geodata and modelling of natural and anthropogenic systems.	2
Lec6	Time series analysis for exploration of geodata and modelling of natural and anthropogenic systems.	2
Lec7	Time series analysis in frequency domain and their applications.	2
Lec8	Cellular automata and Markov chain for exploration of geodata and modelling of natural and anthropogenic systems.	2
Total hours:		16

Form of classes – seminar (Sem)		Number of hours
Sem1	Student presentations on the topic of Lec1	2
Sem2	Student presentations on the topic of Lec2	2
Sem3	Student presentations on the topic of Lec3	2
Sem4	Student presentations on the topic of Lec4	2
Sem5	Student presentations on the topic of Lec5	2
Sem6	Student presentations on the topic of Lec6	2
Sem7	Student presentations on the topic of Lec8	2
Total hours:		14

TEACHING TOOLS USED
N1. Multimedial presentation. N2. Discussion and Q&A N3. Computer programming project.

ACHIEVED SUBJECT LEARNING OUTCOMES		
Type of learning outcome	Code of learning outcome	Assessment of learning outcome
Knowledge	P8S_WG	<ul style="list-style-type: none"> - to such an extent that it is possible to revise existing paradigms – world heritage, including theoretical foundations, general issues and selected specific issues – specific to a scientific or artistic discipline - the main trends in the development of the scientific or artistic disciplines covered in the curricula - research methodology - the rules for the dissemination of scientific results, including in open access mode - student has a sound knowledge of basic subjects such as mathematics, physics, chemistry or others - has an advanced knowledge fundamental to a field relevant to his/her research, including the most advanced methods of research and

**DOCTORAL SCHOOL OF WROCLAW UNIVERSITY OF SCIENCE AND
TECHNOLOGY**

		<ul style="list-style-type: none"> verification of results achieved - has advanced knowledge of directional subjects in a given discipline or in interdisciplinary subjects - has knowledge at an advanced level of discipline and subject matter relevant to the field of research carried out, including the most recent research findings and scientific achievements
Skills	P8S_UW	<ul style="list-style-type: none"> - use knowledge from different fields of science or art to creatively identify, formulate and innovatively solve complex problems or perform research tasks, in particular: - define the purpose and subject of scientific research, formulate a research hypothesis, - develop research methods, techniques and tools, and use them creatively, - draw conclusions on the basis of scientific research, - critically analyse and evaluate the results of scientific research, expertise and other creative work and their contribution to knowledge development - transfer the results of scientific activities to the economic and social spheres - moreover - student has scientific and technological skills relevant to methods and methodology of conducting scientific research and critical evaluation of the results obtained - is able to create and conduct independent research, including outside the educational institution - is able to creatively interpret the results obtained and to search for their application - is prepared to intensify research with commercial potential

**DOCTORAL SCHOOL OF WROCLAW UNIVERSITY OF SCIENCE AND
TECHNOLOGY**

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

- [1] Li, R. (1997). Mobile Mapping: An Emerging Technology for Spatial Data Acquisition. https://www.asprs.org/wp-content/uploads/pers/97journal/september/1997_sep_1085-1092.pdf
- [2] Jones, M. (2018). Signals of opportunity: Holy Grail or a waste of time? <https://www.gpsworld.com/signals-of-opportunity-holy-grail-or-a-waste-of-time/>
- [3] Risos, C. Trends in Geopositioning for LBS, Navigation and Mapping. https://www.researchgate.net/profile/Chris_Rizos/publication/228713924_Trends_in_geopositioning_for_LBS_navigation_and_mapping/links/0fcfd50f473e7c14a3000000/Trends-in-geopositioning-for-LBS-navigation-and-mapping.pdf
- [4] Becek, K. (2016). Real-time mapping: contemporary challenges and the Internet of Things as the way forward. <http://yadda.icm.edu.pl/yadda/element/bwmeta1.element.baztech-26787e0b-4104-417c-8b59-41eccff97c09>.
- [5] Arsanjani, J., J. et al. (2013). Integration of logistic regression, Markov chain and cellular automata models to simulate urban expansion. <https://www.semanticscholar.org/paper/Integration-of-logistic-regression%2C-Markov-chain-to-Arsanjani-Helbich/fa1f9cf4dd658fbb1603b90a0890da58236b086d>
- [6] Statsoft (2019). Internetowy podręcznik statystyki. https://www.statsoft.pl/textbook/stathome_stat.html?https%3A%2F%2Fwww.statsoft.pl%2Ftextbook%2Fstmulreg.html

SECONDARY LITERATURE:

- [1] References suggested by the participants and as required.

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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