![Wrocław University of Science and Technology — Doctoral School]

COURSE CARD

1. Basic information

Course name in English:	Introduction to spatial analysis in environmental protection and mining
Course name in Polish:	Wprowadzenie do analiz przestrzennych w ochronie środowiska i w górnictwie
Number of hours:	15
Type of course:	Elective course
Form of course:	mixed forms (combination of lecture, seminar and laboratory)
Code of course:	W06ISG-SD0121W / IGQ100432W
Course leader:	Dr hab. inż. Jan Blachowski
Faculty of the course leader:	W6 Faculty of Geoengineering, Mining and Geology
Email address of the course leader:	Jan.blachowski@pwr.edu.pl

Scientific discipline(s) assigned to the course (doctoral students representing the marked disciplines can participate in the course):		
	Architecture and urban planning	☒
	Automation, electronic, and electrical engineering	☐
	Information and communication technology	☐
	Biomedical engineering	☐
	Chemical engineering	☐
	Civil engineering and transport	☒
	Mechanical engineering	☐
	Environmental engineering, mining, and energy	☒
	Mathematics	☐
	Chemical sciences	☐
	Physical sciences	☐
	Management and quality studies	☐

2. Objectives

1. Presentation of information on the use of GIS tool and functions in analysis of spatial location, distribution and patterns of objects, phenomena and processes.
2. Acquiring the ability to formulate and solve tasks using GIS analytical functions
3. Acquiring knowledge and skills of using public spatial information services (geoportals, databases, map services)

3. Content

Detailed information about the course content, including topics and form of classes.

No.	Topic	Number of hours	Form of classes
1	Fundamentals of GIS, spatial analysis methods	2	lecture
2	Spatial statistics, interpolation and density functions	2	lecture

3	Map algebra functions	2	lecture
4	Site selection analysis (overlay functions)	2	laboratory
5	Least cost path analysis (DEM analysis)	2	laboratory
6	Mobile GIS and web map development	2	laboratory
7	Interpolation and density analysis of selected	2	laboratory
8	Pitch presentations of semester assignments	1	seminar

4. Prerequisites

List of prerequisites relating to knowledge, skills and other competences for course participants.

Basic knowledge of databases, basic knowledge of statistical concepts

5. Learning outcomes

List of learning outcomes at level 8 of the Polish Qualifications Framework assigned to the course (mark the learning outcomes in the last column).

Symbol	Learning outcome	
	KNOWLEDGE. Doctoral student knows and understands:	
SzD_W3	the main trends in the development of the scientific or artistic disciplines covered in the curricula;	☒
SzD_W4	research methodology;	☒
SzD_W5	the rules for the dissemination of scientific results, including in open access mode;	☐
SzD_W6	the fundamental dilemmas of modern civilization;	☐
SzD_W7	the legal and ethical conditions of scientific activity;	☐
SzD_W8	the economic and other relevant conditions of scientific activity;	☐
SzD_W9	basic principles of knowledge transfer to the economic and social spheres and commercialisation of results of scientific activity and know-how related to these results.	☐
	SKILLS. Doctoral student is able to:	
SzD_U2	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;	☒
SzD_U3	communicate on specialised topics to the extent that they enable an active participation in the international scientific community;	☐
SzD_U4	disseminate research results, including in popular forms;	☒
SzD_U5	initiate debates and participate in a scientific discourse;	☐

SzD_U6	be able to speak a foreign language at B2 level of the Common European Framework of Reference for Languages to a level that enables them to participate in the international scientific and professional environment;	☒
SzD_U7	plan and implement an individual or collective research or creative activity, including in an international environment;	☒
SzD_U8	independently plan and act for one's own development and inspire and organize the development of others;	☒
SzD_U9	plan classes or groups of classes and implement them using modern methods and tools.	☐
	SOCIAL COMPETENCES. Doctoral student is ready to:	
SzD_K3	fulfilling the social obligations of researchers and creators, initiate public interest activities, thinking and acting in an entrepreneurial way;	☐
SzD_K4	maintaining and developing the ethos of research and creative environments, including: - carrying out scientific activities in an independent manner, - respecting the principle of public ownership of research results, taking into account the principles of intellectual property protection.	☒

6. Evaluation
Short description of the method(s) used to evaluate the learning outcomes assigned to the course, e.g., exam, test, report, presentation, etc.

Presentation, Report, Web map

7. Teaching methods
Short description of the teaching methods used during the course, e.g., multimedia presentation, discussion, literature studies, developing written documents, own work, etc.

Multimedia presentations, discussion, text handouts and assigned paper readings, field work, developing database and web map, own work

8. Literature
List of primary and secondary literature used to prepare the course and including additional knowledge for participants, e.g., books, textbooks, research papers, standards, web pages, etc.

Longley P., Goodchild M., Maguire D., Rhind D., Geographic Information Systems and Science, 4th Edition, Wiley 2015
Heywood I., Cornelius S., Carver S., An Introduction to Geographical Information Systems, 4th Edition, Pearson – Prentice Hall 2011
Blachowski J., GIS in mining. Politechnika Wrocławska, Wrocław 2020
Mitchell A., GIS Analysis. Vol. 2: Spatial Measurements and Statistics, ESRI Press 200
ESRI Academy @ https://www.esri.com/training/

9. Other remarks
Additional remarks, comments, (e.g., language of the course)