Wrocław University of Science and Technology

Study programme

Organizational unit:	Faculty of Geoengineering, Mining and Geology
Field of study:	Mining and Geology
Level of study:	second degree 4 semesters
Form of study:	full-time studies
Education cycle:	2025/2026

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Field of study characteristics

Basic information

Organizational unit:	Faculty of Geoengineering, Mining and Geology
Field of study:	Mining and Geology
Study level:	second degree 4 semesters
Study form:	full-time studies
Education profile:	general academic profile
Language of study:	English
Valid from the education cycle:	2025/2026
Number of semesters:	4
Total number of hours of classes:	directional: 15 Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology: 1515 Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST: 1515 Mineral Resources Exploration - Track WUST - University of Zagreb: 1530 Mineral Resources Exploration - Track University of Zagreb - WUST: 1530 Mineral Resources Exploration - Track WUST - University of Miskolc: 1515 Mineral Resources Exploration - Track University of Miskolc - WUST: 1515 Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben: 1575 Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg: 1545
Total number of ECTS points required to complete a given level of study:	120
Professional title awarded to graduates:	magister inżynier

Fields of science and scientific disciplines

Scientific disciplines to which the field of study is assigned:

Field engineering and technical sciences

Assigning the major to the fields and disciplines to which the learning outcomes relate:

Discipline	Percentage
Environmental engineering, mining and energy	100%

Main discipline: Environmental engineering, mining and energy

Description of the field, profile of the graduate and possibilities of continuing studies

The graduate will have the skills to use advanced knowledge in the field of basic, and specialized subjects. He/she will have the skills to lead teams, make high-risk decisions, and be fluent in using legal and economic knowledge.
The graduate will be prepared to design technological processes, as well as to solve scientific and research problems and to undertake creative initiatives.

He/she will be prepared to work in enterprises, technical supervision institutions, public state and local administration, in research and development organisations, in Poland and abroad, where advanced knowledge in the field of mining, geology and geomechanics is required. The graduate will be able to use English freely and will be prepared to work in an international environment and intercultural groups during his/her professional career.

Graduates may apply for admission to the Doctoral School or to postgraduate studies.

Currentness of the study programme

Concept and goals of education

Full-time second-cycle studies in Mining and Geology in English offer 8 specializations that are international in nature, as they include a semester or two of mandatory student mobility at one of the partner universities. All specializations were created as a result of the Faculty's participation in international educational projects EIT KIC Raw Materials. Two projects (7 specializations) received the prestigious EIT Label quality mark.
In order to ensure the highest quality of education, educational programs were developed by selecting sets of subjects in partner universities in which the university has the highest scientific competences. One of the most important criteria for selecting program content was the state of art knowledge, including the latest technological developments and the use of modern teaching methods upgrading students' innovation. The concept of education in English-language studies in Mining and Geology is based on the model of the letter "T" (T-shaped education). This means providing very in-depth knowledge of vocational subjects, supported by broad knowledge and skills in related fields, such as environmental, social, economic and managerial aspects.
The concept of international studies involves the participation of students from many countries, including those outside the EU. Studying in an international group, at universities in different countries, allows students to gain valuable skills in working in multicultural teams, in different social, cultural and legal environments. In this way, they gain better preparation for work in global companies in the mining industry.

Information regarding the inclusion of socio-economic needs in the study programme and the compliance of the major learning outcomes with these needs

The economic development of the country is closely dependent on natural resources, the ability to use them and having appropriate engineering workforce. The assumed learning outcomes correspond to the needs of practice in the field of the generally understood management of mineral resources - technologies and techniques for their identification, valuation, extraction, processing, revitalization of industrial areas, and the practice of managing an enterprise (especially mining) in the sense of managing information, environment and people, using the latest IT and marketing techniques and methods. This integration of economic needs and assumed educational effects favorably shape the labor market for the graduates of the Faculty. Additionally, a good command of English and experience of working in an international group will open up the possibility of working in foreign branches of Polish enterprises and in foreign companies.

The growing demand in Europe for specialists in the field of mining and geology, with competences in the latest technologies and digitization and broad social competences, is evidenced by the "Critical Raw Materials Act" adopted in May 2024. (https://ec.europa.eu/commission/presscorner/detail/en/qanda_24_2749).

The CRM Act aims to provide the EU with a secure and sustainable supply of critical raw materials, strengthen all stages of the European value chain of critical raw materials, and improve circularity and sustainable development. These elements are included in the curricular content of second-cycle studies in the field of Mining and Geology.

National sources also write about the growing demand for masters of engineering in mining and geology prepared to work in the raw materials sector, having competences in modern technologies and social skills. An example is the Report from the study "Employer

needs in the field of underground copper mining, processing of metal ores and mineral raw materials - 2024" (https://bcu.mckk.pl/wp-content/uploads/2025/01/Badanie-potrzeb-pracodawcow-BCU-cz.1-v2.pdf), developed in 2024 by the Industry Skills Center for the field of underground mining, processing of metal ores and mineral raw materials.

Other important factors determining the validity of the study programme

The current content of the curriculum and the quality of education are monitored by the steering committees of the consortia implementing individual educational projects. The consortia are formed by renowned universities in the field of mining and geology, research institutes and mining companies from various European countries. The subjects implemented as part of the study program are at most related to the scientific activities conducted at the Faculty or at partner universities. Master's theses are carried out with the support of industry and research units. This guarantees the current topics and research conducted as part of the theses.

The connection of the programme with the University's mission and its development strategy

The II level study programs of all specializations within the field of study Mining and Geology respond to the strategic goals of the University (Strategia Politechniki Wrocławskiej 2023–2030), by rising the level of correlation of the study offer with the needs of the market (C3), by enhancing the quality of education through didactic interdisciplinarity and by cooperation with industrial partners as well as increasing the level of entrepreneurship, creativity and involvement of students in research processes (C4, C2). Graduates of the faculty should be creative, professional, have theoretical background and practical abilities, as well as have interpersonal skills and cross-cultural experience (C5).

Learning outcomes

Code	Description of the directional learning outcome	Characteristics for qualifications at level 6 or 7 of the Polish Qualifications Framework	Characteristics for qualifications at level 6 or 7 of the Polish Qualifications Framework, enabling the acquisition of engineering competences
Knowledge			
K2_GIG_W01	identifies effective methods of scientific expression and presentation, presents the principles and methods of conducting scientific research and presenting its results in a scientific publication.	P7U_W, P7S_WG	
K2_GIG_W02	has extended and in-depth knowledge of physics and/or chemistry, necessary to understand the phenomena and processes affecting the properties of the Earth's crust and raw materials it contains	P7U_W, P7S_WG	
K2_GIG_W03	characterizes the role and main principles of financial management in an enterprise. Cites the principles of economic evaluation of investment projects and investment risk assessment	P7U_W, P7S_WG, P7S_WK	P7S_WG_INŻ, P7S_WK_INŻ
K2_GIG_W04	has systematised knowledge of the fundamentals and types of environmental management systems in Poland and EU countries; knows the tools and instruments supporting their implementation and the applicable legal regulations	P7S_WG, P7S_WK	P7S_WG_INŻ, P7S_WK_INŻ
K2_GIG_W05	identifies and demonstrates understanding of the social and psychological determinants of engineering activities	P7U_W, P7S_WK	P7S_WK_INŻ
K2_GIG_W06	characterizes the basic decision-making models in management with the use of IT applications	P7U_W, P7S_WK	P7S_WK_INŻ
K2_GIG_W07	has in-depth knowledge and understanding of the processes and technologies used in geoengineering, mining and processing of mineral resources	P7S_WG	P7S_WG_INŻ
K2_GIG_W08	has in-depth knowledge of the recognition and assessment of resources, quality, and value of the deposit, legal procedures to launch mine operations, and to conduct mining and mineral processing	P7U_W, P7S_WG, P7S_WK	P7S_WG_INŻ, P7S_WK_INŻ
K2_GIG_W09	describes the functioning of mining or geoengineering enterprises and discusses the principles of production management and optimization of production processes in these plants	P7S_WG, P7S_WK	P7S_WG_INŻ, P7S_WK_INŻ
K2_GIG_W10	has extended knowledge of the sciences describing the phenomena that are the basis of technologies used in mining and mineral engineering and the sciences explaining the phenomena and threats accompanying mining, mineral engineering, and environmental protection, in particular in the field of rock mass mechanics, soil mechanics, geophysics, hydrogeology, and ecology	P7U_W, P7S_WG, P7S_WK	P7S_WG_INŻ, P7S_WK_INŻ
K2_GIG_W11	characterizes formal and legal conditions in the field of geology, mining, geoengineering, mineral engineering and environmental protection	P7U_W, P7S_WK	
K2_GIG_W12	has in-depth knowledge of the rational use of environmental resources, circular economy and economic activity sustainable in terms of innovation, environmental protection and safety	P7U_W, P7S_WG, P7S_WK	P7S_WG_INŻ, P7S_WK_INŻ

Code	Description of the directional learning outcome	Characteristics for qualifications at level 6 or 7 of the Polish Qualifications Framework	Characteristics for qualifications at level 6 or 7 of the Polish Qualifications Framework, enabling the acquisition of engineering competences
K2_GIG_W13	cites the procedures for assessing the impact on the environment, legal regulations in this area, factors influencing such an assessment, lists the stages of developing an environmental impact study, discusses the principles of assessing the effectiveness of the research methods used. Characterizes the basic concepts and frameworks for assessing environmental risk and the degree of exposure to human health	P7S_WG, P7S_WK	P7S_WG_INŻ, P7S_WK_INŻ
K2_GIG_W14	has broadened knowledge of the hazards that occur in mining and mineral engineering and knows how to counteract them	P7S_WG	P7S_WG_INŻ
K2_GIG_W15	cites the main principles of computer modeling of geological structures and computer-aided design and monitoring of mining or geoengineering facilities	P7U_W, P7S_WG, P7S_WK	P7S_WG_INŻ, P7S_WK_INŻ
K2_GIG_W16	characterizes the changes in the rock mass occurring during mining operations with particular emphasis on their impact on the ground surface and methods of monitoring these changes in order to enable the protection of the surface	P7S_WG	P7S_WG_INŻ
K2_GIG_W17	has depened knowledge of the methodology and techniques of occupational risk assessment in light of Polish and international law; knows the basics of organization and management of work safety, necessary for management and traffic supervision in mining, geoengineering and mineral engineering	P7U_W, P7S_WG, P7S_WK	P7S_WG_INŻ, P7S_WK_INŻ
K2_GIG_W18	has in-depth knowledge of methods and tools for designing, calculating, and optimizing systems for the extraction and processing of minerals and waste with the use of mathematical modelling and digital simulation of technological operations	P7U_W, P7S_WG, P7S_WK	P7S_WG_INŻ, P7S_WK_INŻ
K2_GIG_W19	has depened knowledge of machine systems used in raw material technologies and geoengineering, their reliability and life cycle	P7S_WG, P7S_WK	P7S_WG_INŻ, P7S_WK_INŻ
Skills			
K2_GIG_U01	uses linguistic means appropriate to the specialist language and is able to use the specialist language in all linguistic activities in order to communicate in a professional environment within the scope of the field of study being studied	P7S_UK	
K2_GIG_U04	uses analytical methods and IT tools, including digital simulation, to design, calculate, and optimize mining, processing, and waste management systems or to revitalize post-mining facilities	P7U_U, P7S_UW	P7S_UW_INŻ
K2_GIG_U05	selects and applies appropriate methods and IT tools for systemic management of environmental components for given geological and mining conditions	P7U_U, P7S_UW	P7S_UW_INŻ
K2_GIG_U06	based on historical data and financial forecasts, creates a simple financial model of the investment, assesses its profitability and conducts a risk analysis	P7S_UW	P7S_UW_INŻ
K2_GIG_U07	student designs technological processes and systems used in geoengineering, mining or mineral processing industries, programs basic models/algorithms of technological operations in the analysis of the efficiency of a complex industrial system.	P7U_U, P7S_UW	P7S_UW_INŻ
K2_GIG_U08	expresses understanding of the need for lifelong learning, organizes the learning process of himself and others	P7U_U, P7S_UU	

Code	Description of the directional learning outcome	Characteristics for qualifications at level 6 or 7 of the Polish Qualifications Framework	Characteristics for qualifications at level 6 or 7 of the Polish Qualifications Framework, enabling the acquisition of engineering competences
K2_GIG_U09	demonstrates the ability to work in a team and to lead a team in order to fully utilize its potential to solve assigned tasks	P7U_U, P7S_UO	
K2_GIG_U10	uses knowledge from the field of science describing phenomena that are the basis of technologies used in mining and mineral engineering, as well as science explaining phenomena and threats accompanying mining exploitation, mineral engineering and environmental protection, for calculations, analyses and design of objects, processes and technologies	P7U_U, P7S_UW, P7S_UU	P7S_UW_INŻ
K2_GIG_U11	conducts an occupational risk assessment for selected factors of the work environment using computer tools. Independently develops elements of occupational safety documents required by law	P7U_U, P7S_UW, P7S_UK, P7S_UO	P7S_UW_INŻ
K2_GIG_U12	is able to carry out an assessment of the impact of industrial activities on the environment for a simple case study; is able to interpret the documentation regarding the risk assessment of the negative impact of mining activities on the health of the population and independently perform simple risk calculations	P7S_UW, P7S_UO	P7S_UW_INŻ
K2_GIG_U13	critically evaluates and draws conclusions based on various sources, develops written documentation or an oral statement on issues in the field of mineral resources engineering	P7S_UW, P7S_UK	P7S_UW_INŻ
K2_GIG_U02	applies and interprets basic decision-making models using computer applications	P7U_U, P7S_UW, P7S_UO, P7S_UU	P7S_UW_INŻ
K2_GIG_U03	critically analyzes the technical and organizational solutions used in mining, geoengineering and mineral engineering processes	P7S_UW, P7S_UK	P7S_UW_INŻ
Social competence			
K2_GIG_K01	demonstrates the ability to think and act in a creative and entrepreneurial manner	P7S_KK, P7S_KR	
K2_GIG_K02	declares the need to formulate and convey to the public – including through the mass media – information and opinions on the achievements of the mining industry, geoengineering and mineral engineering, and other aspects of the engineer's activity, makes efforts to convey such information and opinions in a generally understandable manner, presenting different points of view, is aware of the value and need to shape the culture of occupational safety and responsibility for the health and life of other employees	P7U_K, P7S_KK, P7S_KO, P7S_KR	
K2_GIG_K03	declares awareness of the importance of non-technical effects of engineering activities, including their impact on the environment and the related responsibility for decisions made	P7U_K, P7S_KO, P7S_KR	
Language outcomes			
SJO_S2_U01	Be able to use a foreign language at B2+ ESCJ level and specialised terminology	P7S_UK	

Detailed information on ECTS points

Mining and Geology

Name	Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben	Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology	Mineral Resources Exploration - Track WUST - University of Miskolc	Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg	Mineral Resources Exploration - Track WUST - University of Zagreb	Mineral Resources Exploration - Track University of Miskolc - WUST	Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST	Mineral Resources Exploration - Track University of Zagreb - WUST
Total ECTS	120	120	120	120	120	120	120	120
Total number of hours of classes	1590	1530	1530	1560	1545	1530	1530	1545
Number of ECTS points assigned to classes related to scientific activities conducted at the university in the discipline or disciplines to which the field of study is assigned (DN)	97/120 (80.83%)	98/120 (81.67%)	92/120 (76.67%)	73/120 (60.83%)	90/120 (75%)	81/120 (67.5%)	98/120 (81.67%)	90/120 (75%)
Number of ECTS points allocated to classes developing practical skills (including laboratory, project) (P)	76.5	77.9	79.3	75.5	76.3	77.2	77.9	76.4
The number of ECTS points that a student will receive by completing classes that require the direct participation of academic teachers or other persons conducting classes and students (BU)	66.6	63.7	64.2	64.9	64.9	64.2	63.7	64.8
Percentage of ECTS for elective courses	120/120 (100%)	120/120 (100%)	120/120 (100%)	120/120 (100%)	120/120 (100%)	120/120 (100%)	120/120 (100%)	120/120 (100%)

Name	Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben	Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology	Mineral Resources Exploration - Track WUST - University of Miskolc	Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg	Mineral Resources Exploration - Track WUST - University of Zagreb	Mineral Resources Exploration - Track University of Miskolc - WUST	Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST	Mineral Resources Exploration - Track University of Zagreb - WUST
The number of ECTS points that a student will receive by completing classes in the humanities or social sciences appropriate for a given field of study	7	7	7	7	11	6	7	11
The number of ECTS points that a student will receive by completing classes in basic sciences (mathematics, physics/chemistry)	5	5	5	5	5	7	5	5

Organization of studies

Implementation of the study programme

Allowable ECTS deficit

Semester	Allowable deficit of ECTS points after a semester
Semester 1	12
Semester 2	12
Semester 3	8
Semester 4	0

Detailed requirements

The courses should be completed by students in the semester in which they are scheduled in the study program. In case of failure, students have the opportunity to repeat the course in accordance with the Study Regulations at WUST.

Methods of verifying the intended learning outcomes

Activity form	Methods of verifying the intended learning outcomes
Project	Project preparation, project implementation, project documentation, case study analysis, model
Seminar	Multimedia presentations conducted and prepared individually or in groups; case study analysis, class participation, paper
Classes	Credit - oral, written; short test, input task, evaluation of the sub-tasks; practical exam, model, essay, paper
Laboratory	Preparation of laboratory reports; oral statements, class participation; short test, input task, evaluation of the sub-tasks
Lecture	Exam - oral, written, credit, test - oral, written

Description of the process leading to achieving learning outcomes

- The student participates in classes organized at the University;
- when starting classes in a given subject, the student has the level of knowledge and skills appropriate to the prerequisites of this course (it is verified by the teacher or the dean's office;
- the student carries out the assigned work in and outside of the University and studies the literature and materials recommended by the teacher;
- the student uses the appointed hours of the teacher's consultation, explaining his doubts and verifying the correct understanding of the content;
- the student and the teacher use the e-learning platform of Wrocław University of Science and Technology in order to support the implementation of didactic classes, the student may use the University's Open Educational Resources;
- the student participates in periodic tests of knowledge and skills and gets acquainted with the correct answers, grades and comments from the teacher;
- the student is working on a diploma thesis;
- the student is encouraged to participate in meetings with representatives of the economy and administration, takes part in job fairs, tries to gain knowledge about the labour market and additional advantages when applying for a job;
- the student is encouraged to participate in conferences and scientific seminars;
- the student is encouraged to become involved in the activities of research clubs, student organizations, sports groups, participation in social life by working in public welfare organizations, volunteering (e.g. as part of the Lower Silesian Science Festival), thus gaining valuable interpersonal skills and social competences;
- the student is encouraged to participate in international student exchange and thus acquires additional interpersonal, cultural

and linguistic competences;
- the Faculty has a Faculty Education Quality Assurance System, student surveys and hospitals are used, the study program is periodically verified and adapted to the current and anticipated needs of the labour market.

Internships

Diploma exam

According to the Regulations governing studies at WUST.

Study plan

Mining and Geology

Semester 1

Specialty: Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg

First and fourth semesters (Summer, Winter) are taught at WUST

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Project Management, Appraisal and Risk Evaluation	Lecture: 15 Laboratory: 30 Project: 15	Exam	4	Obligatory in specialty
Integrated Analysis of Deformations in Geomechanical Engineering	Lecture: 30 Laboratory: 30	Exam	5	Obligatory in specialty
Free Elective 1	Lecture: 15 Total practical contact hours: 15	Graded credit	3	Obligatory group
The student chooses one subject				
Operations Research	Lecture: 15 Laboratory: 15	Lecture: Graded credit Laboratory: Graded credit	Lecture: 1 Laboratory: 2	Elective
Environmental Management	Lecture: 30 Seminar: 15	Lecture: Graded credit Seminar: Graded credit	Lecture: 2 Seminar: 1	Elective
Computer Aided Geological Modelling & Geostatistics - Part Geostatistics	Lecture: 15	Graded credit	2	Obligatory in specialty
Computer Aided Geological Modelling & Geostatistics - Part Geological Modeling	Laboratory: 45	Graded credit	2	Obligatory in specialty
Engineering Geophysics	Lecture: 15 Project: 15	Lecture: Graded credit Project: Graded credit	Lecture: 1 Project: 2	Obligatory in specialty
Principles and Application of InSAR and GIS in Mining	Lecture: 30 Laboratory: 45	Lecture: Exam Laboratory: Graded credit	Lecture: 2 Laboratory: 2	Obligatory in specialty

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Occupational Health and Safety	Lecture: 15 Project: 15	Lecture: Graded credit Project: Graded credit	Lecture: 1 Project: 1	Obligatory in specialty
Foreign Language 2.1	Classes: 30	Graded credit	2	Obligatory group
The student chooses classes from the offer of the Department of Foreign Languages				
Foreign Language 2.1	Classes: 30	Graded credit	2	Elective
Foreign Language 2.2	Classes: 60	Graded credit	3	Obligatory group
The student chooses classes from the offer of the Department of Foreign Languages				
Foreign Language 2.2	Classes: 60	Graded credit	3	Elective
Sum	**435**		**30**	

Specialty: Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

First and fourth (Summer, Winter) semesters are taught at WUST

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Project Management, Appraisal and Risk Evaluation	Lecture: 15 Laboratory: 30 Project: 15	Exam	4	Obligatory in specialty
Integrated Analysis of Deformations in Geomechanical Engineering	Lecture: 30 Laboratory: 30	Exam	5	Obligatory in specialty
Free Elective 1	Lecture: 15 Total practical contact hours: 15	Graded credit	3	Obligatory group
The student chooses one subject				
Operations Research	Lecture: 15 Laboratory: 15	Lecture: Graded credit Laboratory: Graded credit	Lecture: 1 Laboratory: 2	Elective
Environmental Management	Lecture: 30 Seminar: 15	Lecture: Graded credit Seminar: Graded credit	Lecture: 2 Seminar: 1	Elective
Computer Aided Geological Modelling & Geostatistics - Part Geostatistics	Lecture: 15	Graded credit	2	Obligatory in specialty

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Computer Aided Geological Modelling & Geostatistics - Part Geological Modeling	Laboratory: 45	Graded credit	2	Obligatory in specialty
Engineering Geophysics	Lecture: 15 Project: 15	Lecture: Graded credit Project: Graded credit	Lecture: 1 Project: 2	Obligatory in specialty
Occupational Health and Safety	Lecture: 15 Project: 15	Lecture: Graded credit Project: Graded credit	Lecture: 1 Project: 1	Obligatory in specialty
Principles and Application of InSAR and GIS in Mining	Lecture: 30 Laboratory: 45	Lecture: Exam Laboratory: Graded credit	Lecture: 2 Laboratory: 2	Obligatory in specialty
Foreign Language 2.1	Classes: 30	Graded credit	2	Obligatory group
The student chooses classes from the offer of the Department of Foreign Languages				
Foreign Language 2.1	Classes: 30	Graded credit	2	Elective
Foreign Language 2.2	Classes: 60	Graded credit	3	Obligatory group
The student chooses classes from the offer of the Department of Foreign Languages				
Foreign Language 2.2	Classes: 60	Graded credit	3	Elective
Sum	**435**		**30**	

Specialty: Mineral Resources Exploration - Track University of Miskolc - WUST

Students study in the first and second semester (Winter, Summer) at the University of Miskolc

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Physical Geology	Lecture: 30 Project: 30	Exam	4	Obligatory in specialty
Mineralogy and Geochemistry	Lecture: 30 Laboratory: 30	Exam	4	Obligatory in specialty
Geophisical Exploration Methods I	Lecture: 30 Laboratory: 30	Exam	4	Obligatory in specialty
Numerical Methods and Optimization	Lecture: 15 Laboratory: 15	Graded credit	2	Obligatory in specialty

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Engineering Physics	Lecture: 30 Seminar: 30	Exam	4	Obligatory in specialty
Geodesy, Spatial Informatics	Lecture: 30 Seminar: 30	Exam	4	Obligatory in specialty
Computer Science for Engineers	Laboratory: 30	Graded credit	2	Obligatory in specialty
Data and Information Processing	Lecture: 30 Seminar: 30	Graded credit	4	Obligatory in specialty
Graduate Research Seminar	Seminar: 30	Graded credit	2	Obligatory in specialty
Sum	**450**		**30**	

Specialty: Mineral Resources Exploration - Track WUST - University of Miskolc

In the first semester (Summer) students study at WUST

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Operations Research	Lecture: 15 Laboratory: 15	Lecture: Graded credit Laboratory: Graded credit	Lecture: 1 Laboratory: 2	Obligatory in specialty
Project Management, Appraisal and Risk Evaluation	Lecture: 15 Laboratory: 30 Project: 15	Exam	4	Obligatory in specialty
Environmental Management	Lecture: 30 Seminar: 15	Lecture: Graded credit Seminar: Graded credit	Lecture: 2 Seminar: 1	Obligatory in specialty
Digital Mine	Lecture: 15 Laboratory: 15	Lecture: Graded credit Laboratory: Graded credit	Lecture: 1 Laboratory: 1	Obligatory in specialty
Computer Aided Geological Modelling & Geostatistics - Part Geostatistics	Lecture: 15	Graded credit	2	Obligatory in specialty
Computer Aided Geological Modelling & Geostatistics - Part Geological Modeling	Laboratory: 45	Graded credit	2	Obligatory in specialty
Engineering Geophysics	Lecture: 15 Project: 15	Lecture: Graded credit Project: Graded credit	Lecture: 1 Project: 2	Obligatory in specialty

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Principles and Application of InSAR and GIS in Mining	Lecture: 30 Laboratory: 45	Lecture: Exam Laboratory: Graded credit	Lecture: 2 Laboratory: 2	Obligatory in specialty
Occupational Health and Safety	Lecture: 15 Project: 15	Lecture: Graded credit Project: Graded credit	Lecture: 1 Project: 1	Obligatory in specialty
Foreign Language 2.1	Classes: 30	Graded credit	2	Obligatory group
The student chooses classes from the offer of the Department of Foreign Languages				
Foreign Language 2.1	Classes: 30	Graded credit	2	Elective
Foreign Language 2.2	Classes: 60	Graded credit	3	Obligatory group
The student chooses classes from the offer of the Department of Foreign Languages				
Foreign Language 2.2	Classes: 60	Graded credit	3	Elective
Sum	**450**		**30**	

Specialty: Mineral Resources Exploration - Track University of Zagreb - WUST

Students study in the first and second semester (Winter, Summer) at the University of Zagreb

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Sedimentology	Lecture: 30 Project: 45	Exam	5	Obligatory in specialty
Mineral Deposits Exploration	Lecture: 30 Project: 45	Exam	5	Obligatory in specialty
Petroleum Geology	Lecture: 30 Project: 45	Exam	5	Obligatory in specialty
Engineering Geological Investigations	Lecture: 30 Project: 45	Exam	5	Obligatory in specialty
Exploration Geochemistry	Lecture: 30 Project: 30	Graded credit	4	Obligatory in specialty
Remote Sensing of Mineral Resources	Lecture: 15 Laboratory: 30	Graded credit	3	Obligatory in specialty

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
GIS in Exploration of Mineral Resources	Lecture: 15 Laboratory: 30	Graded credit	3	Obligatory in specialty
Sum	**450**		**30**	

Specialty: Mineral Resources Exploration - Track WUST - University of Zagreb

In the first semester (Summer) students study at WUST

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Operations Research	Lecture: 15 Laboratory: 15	Lecture: Graded credit Laboratory: Graded credit	Lecture: 1 Laboratory: 2	Obligatory in specialty
Project Management, Appraisal and Risk Evaluation	Lecture: 15 Laboratory: 30 Project: 15	Exam	4	Obligatory in specialty
Environmental Management	Lecture: 30 Seminar: 15	Lecture: Graded credit Seminar: Graded credit	Lecture: 2 Seminar: 1	Obligatory in specialty
Digital Mine	Lecture: 15 Laboratory: 15	Lecture: Graded credit Laboratory: Graded credit	Lecture: 1 Laboratory: 1	Obligatory in specialty
Computer Aided Geological Modelling & Geostatistics - Part Geostatistics	Lecture: 15	Graded credit	2	Obligatory in specialty
Computer Aided Geological Modelling & Geostatistics - Part Geological Modeling	Laboratory: 45	Graded credit	2	Obligatory in specialty
Engineering Geophysics	Lecture: 15 Project: 15	Lecture: Graded credit Project: Graded credit	Lecture: 1 Project: 2	Obligatory in specialty
Principles and Application of InSAR and GIS in Mining	Lecture: 30 Laboratory: 45	Lecture: Exam Laboratory: Graded credit	Lecture: 2 Laboratory: 2	Obligatory in specialty
Occupational Health and Safety	Lecture: 15 Project: 15	Lecture: Graded credit Project: Graded credit	Lecture: 1 Project: 1	Obligatory in specialty
Foreign Language 2.1	Classes: 30	Graded credit	2	Obligatory group
The student chooses classes from the offer of the Department of Foreign Languages				
Foreign Language 2.1	Classes: 30	Graded credit	2	Elective

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Foreign Language 2.2	Classes: 60	Graded credit	3	Obligatory group
The student chooses classes from the offer of the Department of Foreign Languages				
Foreign Language 2.2	Classes: 60	Graded credit	3	Elective
Sum	**450**		**30**	

Specialty: Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Students study in the first and second semester (Winter, Summer) at the Lappeenranta-Lahti University of Technology

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Modelling of Unit Operations	Lecture: 30 Laboratory: 45	Graded credit	5	Obligatory in specialty
Advanced Process Design	Lecture: 15 Classes: 30 Project: 30	Graded credit	5	Obligatory in specialty
Research Methodology	Lecture: 30 Classes: 15 Project: 30	Graded credit	5	Obligatory in specialty
Circular Economy for Materials Processing	Lecture: 30 Project: 30 Seminar: 15	Exam	5	Obligatory in specialty
Technology and Innovation Management Introduction	Lecture: 15 Classes: 30	Exam	3	Obligatory in specialty
Solid-Liquid Separation	Lecture: 15 Classes: 15 Laboratory: 30	Exam	4	Obligatory in specialty
Elective Subjects Block I	Lecture: 15 Project: 30	Graded credit	3	Obligatory group
The student chooses one subject				

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Artificial Inventiveness	Lecture: 15 Project: 30	Graded credit	3	Elective
Entrepreneurship and Career Opportunities in Raw Material Sector	Lecture: 15 Project: 30	Graded credit	3	Elective
Sustainable Water Use	Lecture: 15 Project: 31	Graded credit	3	Elective
Sum	**450**		**30**	

Specialty: Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Students study in the first and last semester (Summer, Winter) at WUST

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Operations Research	Lecture: 15 Laboratory: 15	Lecture: Graded credit Laboratory: Graded credit	Lecture: 1 Laboratory: 2	Obligatory in specialty
Project Management, Appraisal and Risk Evaluation	Lecture: 15 Laboratory: 30 Project: 15	Exam	4	Obligatory in specialty
Environmental Management	Lecture: 30 Seminar: 15	Lecture: Graded credit Seminar: Graded credit	Lecture: 2 Seminar: 1	Obligatory in specialty
Digital Mine	Lecture: 15 Laboratory: 15	Lecture: Graded credit Laboratory: Graded credit	Lecture: 1 Laboratory: 1	Obligatory in specialty
Computer Aided Geological Modelling & Geostatistics - Part Geostatistics	Lecture: 15	Graded credit	2	Obligatory in specialty
Computer Aided Geological Modelling & Geostatistics - Part Geological Modeling	Laboratory: 45	Graded credit	2	Obligatory in specialty
Engineering Geophysics	Lecture: 15 Project: 15	Lecture: Graded credit Project: Graded credit	Lecture: 1 Project: 2	Obligatory in specialty
Principles and Application of InSAR and GIS in Mining	Lecture: 30 Laboratory: 45	Lecture: Exam Laboratory: Graded credit	Lecture: 2 Laboratory: 2	Obligatory in specialty

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Occupational Health and Safety	Lecture: 15 Project: 15	Lecture: Graded credit Project: Graded credit	Lecture: 1 Project: 1	Obligatory in specialty
Foreign Language 2.1	Classes: 30	Graded credit	2	Obligatory group
The student chooses classes from the offer of the Department of Foreign Languages				
Foreign Language 2.1	Classes: 30	Graded credit	2	Elective
Foreign Language 2.2	Classes: 60	Graded credit	3	Obligatory group
The student chooses classes from the offer of the Department of Foreign Languages				
Foreign Language 2.2	Classes: 60	Graded credit	3	Elective
Sum	**450**		**30**	

Semester 2

Specialty: Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg

Second and third (Winter, Summer) semesters are taught at TU Bergakademie Freiberg (Germany)

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Applied Remote Sensing in Geosciences	Lecture: 60 Laboratory: 60	Exam	6	Obligatory in specialty
Underground Mine Surveying	Lecture: 30 Classes: 45	Exam	5	Obligatory in specialty
Geomonitoring	Lecture: 30 Laboratory: 45	Exam	5	Obligatory in specialty
Operations Management	Lecture: 60 Classes: 60	Exam	6	Obligatory in specialty
Geomodelling – Geostatistics for Natural Resource Modelling	Lecture: 30 Laboratory: 45	Exam	5	Obligatory in specialty
Free Elective 2	Lecture: 30	Graded credit	3	Obligatory group

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
The student chooses one subject				
Ore Deposit & Economic Geology	Lecture: 30	Graded credit	3	Elective
Introduction to Earth System Science	Lecture: 30	Graded credit	3	Elective
Introduction to Bayesian Analysis with R	Lecture: 30	Graded credit	3	Elective
Sum	**495**		**30**	

Specialty: Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Second and third (Winter, Summer) semesters are taught at MUL

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Spatial Planning	Lecture: 45	Graded credit	2	Obligatory in specialty
Risk Management in Mines	Lecture: 30 Laboratory: 30	Exam	3	Obligatory in specialty
Deposit Modelling and Associated Software	Lecture: 15 Laboratory: 30	Graded credit	2	Obligatory in specialty
Underground Mining	Lecture: 30 Classes: 30	Exam	4	Obligatory in specialty
Mining Subsidence Engineering	Lecture: 30 Laboratory: 30	Exam	3	Obligatory in specialty
Geotechnical Monitoring and Instrumentation	Lecture: 15 Laboratory: 15	Graded credit	1.5	Obligatory in specialty
CAD-Constructions in Tunneling	Lecture: 15 Laboratory: 45	Graded credit	3	Obligatory in specialty
Mine Surveying Project Study	Project: 45	Graded credit	3	Obligatory in specialty
Regulation of Mining Damages and Ensuring Land Use	Lecture: 30	Graded credit	1.5	Obligatory in specialty
Automatic Surface Inspection	Lecture: 30 Laboratory: 30	Graded credit	3	Obligatory in specialty
Przedmiot wybieralny 2	Lecture: 45	Graded credit	3	Obligatory group

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
The student chooses one subject				
Construction Contracts	Lecture: 45	Graded credit	3	Elective
Machine Vision	Lecture: 45	Graded credit	3	Elective
Fundamentals of Soil and Rock Mechanics	Lecture: 45	Graded credit	3	Elective
Sum	**540**		**29**	

Specialty: Mineral Resources Exploration - Track University of Miskolc - WUST

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Structural Geology	Lecture: 30 Project: 30	Exam	4	Obligatory in specialty
Mineral Deposits	Lecture: 30 Laboratory: 30	Exam	4	Obligatory in specialty
Engineering Geology and Hydrogeology	Lecture: 30 Laboratory: 30	Exam	4	Obligatory in specialty
Analytical Technics in Mineralogy and Petrology	Lecture: 15 Laboratory: 15	Graded credit	2	Obligatory in specialty
Geophysical Measurements	Lecture: 30 Laboratory: 30	Exam	4	Obligatory in specialty
Geological Mapping	Lecture: 30 Project: 30	Exam	4	Obligatory in specialty
Historical Geology	Lecture: 30 Seminar: 30	Exam	4	Obligatory in specialty
Geophysical Exploration Methods II	Lecture: 30 Seminar: 30	Exam	4	Obligatory in specialty
Sum	**450**		**30**	

Specialty: Mineral Resources Exploration - Track WUST - University of Miskolc

In the second and third semester (Winter and Summer) students study at the University of Miskolc

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Physical Geology	Lecture: 30 Project: 30	Exam	4	Obligatory in specialty
Mineralogy and Geochemistry	Lecture: 30 Laboratory: 30	Exam	4	Obligatory in specialty
Geophisical Exploration Methods I	Lecture: 30 Laboratory: 30	Exam	4	Obligatory in specialty
Geological Interpretation and Prospecting	Lecture: 30 Project: 30	Exam	4	Obligatory in specialty
Geophysical Interpretation and Prospecting	Lecture: 30 Project: 30	Exam	4	Obligatory in specialty
Geoelectric Lectureship	Lecture: 30 Project: 30	Graded credit	4	Obligatory in specialty
Global Environmental Geophysics	Lecture: 15 Seminar: 15	Graded credit	2	Obligatory in specialty
Non-Metallic Industrial Minerals	Lecture: 30 Laboratory: 30	Graded credit	4	Obligatory in specialty
Sum	**450**		**30**	

Specialty: Mineral Resources Exploration - Track University of Zagreb - WUST

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Regional Hydrogeology	Lecture: 30 Project: 30	Exam	4	Obligatory in specialty
Seismotectonics	Lecture: 30 Project: 30	Exam	4	Obligatory in specialty
Industrial Mineral Deposits and Applications	Lecture: 45 Seminar: 30	Exam	5	Obligatory in specialty

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Analytical Methods in Ore Deposits	Lecture: 30 Laboratory: 45	Exam	5	Obligatory in specialty
Geophysical Exploration and Mineral Resources	Lecture: 30	Exam	3	Obligatory in specialty
Analyses of Mineral Paragenesis	Lecture: 15 Laboratory: 30	Exam	3	Obligatory in specialty
Field and Laboratory Practicum	Project: 120	Graded credit	6	Obligatory in specialty
Sum	**465**		**30**	

Specialty: Mineral Resources Exploration - Track WUST - University of Zagreb

In the second and third semester (Winter and Summer) students study at the University of Zagreb

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Sedimentology	Lecture: 30 Project: 45	Exam	5	Obligatory in specialty
Mineral Deposits Exploration	Lecture: 30 Project: 45	Exam	5	Obligatory in specialty
Petroleum Geology	Lecture: 30 Project: 45	Exam	5	Obligatory in specialty
Engineering Geological Investigations	Lecture: 30 Project: 45	Exam	5	Obligatory in specialty
Exploration Geochemistry	Lecture: 30 Project: 30	Graded credit	4	Obligatory in specialty
Remote Sensing of Mineral Resources	Lecture: 15 Laboratory: 30	Exam	3	Obligatory in specialty
GIS in Exploration of Mineral Resources	Lecture: 15 Laboratory: 30	Graded credit	3	Obligatory in specialty
Sum	**450**		**30**	

Specialty: Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Fluid Dynamics in Chemical Engineering	Lecture: 30 Classes: 15 Project: 30	Graded credit	5	Obligatory in specialty
Process Intensification	Lecture: 30 Classes: 30 Seminar: 15	Exam	5	Obligatory in specialty
Current Issues in Enabling Technologies for Circular Economy	Lecture: 30 Classes: 15 Project: 30	Graded credit	5	Obligatory in specialty
Start-Ups and Venture Formation	Lecture: 30 Project: 30 Seminar: 30	Exam	6	Obligatory in specialty
Academic Entrepreneurship	Lecture: 30 Project: 30 Seminar: 30	Exam	6	Obligatory in specialty
Elective Subjects Block II	Lecture: 15 Laboratory: 30	Graded credit	3	Obligatory group
The student chooses one subject				
Intelligent Product-Service Systems	Lecture: 15 Laboratory: 30	Graded credit	3	Elective
Inventive Product Design and Advanced TRIZ	Lecture: 15 Laboratory: 30	Graded credit	3	Elective
Knowledge Discovery and Process Data Analysis	Lecture: 15 Laboratory: 30	Graded credit	3	Elective
Development of New Sustainable Products and Solutions	Lecture: 15 Laboratory: 30	Graded credit	3	Elective
Sum	**450**		**30**	

Specialty: Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Students study in the second and third semester (Winter, Summer) at the Lappeenranta -Lahti University of Technology

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Modelling of Unit Operations	Lecture: 30 Laboratory: 45	Graded credit	5	Obligatory in specialty
Advanced Process Design	Lecture: 15 Classes: 30 Project: 30	Graded credit	5	Obligatory in specialty
Research Methodology	Lecture: 30 Classes: 15 Project: 30	Graded credit	5	Obligatory in specialty
Circular Economy for Materials Processing	Lecture: 30 Project: 30 Seminar: 15	Exam	5	Obligatory in specialty
Technology and Innovation Management Introduction	Lecture: 15 Classes: 30	Exam	3	Obligatory in specialty
Solid-Liquid Separation	Lecture: 15 Classes: 15 Laboratory: 30	Exam	4	Obligatory in specialty
Elective Subjects Block I	Lecture: 15 Project: 30	Graded credit	3	Obligatory group
The student chooses one subject				
Artificial Inventiveness	Lecture: 15 Project: 30	Graded credit	3	Elective
Entrepreneurship and Career Opportunities in Raw Material Sector	Lecture: 15 Project: 30	Graded credit	3	Elective
Sustainable Water Use	Lecture: 15 Project: 31	Graded credit	3	Elective
Sum	**450**		**30**	

Semester 3

Specialty: Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Human Resources Management & Organizational Behaviour	Lecture: 30	Exam	3	Obligatory in specialty
Special Topics Geokinematics	Lecture: 30 Laboratory: 30	Exam	4	Obligatory in specialty
Applied Spatial Data Analysis and Modelling - Case Study (GIS 2)	Lecture: 30 Classes: 45	Exam	5	Obligatory in specialty
Geomatics for Mineral Resource and Reserve Management	Lecture: 60 Project: 60	Exam	6	Obligatory in specialty
Reclamation	Lecture: 30 Laboratory: 45 Project: 45	Exam	6	Obligatory in specialty
Free Elective 3	Lecture: 60 Total practical contact hours: 60	Graded credit	6	Obligatory group
The student chooses one subject				
Mine Water I – Formation and Treatment	Lecture: 60 Laboratory: 60	Graded credit	6	Elective
Information Management	Lecture: 60 Laboratory: 60	Graded credit	6	Elective
Business Communication	Lecture: 60 Classes: 60	Graded credit	6	Elective
Sum	**525**		**30**	

Specialty: Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Environmental Aspects of Mineral Extraction	Lecture: 30 Classes: 30	Exam	3	Obligatory in specialty
Rock Mechanics	Lecture: 45 Laboratory: 30	Lecture: Exam Laboratory: Graded credit	Lecture: 3 Laboratory: 2	Obligatory in specialty
Applied Geodesy	Lecture: 30 Laboratory: 30	Lecture: Exam Laboratory: Graded credit	Lecture: 2 Laboratory: 2	Obligatory in specialty
Selected Aspects of Engineering Surveying in Mining and Tunnelling	Lecture: 45 Laboratory: 60	Lecture: Exam Laboratory: Graded credit	Lecture: 3 Laboratory: 3	Obligatory in specialty
Mine Mapping	Lecture: 45	Graded credit	3	Obligatory in specialty
Compulsory Internship	Project: 75	Graded credit	5	Obligatory in specialty
Free Elective 3 - Modules	Lecture: 90	Graded credit	5	Obligatory group
The student chooses one module and completes all subjects assigned to it				
Module 1	Lecture: 90	Graded credit	5	Elective
Geoinformatics	Lecture: 45	Graded credit	2.5	Obligatory in module
Sensor and Measurement Technology in Automation	Lecture: 45	Graded credit	2.5	Obligatory in module
Module 2	Lecture: 90	Graded credit	5	Elective
Production Data Analysis and Modelling	Lecture: 75	Graded credit	4	Obligatory in module
Geothermy	Lecture: 15	Graded credit	1	Obligatory in module
Sum	**510**		**31**	

Specialty: Mineral Resources Exploration - Track University of Miskolc - WUST

Students study in the third and fourth semester (Winter, Summer) at WUST

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Digital Mine	Lecture: 15 Laboratory: 15	Lecture: Graded credit Laboratory: Graded credit	Lecture: 1 Laboratory: 1	Obligatory in specialty

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Geochemistry	Lecture: 30	Graded credit	2	Obligatory in specialty
Free Elective 1	Project: 15	Graded credit	1	Obligatory group
The student chooses one subject				
Design Thinking	Project: 15	Graded credit	1	Elective
Electronic Sources of Information in Master Thesis Preparation	Project: 15	Graded credit	1	Elective
Research in Innovative Exploration	Project: 90	Graded credit	7	Obligatory in specialty
Computer Aided Geological Modelling & Geostatistics - Part Geostatistics	Lecture: 15	Graded credit	2	Obligatory in specialty
Computer Aided Geological Modelling & Geostatistics - Part Geological Modeling	Laboratory: 45	Graded credit	2	Obligatory in specialty
Engineering Geophysics	Lecture: 15 Project: 15	Lecture: Graded credit Project: Graded credit	Lecture: 1 Project: 2	Obligatory in specialty
Principles and Application of InSAR and GIS in Mining	Lecture: 30 Laboratory: 45	Lecture: Exam Laboratory: Graded credit	Lecture: 2 Laboratory: 2	Obligatory in specialty
Occupational Health and Safety	Lecture: 15 Project: 15	Lecture: Graded credit Project: Graded credit	Lecture: 1 Project: 1	Obligatory in specialty
Foreign Language 2.1	Classes: 30		2	Obligatory group
The student chooses classes from the offer of the Department of Foreign Languages				
Foreign Language 2.1	Classes: 30	Graded credit	2	Elective
Foreign Language 2.2	Classes: 60	Graded credit	3	Obligatory group
The student chooses classes from the offer of the Department of Foreign Languages				
Foreign Language 2.2	Classes: 60	Graded credit	3	Elective
Sum	**450**		**30**	

Specialty: Mineral Resources Exploration - Track WUST - University of Miskolc

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Structural Geology	Lecture: 30 Project: 30	Exam	4	Obligatory in specialty
Mineral Deposits	Lecture: 30 Laboratory: 30	Exam	4	Obligatory in specialty
Engineering Geology and Hydrogeology	Lecture: 30 Laboratory: 30	Exam	4	Obligatory in specialty
Analytical Technics in Mineralogy and Petrology	Lecture: 15 Laboratory: 15	Graded credit	2	Obligatory in specialty
Geochemical Prospecting Methods	Lecture: 30 Project: 30	Graded credit	4	Obligatory in specialty
Geological Mapping	Lecture: 30 Project: 30	Exam	4	Obligatory in specialty
Graduate Research Seminar	Seminar: 30	Graded credit	2	Obligatory in specialty
Student Research Project	Project: 90	Graded credit	6	Obligatory in specialty
Sum	**450**		**30**	

Specialty: Mineral Resources Exploration - Track University of Zagreb - WUST

Students study in the third and fourth semester (Winter, Summer) at WUST

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Operations Research	Lecture: 15 Laboratory: 15	Lecture: Graded credit Laboratory: Graded credit	Lecture: 1 Laboratory: 2	Obligatory in specialty
Project Management, Appraisal and Risk Evaluation	Lecture: 15 Laboratory: 30 Project: 15	Exam	4	Obligatory in specialty
Environmental Management	Lecture: 30 Seminar: 15	Lecture: Graded credit Seminar: Graded credit	Lecture: 2 Seminar: 1	Obligatory in specialty
Digital Mine	Lecture: 15 Laboratory: 15	Lecture: Graded credit Laboratory: Graded credit	Lecture: 1 Laboratory: 1	Obligatory in specialty

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Computer Aided Geological Modelling & Geostatistics - Part Geostatistics	Lecture: 15	Graded credit	2	Obligatory in specialty
Computer Aided Geological Modelling & Geostatistics - Part Geological Modeling	Laboratory: 45	Graded credit	2	Obligatory in specialty
Engineering Geophysics	Lecture: 15 Project: 15	Lecture: Graded credit Project: Graded credit	Lecture: 1 Project: 2	Obligatory in specialty
Principles and Application of InSAR and GIS in Mining	Lecture: 30 Laboratory: 45	Lecture: Exam Laboratory: Graded credit	Lecture: 2 Laboratory: 2	Obligatory in specialty
Occupational Health and Safety	Lecture: 15 Project: 15	Lecture: Graded credit Project: Graded credit	Lecture: 1 Project: 1	Obligatory in specialty
Foreign Language 2.1	Classes: 30	Graded credit	2	Obligatory group
The student chooses classes from the offer of the Department of Foreign Languages				
Foreign Language 2.1	Classes: 30	Graded credit	2	Elective
Foreign Language 2.2	Classes: 60	Graded credit	3	Obligatory group
The student chooses classes from the offer of the Department of Foreign Languages				
Foreign Language 2.2	Classes: 60	Graded credit	3	Elective
Sum	**450**		**30**	

Specialty: Mineral Resources Exploration - Track WUST - University of Zagreb

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Regional Hydrogeology	Lecture: 30 Project: 30	Exam	4	Obligatory in specialty
Seismotectonics	Lecture: 30 Project: 30	Exam	4	Obligatory in specialty
Industrial Mineral Deposits and Applications	Lecture: 45 Seminar: 30	Exam	5	Obligatory in specialty

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Analytical Methods in Ore Deposits	Lecture: 30 Laboratory: 45	Exam	5	Obligatory in specialty
Geophysical Exploration and Mineral Resources	Lecture: 30	Exam	3	Obligatory in specialty
Analyses of Mineral Paragenesis	Lecture: 15 Laboratory: 30	Exam	3	Obligatory in specialty
Field and Laboratory Practicum	Project: 120	Graded credit	6	Obligatory in specialty
Sum	**465**		**30**	

Specialty: Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Students study in the third and fourth semester (Winter, Summer) at WUST

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Project Management, Appraisal and Risk Evaluation	Lecture: 15 Laboratory: 30 Project: 15	Exam	4	Obligatory in specialty
Operations Research	Lecture: 15 Laboratory: 15	Lecture: Graded credit Laboratory: Graded credit	Lecture: 1 Laboratory: 2	Obligatory in specialty
Environmental Management	Lecture: 30 Seminar: 15	Lecture: Graded credit Seminar: Graded credit	Lecture: 2 Seminar: 1	Obligatory in specialty
Digital Mine	Lecture: 15 Laboratory: 15	Lecture: Graded credit Laboratory: Graded credit	Lecture: 1 Laboratory: 1	Obligatory in specialty
Computer Aided Geological Modelling & Geostatistics - Part Geostatistics	Lecture: 15	Graded credit	2	Obligatory in specialty
Computer Aided Geological Modelling & Geostatistics - Part Geological Modeling	Laboratory: 45	Graded credit	2	Obligatory in specialty
Engineering Geophysics	Lecture: 15 Project: 15	Lecture: Graded credit Project: Graded credit	Lecture: 1 Project: 2	Obligatory in specialty
Principles and Application of InSAR and GIS in Mining	Lecture: 30 Laboratory: 45	Lecture: Exam Laboratory: Graded credit	Lecture: 2 Laboratory: 2	Obligatory in specialty

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Foreign Language 2.1	Classes: 30	Graded credit	2	Obligatory group
The student chooses classes from the offer of the Department of Foreign Languages				
Foreign Language 2.1	Classes: 30	Graded credit	2	Elective
Foreign Language 2.2	Classes: 60	Graded credit	3	Obligatory group
The student chooses classes from the offer of the Department of Foreign Languages				
Foreign Language 2.2	Classes: 60	Graded credit	3	Elective
Occupational Health and Safety	Lecture: 15 Project: 15	Lecture: Graded credit Project: Graded credit	Lecture: 1 Project: 1	Obligatory in specialty
Sum	**450**		**30**	

Specialty: Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Fluid Dynamics in Chemical Engineering	Lecture: 30 Classes: 15 Project: 30	Graded credit	5	Obligatory in specialty
Process Intensification	Lecture: 30 Classes: 30 Seminar: 15	Exam	5	Obligatory in specialty
Current Issues in Enabling Technologies for Circular Economy	Lecture: 30 Classes: 15 Project: 30	Graded credit	5	Obligatory in specialty
Start-Ups and Venture Formation	Lecture: 30 Project: 30 Seminar: 30	Exam	6	Obligatory in specialty
Academic Entrepreneurship	Lecture: 30 Project: 30 Seminar: 30	Exam	6	Obligatory in specialty

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Elective Subjects Block II	Lecture: 15 Laboratory: 30	Graded credit	3	Obligatory group
The student chooses one subject				
Intelligent Product-Service Systems	Lecture: 15 Laboratory: 30	Graded credit	3	Elective
Inventive Product Design and Advanced TRIZ	Lecture: 15 Laboratory: 30	Graded credit	3	Elective
Knowledge Discovery and Process Data Analysis	Lecture: 15 Laboratory: 30	Graded credit	3	Elective
Development of New Sustainable Products and Solutions	Lecture: 15 Laboratory: 30	Graded credit	3	Elective
Sum	**450**		**30**	

Semester 4

Each of the specialisations offered includes an international mobility period. A student is supposed to study for two semesters at one of the Partner Universities and two semesters at WUST (in differet sequence). Some of the programs start with a Summer semester at WUST, other start at one of the Partner Universities in the Winter semester. In most specialisations the double degree opion is avalable. In the nearest future it will become possible in all 4-semester programs.

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Diploma Seminar	Seminar: 15	Graded credit	1	Obligatory elective
Sum	**15**		**1**	

Specialty: Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg

First and fourth semesters (Summer, Winter) are taught at WUST

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Master Thesis	Project: 90	Graded credit	29	Obligatory in specialty
Sum	**90**		**29**	

Specialty: Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

First and fourth (Summer, Winter) semesters are taught at WUST

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Master Thesis	Project: 90	Graded credit	29	Obligatory elective
Sum	**90**		**29**	

Specialty: Mineral Resources Exploration - Track University of Miskolc - WUST

Students study in the third and fourth semester (Winter, Summer) at WUST During Summer (in June) students must take the Applied Field Exploration course in North Sweeden organised by LTU

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Exploration Entrepreneurship	Lecture: 15 Project: 15 Seminar: 30	Graded credit	4	Obligatory in specialty
SOC Internship	Project: 30	Graded credit	2	Obligatory in specialty
Applied Field Exploration	Project: 45	Graded credit	3	Obligatory in specialty
Master Thesis	Project: 30	Graded credit	20	Obligatory elective
Sum	**165**		**29**	

Specialty: Mineral Resources Exploration - Track WUST - University of Miskolc

During Summer (in June) students must take the Applied Field Exploration course in North Sweeden organised by LTU In the fourth semester (Winter) students study at WUST and write the MSc thesis

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Exploration Entrepreneurship	Lecture: 15 Project: 15 Seminar: 30	Graded credit	4	Obligatory in specialty
SOC Internship	Project: 30	Graded credit	2	Obligatory in specialty
Applied Field Exploration	Project: 45	Graded credit	3	Obligatory in specialty
Master Thesis	Project: 30	Graded credit	20	Obligatory elective
Sum	**165**		**29**	

Specialty: Mineral Resources Exploration - Track University of Zagreb - WUST

Students study in the third and fourth semester (Winter, Summer) at WUST During Summer (in June) students must take the Applied Field Exploration course in North Sweeden organised by LTU

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Exploration Entrepreneurship	Lecture: 15 Project: 15 Seminar: 30	Graded credit	4	Obligatory in specialty
SOC Internship	Project: 30	Graded credit	2	Obligatory in specialty
Applied Field Exploration	Project: 45	Graded credit	3	Obligatory in specialty
Master Thesis	Project: 30	Graded credit	20	Obligatory elective
Sum	**165**		**29**	

Specialty: Mineral Resources Exploration - Track WUST - University of Zagreb

During Summer (in June) students must take the Applied Field Exploration course in North Sweeden organised by LTU In the fourth semester (Winter) students study at WUST and write the MSc thesis

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Exploration Entrepreneurship	Lecture: 15 Project: 15 Seminar: 30	Graded credit	4	Obligatory in specialty
SOC Internship	Project: 30	Graded credit	2	Obligatory in specialty
Applied Field Exploration	Project: 45	Graded credit	3	Obligatory in specialty
Master Thesis	Project: 30	Graded credit	20	Obligatory elective
Sum	**165**		**29**	

Specialty: Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Integrated Analysis of Deformations in Geomechanical Engineering	Lecture: 30 Laboratory: 30	Lecture: Graded credit Laboratory: Graded credit	Lecture: 2 Laboratory: 2	Obligatory in specialty

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Industrial Research Internship Project	Project: 30	Graded credit	2	Obligatory in specialty
Field Academy Student Project	Project: 45	Graded credit	3	Obligatory in specialty
Master Thesis	Project: 30	Graded credit	20	Obligatory elective
Sum	**165**		**29**	

Specialty: Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Students study in the first and last semester (Summer, Winter) at WUST

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Integrated Analysis of Deformations in Geomechanical Engineering	Lecture: 30 Laboratory: 30	Lecture: Graded credit Laboratory: Graded credit	Lecture: 2 Laboratory: 2	Obligatory in specialty
Industrial Research Internship Project	Project: 30	Graded credit	2	Obligatory in specialty
Field Academy Student Project	Project: 45	Graded credit	3	Obligatory in specialty
Master Thesis	Project: 30	Graded credit	20	Obligatory elective
Sum	**165**		**29**	

Syllabuses

Wrocław University of Science and Technology

Modelling of Unit Operations

Educational subject description sheet

Basic information

Field of study Mining and Geology **Speciality** Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST **Organizational unit** Faculty of Geoengineering, Mining and Geology **Study level** second degree 4 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** W6GIG/000ILWS.51PS.05019.25 **Group of classes** Yes **Lecture languages** English **Mandatoriness** Obligatory in specialty **Block** Specialty subjects **Subject related to scientific research** Yes

Semester	**Examination**	**Number of ECTS points**
Semester 1	Graded credit **Activities and hours** Lecture: 30 Laboratory: 45	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	recognises and describes the most common unit operations of chemical engineering, including batch reactors and continuously stirred tank reactors (CSTRs), both in dynamic and steady-state.	K2_GIG_W01, K2_GIG_W06, K2_GIG_W18
PEU_W02	identifies and explains tubular plug flow reactors, flash distillations, and modelling of the temperature dependence of reactions and elements of heat transfer.	K2_GIG_W01, K2_GIG_W06, K2_GIG_W18
PEU_W03	recognises, differentiates and explains the chemical processes in chemical engineering.	K2_GIG_W01, K2_GIG_W06, K2_GIG_W18

In terms of skills		
PEU_U01	uses Matlab (mathematical and simulation software) in chemical engineering and applied mathematics.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
PEU_U02	elaborates steady-state and transient unit operations with mathematical models, validates the models and estimates their parameters from experimental data.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U13
PEU_U03	applies modeling (simulation) in process development and design, including sizing, optimization, and scaling-up.	K2_GIG_U04, K2_GIG_U05, K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	demonstrates the ability to think and act creatively and entrepreneurially.	K2_GIG_K01
PEU_K02	declares an awareness of the importance of the non-technical consequences of engineering activities, including their impact on the environment and the related responsibility for decisions.	K2_GIG_K03

Program content ensuring learning outcomes

Modeling and parameter estimation using Matlab in chemical engineering and applied mathematics in general. The most common unit operations of chemical engineering, including batch reactors, continuous stirred tank reactors (CSTR’s), both in dynamic and steady state; tubular plug flow reactors, flash distillations, and modeling of temperature dependence of reactions and elements of heat transfer. The models are limited to ones that do not require solving partial differential equations (PDE’s).

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	45
Preparaton for classes	10
Conducting empirical studies	18
Prepararation for an exam/credit	8
Credit/Exam	2
Preparation of a report/summary/presentation/paper	12
Student workload	**Hours** 125

Wrocław University of Science and Technology

Project Management, Appraisal and Risk Evaluation

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.51HS.04924.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects from the fields of humanities or social sciences

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 1	Exam **Activities and hours** Lecture: 15 Laboratory: 30 Project: 15	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	discusses the concepts of demand and supply and their impact on the market. They characterize the concepts of costs in economics and accounting and explain their differences.	K2_GIG_W03, K2_GIG_W05
PEU_W02	characterizes the contents of financial statements and presents the method of ratio analysis of financial statements	K2_GIG_W03, K2_GIG_W11
PEU_W03	understands the concepts of Future Value and Present Value of cash flows, characterizes the main methods of capital budgeting and project evaluation, as well as the main methods of investment project risk assessment.	K2_GIG_W03

In terms of skills		
PEU_U01	analyzes the causes and consequences of changes in demand and supply, interprets cost data presented in various cost classification systems, demonstrates the ability to make short-term decisions based on cost data.	K2_GIG_U04, K2_GIG_U08
PEU_U02	can read information presented in financial statements and analyse them using financial ratios.	K2_GIG_U04, K2_GIG_U06
PEU_U03	is able to calculate Present Value of cash flows, can perform capital budgeting procedure, assess the investment project as well as the risk involved.	K2_GIG_U03, K2_GIG_U06
PEU_U04	is able to create basic project documentation and initiate the project. Can utilise the basic methods of project management, monitoring and risk assessment.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U09
PEU_U05	is able to utilise the basic methods of group conflict management, basic methods of group management and leadership, can assess effectiveness of group management	K2_GIG_U08, K2_GIG_U09
In terms of social competences		
PEU_K01	demonstrates the ability to think and act in a systematic, creative and entrepreneurial manner, has an attitude of economic acting and decision making on the basis of financial data and forecasts.	K2_GIG_K01

Program content ensuring learning outcomes

The course combines two groups of topics: basics of mineral resources economics and financial management and introduction to project management.
Part A: Supply and demand mechanism, Concept of costs in microeconomics and accounting. Cost accounting for reporting and management purposes. Content of financial statements and their analysis. Concept of change in the value of money over time. Methods of investment project evaluation. Analysis of the profitability of investment projects in risk conditions.
Part B: Introduction to basic concepts, methods and tools of project management. Presentation of selected areas of project management: project scope management, project time management, project cost management, project risk management. Planning, scheduling and control of projects using Microsoft Project. Issues of effective communication in project teams, group behavior and leadership.

Calculation of ECTS points

Activity form	Activity hours
Lecture	15
Laboratory	30
Project	15
Preparation of a project	10
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	6
Prepararation for an exam/credit	10
Credit/Exam	4

Student workload	**Hours** 100

Wrocław University of Science and Technology

Operations Research

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.51HS.04927.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects from the fields of humanities or social sciences

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 1 ECTS, Graded credit • Laboratory: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	presents the linear programming method, the types of variables in the model, constraints, and the solution approach, as well as the scope of applications, and distinguishes between linear and nonlinear optimization.	K2_GIG_W06
PEU_W02	explains project planning models (CPM and PERT), as well as resource and cost management models.	K2_GIG_W06
PEU_W03	presents the concept of mass service system models and describes simulation models of industrial processes.	K2_GIG_W06
In terms of skills		
PEU_U01	constructs optimization models for production systems and transportation issues.	K2_GIG_U02, K2_GIG_U10

PEU_U02	develops a project schedule based on the CPM and PERT methods.	K2_GIG_U02, K2_GIG_U10
PEU_U03	prepares a simulation model of a technological process using the specified software.	K2_GIG_U02, K2_GIG_U10
In terms of social competences		
PEU_K01	is open to various approaches in decision-making problem-solving and has the ability to work in a team.	K2_GIG_K01

Program content ensuring learning outcomes

Linear and nonlinear optimization models.
Network programming and project scheduling.
Simulations and models of stochastic processes.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	15
Preparaton for classes	5
Self-study of class topics	10
Preparation of a report/summary/presentation/paper	15
Prepararation for an exam/credit	13
Credit/Exam	2
Student workload	**Hours** 75

Wrocław University of Science and Technology

Project Management, Appraisal and Risk Evaluation

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMFS.51HS.04924.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects from the fields of humanities or social sciences

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 1	Exam **Activities and hours** Lecture: 15 Laboratory: 30 Project: 15	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Discusses the concepts of demand and supply and their impact on the market, characterizes the concepts of costs in economics and accounting and their differences.	K2_GIG_W03, K2_GIG_W05
PEU_W02	characterizes the contents of financial statements and presents the method of ratio analysis of financial statements	K2_GIG_W03, K2_GIG_W11
PEU_W03	understands the concepts of Future Value and Present Value of cash flows, characterizes the main methods of capital budgeting and project evaluation, as well as the main methods of investment project risk assessment.	K2_GIG_W03

In terms of skills		
PEU_U01	analyzes the causes and consequences of changes in demand and supply, interprets cost data presented in various cost classification systems, demonstrates the ability to make short-term decisions based on cost data..	K2_GIG_U04, K2_GIG_U08
PEU_U02	can read information presented in financial statements and analyse them using financial ratios.	K2_GIG_U04, K2_GIG_U06
PEU_U03	is able to calculate Present Value of cash flows, can perform capital budgeting procedure, assess the investment project as well as the risk involved.	K2_GIG_U03, K2_GIG_U06
PEU_U04	is able to create basic project documentation and initiate the project. Can utilise the basic methods of project management, monitoring and risk assessment.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U09
PEU_U05	is able to utilise the basic methods of group conflict management, basic methods of group management and leadership, can assess effectiveness of group management	K2_GIG_U08, K2_GIG_U09
In terms of social competences		
PEU_K01	demonstrates the ability to think and act in a systematic, creative and entrepreneurial manner, has an attitude of economic acting and decision making on the basis of financial data and forecasts.	K2_GIG_K01

Program content ensuring learning outcomes

The course combines two groups of topics: basics of mineral resources economics and financial management and introduction to project management.
Part A: Supply and demand mechanism, Concept of costs in microeconomics and accounting. Cost accounting for reporting and management purposes. Content of financial statements and their analysis. Concept of change in the value of money over time. Methods of investment project evaluation. Analysis of the profitability of investment projects in risk conditions.
Part B: Introduction to basic concepts, methods and tools of project management. Presentation of selected areas of project management: project scope management, project time management, project cost management, project risk management. Planning, scheduling and control of projects using Microsoft Project. Issues of effective communication in project teams, group behavior and leadership.

Calculation of ECTS points

Activity form	Activity hours
Lecture	15
Laboratory	30
Project	15
Preparation of a project	10
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	6
Prepararation for an exam/credit	10
Credit/Exam	4

Student workload	**Hours** 100

Wrocław University of Science and Technology

Operations Research

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.51HS.04927.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects from the fields of humanities or social sciences

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 1 ECTS, Graded credit • Laboratory: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	presents the linear programming method, the types of variables in the model, constraints, and the solution approach, as well as the scope of applications, and distinguishes between linear and nonlinear optimization.	K2_GIG_W06
PEU_W02	explains project planning models (CPM and PERT), as well as resource and cost management models.	K2_GIG_W06
PEU_W03	presents the concept of mass service system models and describes simulation models of industrial processes.	K2_GIG_W06
In terms of skills		
PEU_U01	constructs optimization models for production systems and transportation issues.	K2_GIG_U02, K2_GIG_U10

PEU_U02	develops a project schedule based on the CPM and PERT methods.	K2_GIG_U02, K2_GIG_U10
PEU_U03	prepares a simulation model of a technological process using the specified software.	K2_GIG_U02, K2_GIG_U10
In terms of social competences		
PEU_K01	is open to various approaches in decision-making problem-solving and has the ability to work in a team.	K2_GIG_K01

Program content ensuring learning outcomes

Linear and nonlinear optimization models.
Network programming and project scheduling.
Simulations and models of stochastic processes.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	15
Preparaton for classes	5
Self-study of class topics	10
Preparation of a report/summary/presentation/paper	15
Prepararation for an exam/credit	13
Credit/Exam	2
Student workload	**Hours** 75

Wrocław University of Science and Technology

Physical Geology

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.51PS.04973.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 1	Exam **Activities and hours** Lecture: 30 Project: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student differentiates the processes described by the general and specific theories of physical geology required for the practicising of the fields of earth science engineering. Categorizes the internal connections between geological processes.	K2_GIG_W08, K2_GIG_W10
In terms of skills		
PEU_U01	The student applies general and specific scientific theories of internal and external geologial processes, to systematize them. Characterizes complex geological processes and explains them in the appropriate context.	K2_GIG_U10, K2_GIG_U13

In terms of social competences		
PEU_K01	Student percieves the professional methodological developments in the fields of applied earth sciences. Applies creativity skills and knowledge in understanding and interpreting complex geological structures and processes., Student will plan the work independently, and rules on to lead workgroups	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

The course is deepening the students' abilities for geological interpretation, making them familiar with the reconstruction of rock-forming processes, introducing them to facial analysis and the stratigraphic methods. It introduces the basic concepts and skills necessary for interpreation of different geological processes. The formation and the inner structure of the Earth. The role of physical geology in the geological exploration. Magmatic processes, their interpretation on field. Sedimentary processes, their interpretation on field. Metamorphic processes, their interpretation on field. Principles of stratigraphy, stratigraphic nomenclature. Stratotype, lito-, bio- and chronostratigraphy.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Preparaton for classes	10
Prepararation for an exam/credit	10
Preparation of a report/summary/presentation/paper	16
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Sedimentology

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Zagreb - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EZWS.51PS.05005.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 1	Exam **Activities and hours** Lecture: 30 Project: 45	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Presents methods for defining sediment fractions and illustrates sedimentary processes in various depositional environments.	K2_GIG_W01, K2_GIG_W02
In terms of skills		
PEU_U01	To construct general and thematic geological maps, as well as geological profiles with accompanying descriptions.	K2_GIG_U01, K2_GIG_U13
In terms of social competences		

PEU_K01	Declares readiness to communicate to the public about the achievements of the mining and mineral engineering industry, ensuring clarity and accuracy.	K2_GIG_K02

Program content ensuring learning outcomes

Upon completion of the course, the student will acquire skills in:
Defining sedimentary fractions.
Recognizing sedimentary processes.
Identifying the basic features of modern and paleo-depositional environments.
Recognizing and interpreting characteristic sedimentary sequences.
Analyzing all elements present in the sedimentary environment.
Interpreting possible depositional environments.
This course provides students with knowledge about sedimentary processes and their interpretation.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	45
Preparaton for classes	15
Prepararation for an exam/credit	11
Preparation of a project	15
Preparation of a report/summary/presentation/paper	5
Credit/Exam	4
Student workload	**Hours** 125

Wrocław University of Science and Technology

Operations Research

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.51HS.04927.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects from the fields of humanities or social sciences

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 1 ECTS, Graded credit • Laboratory: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	presents the linear programming method, the types of variables in the model, constraints, and the solution approach, as well as the scope of applications, and distinguishes between linear and nonlinear optimization.	K2_GIG_W06
PEU_W02	explains project planning models (CPM and PERT), as well as resource and cost management models.	K2_GIG_W06
PEU_W03	presents the concept of mass service system models and describes simulation models of industrial processes.	K2_GIG_W06
In terms of skills		
PEU_U01	constructs optimization models for production systems and transportation issues.	K2_GIG_U02, K2_GIG_U10

PEU_U02	develops a project schedule based on the CPM and PERT methods.	K2_GIG_U02, K2_GIG_U10
PEU_U03	prepares a simulation model of a technological process using the specified software.	K2_GIG_U02, K2_GIG_U10
In terms of social competences		
PEU_K01	is open to various approaches in decision-making problem-solving and has the ability to work in a team.	K2_GIG_K01

Program content ensuring learning outcomes

Linear and nonlinear optimization models.
Network programming and project scheduling.
Simulations and models of stochastic processes.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	15
Preparaton for classes	5
Self-study of class topics	10
Preparation of a report/summary/presentation/paper	15
Prepararation for an exam/credit	13
Credit/Exam	2
Student workload	**Hours** 75

Wrocław University of Science and Technology

Advanced Process Design

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.51PS.05020.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 1	Graded credit **Activities and hours** Lecture: 15 Classes: 30 Project: 30	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	recognises and assesses design activities required during the process design.	K2_GIG_W02, K2_GIG_W07
PEU_W02	depicts and explains the relation between process and product design.	K2_GIG_W06, K2_GIG_W07, K2_GIG_W08, K2_GIG_W10, K2_GIG_W11, K2_GIG_W14

PEU_W03	depicts and explains the design of processes: their aims and steps.	K2_GIG_W06, K2_GIG_W07, K2_GIG_W08, K2_GIG_W10, K2_GIG_W14
PEU_W04	identifies and explains the role of modern simulation packages during the process life cycle.	K2_GIG_W02, K2_GIG_W07, K2_GIG_W08, K2_GIG_W10, K2_GIG_W11
In terms of skills		
PEU_U01	applies simulation packages to support every step during the process design.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U05, K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
PEU_U02	validates models and estimates their parameters from experimental data.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U05, K2_GIG_U07, K2_GIG_U13
PEU_U03	applies and analyzes models in process development and design.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U09, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	demonstrates the ability to think and act in a creative and entrepreneurial manner.	K2_GIG_K01
PEU_K02	declares their awareness of the consequences of non-technical effects of engineering activities, including their impact on the environment and, thus, responsibility for decisions.	K2_GIG_K03

Program content ensuring learning outcomes

Chemical and physical properties. Determination of chemical components in process simulation. Property estimation methods. Chemical process material and energy balances, sizing, costing, and economic evaluation. Process performance analysis, process evaluation and optimization. Chemical process synthesis, biorefinery process synthesis: objectives and steps. Synthesis of separation sequences. Energy integration in process design.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Classes	30
Project	30
Credit/Exam	2

Preparation of a project	15
Preparation of a report/summary/presentation/paper	6
Prepararation for an exam/credit	6
Preparaton for classes	8
Conducting literature research	6
Self-study of class topics	7
Student workload	**Hours** 125

Wrocław University of Science and Technology

Integrated Analysis of Deformations in Geomechanical Engineering

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.51PS.04925.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 1	Exam **Activities and hours** Lecture: 30 Laboratory: 30	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student distinguishes and describes the applications of deformation monitoring techniques in the spectrum of engineering disciplines such as mining and construction engineering	K2_GIG_W07, K2_GIG_W13, K2_GIG_W14
PEU_W02	Student characterizes the rock mass and mining methods. Describes empirical and deterministic analyses of rock mass deformations using FEM	K2_GIG_W07, K2_GIG_W13, K2_GIG_W14
In terms of skills		

PEU_U01	Student determines the main assumptions for geodetic measurement of deformations caused by mining exploitation	K2_GIG_U07, K2_GIG_U08, K2_GIG_U10
PEU_U02	Student creates a FEM model. Performs integrated analysis using deterministic modelling by means of the FEM method and using the results of geodetic and geotechnical measurements.	K2_GIG_U07, K2_GIG_U08, K2_GIG_U10

Program content ensuring learning outcomes

1. Integrated analysis of deformations using the combination of monitoring and numerical modelling of deformations, processes occurring in engineering structures and in rock mass at the construction and post-construction stages.
2. Fully automated monitoring principles, data collection, and processing.
3. Analysis of deformations, processes occurring in engineering structures and in rock mass at the construction and post-construction
stages.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	30
Preparation of a project	20
Preparation of a report/summary/presentation/paper	13
Credit/Exam	4
Prepararation for an exam/credit	8
Preparaton for classes	10
Self-study of class topics	10
Student workload	**Hours** 125

Wrocław University of Science and Technology

Project Management, Appraisal and Risk Evaluation

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.51HS.04924.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects from the fields of humanities or social sciences

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 1	Exam **Activities and hours** Lecture: 15 Laboratory: 30 Project: 15	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	discusses the concepts of demand and supply and their impact on the market. They characterize the concepts of costs in economics and accounting and explain their differences.	K2_GIG_W03, K2_GIG_W05
PEU_W02	characterizes the contents of financial statements and presents the method of ratio analysis of financial statements	K2_GIG_W03, K2_GIG_W11
PEU_W03	understands the concepts of Future Value and Present Value of cash flows, characterizes the main methods of capital budgeting and project evaluation, as well as the main methods of investment project risk assessment.	K2_GIG_W03

In terms of skills		
PEU_U01	analyzes the causes and consequences of changes in demand and supply, interprets cost data presented in various cost classification systems, demonstrates the ability to make short-term decisions based on cost data.	K2_GIG_U04, K2_GIG_U08
PEU_U02	can read information presented in financial statements and analyse them using financial ratios.	K2_GIG_U04, K2_GIG_U06
PEU_U03	is able to calculate Present Value of cash flows, can perform capital budgeting procedure, assess the investment project as well as the risk involved.	K2_GIG_U03, K2_GIG_U06
PEU_U04	is able to create basic project documentation and initiate the project. Can utilise the basic methods of project management, monitoring and risk assessment.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U09
PEU_U05	is able to utilise the basic methods of group conflict management, basic methods of group management and leadership, can assess effectiveness of group management	K2_GIG_U08, K2_GIG_U09
In terms of social competences		
PEU_K01	Demonstrates the ability to think and act in a systematic, creative, and entrepreneurial manner, maintaining an economic approach and making decisions based on available financial information and forecasts.	K2_GIG_K01

Program content ensuring learning outcomes

The course combines two groups of topics: basics of mineral resources economics and financial management and introduction to project management.
Part A: Supply and demand mechanism, Concept of costs in microeconomics and accounting. Cost accounting for reporting and management purposes. Content of financial statements and their analysis. Concept of change in the value of money over time. Methods of investment project evaluation. Analysis of the profitability of investment projects in risk conditions.
Part B: Introduction to basic concepts, methods and tools of project management. Presentation of selected areas of project management: project scope management, project time management, project cost management, project risk management. Planning, scheduling and control of projects using Microsoft Project. Issues of effective communication in project teams, group behavior and leadership.

Calculation of ECTS points

Activity form	Activity hours
Lecture	15
Laboratory	30
Project	15
Preparation of a project	10
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	6
Prepararation for an exam/credit	10

Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Integrated Analysis of Deformations in Geomechanical Engineering

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg	**Subject code** W6GIG/000GMFS.51PS.04925.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 1	Exam **Activities and hours** Lecture: 30 Laboratory: 30	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student distinguishes and describes the applications of deformation monitoring techniques in the spectrum of engineering disciplines such as mining and construction engineering	K2_GIG_W07, K2_GIG_W13, K2_GIG_W14
PEU_W02	Student characterizes the rock mass and mining methods. Describes empirical and deterministic analyses of rock mass deformations using FEM	K2_GIG_W07, K2_GIG_W13, K2_GIG_W14
In terms of skills		

PEU_U01	Student determines the main assumptions for geodetic measurement of deformations caused by mining exploitation	K2_GIG_U07, K2_GIG_U08, K2_GIG_U10
PEU_U02	Student creates a FEM model. Performs integrated analysis using deterministic modelling by means of the FEM method and using the results of geodetic and geotechnical measurements.	K2_GIG_U07, K2_GIG_U08, K2_GIG_U10

Program content ensuring learning outcomes

1. Integrated analysis of deformations using the combination of monitoring and numerical modelling of deformations, processes occurring in engineering structures and in rock mass at the construction and post-construction stages.
2. Fully automated monitoring principles, data collection, and processing.
3. Analysis of deformations, processes occurring in engineering structures and in rock mass at the construction and post-construction stages.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	30
Preparation of a project	20
Preparation of a report/summary/presentation/paper	13
Credit/Exam	4
Prepararation for an exam/credit	8
Preparaton for classes	10
Self-study of class topics	10
Student workload	**Hours** 125

Wrocław University of Science and Technology

Project Management, Appraisal and Risk Evaluation

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.51HS.04924.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects from the fields of humanities or social sciences

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 1	Exam **Activities and hours** Lecture: 15 Laboratory: 30 Project: 15	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Discusses the concepts of demand and supply and their impact on the market. Characterizes the concepts of costs in economics and accounting and their differences.	K2_GIG_W03, K2_GIG_W05
PEU_W02	characterizes the contents of financial statements and presents the method of ratio analysis of financial statements	K2_GIG_W03, K2_GIG_W11
PEU_W03	understands the concepts of Future Value and Present Value of cash flows, characterizes the main methods of capital budgeting and project evaluation, as well as the main methods of investment project risk assessment.	K2_GIG_W03

In terms of skills		
PEU_U01	analyzes the causes and consequences of changes in demand and supply, interprets cost data presented in various cost classification systems, demonstrates the ability to make short-term decisions based on cost data.	K2_GIG_U04, K2_GIG_U08
PEU_U02	can read information presented in financial statements and analyse them using financial ratios.	K2_GIG_U04, K2_GIG_U06
PEU_U03	is able to calculate Present Value of cash flows, can perform capital budgeting procedure, assess the investment project as well as the risk involved.	K2_GIG_U03, K2_GIG_U06
PEU_U04	is able to create basic project documentation and initiate the project. Can utilise the basic methods of project management, monitoring and risk assessment.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U09
PEU_U05	is able to utilise the basic methods of group conflict management, basic methods of group management and leadership, can assess effectiveness of group management	K2_GIG_U08, K2_GIG_U09
In terms of social competences		
PEU_K01	demonstrates the ability to think and act in a systematic, creative and entrepreneurial manner, has an attitude of economic acting and decision making on the basis of financial data and forecasts.	K2_GIG_K01

Program content ensuring learning outcomes

The course combines two groups of topics: basics of mineral resources economics and financial management and introduction to project management.
Part A: Supply and demand mechanism, Concept of costs in microeconomics and accounting. Cost accounting for reporting and management purposes. Content of financial statements and their analysis. Concept of change in the value of money over time. Methods of investment project evaluation. Analysis of the profitability of investment projects in risk conditions.
Part B: Introduction to basic concepts, methods and tools of project management. Presentation of selected areas of project management: project scope management, project time management, project cost management, project risk management. Planning, scheduling and control of projects using Microsoft Project. Issues of effective communication in project teams, group behavior and leadership.

Calculation of ECTS points

Activity form	Activity hours
Lecture	15
Laboratory	30
Project	15
Preparation of a project	10
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	6
Prepararation for an exam/credit	10
Credit/Exam	4

Student workload	**Hours** 100

Wrocław University of Science and Technology

Mineralogy and Geochemistry

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.51PS.04974.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 1	Exam **Activities and hours** Lecture: 30 Laboratory: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student distinguishes the main internal and external processes of mineral formation and geochemical processes, the distribution of chemical elements on Earth, and selects the appropriate approach to identifying geochemical characteristics of minerals, rocks, and waters.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
In terms of skills		
PEU_U01	The student analyzes general and detailed scientific theories in the fields of mineralogy and geochemistry, systematizing them to characterize complex mineral formation processes.	K2_GIG_U08, K2_GIG_U10, K2_GIG_U13

In terms of social competences		
PEU_K01	The student is engaged in the practice of sustainable management of natural resources through the study of mineral and rock formation processes.	K2_GIG_K03

Program content ensuring learning outcomes

This course provides an understanding of the principles of the distribution of chemical elements in the Earth. Additionally, it covers the most important thermodynamic processes related to solid materials, the geochemical classification of elements, and the geochemical aspects of the genesis of the most important minerals and mineral assemblages. The course will also introduce topics in isotope geochemistry, which study the chemical evolution of the Earth, as well as the geochemical characteristics of water, organic matter, igneous, sedimentary, and metamorphic rocks, which help describe the processes of mineral and rock formation in the Earth's crust and mantle.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	30
Preparaton for classes	10
Preparation of a report/summary/presentation/paper	10
Prepararation for an exam/credit	6
Conducting empirical studies	10
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Mineral Deposits Exploration

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Mineral Resources Exploration - Track University of Zagreb - WUST	**Subject code** W6GIG/000EZWS.51PS.05006.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 1	Exam **Activities and hours** Lecture: 30 Project: 45	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	To describe all phases of raw materials exploration, from prospecting of deposits to the preparation of reports on raw materials reserves. To select basic geological, geochemical, geophysical, and statistical methods in exploration of selected mineral raw materials deposits.	K2_GIG_W01, K2_GIG_W08, K2_GIG_W11, K2_GIG_W15
In terms of skills		

PEU_U01	To apply statistical methods and spatial analyses in interpretation of laboratory and field measurements. To use information technology in computation and modelling of geological phenomena and processes. To identify the properties of geological materials and processes within hydrogeological, engineering geological and petroleum engineering investigation and mineral exploration.	K2_GIG_U01, K2_GIG_U13
In terms of social competences		
PEU_K01	To apply standards and (legal) regulations related to geological research, geohazards, environmental protection, water exploitation, exploitation of mineral resources or construction conditions. To create geological reports for the economy and strategic documents.	K2_GIG_K03

Program content ensuring learning outcomes

The course introduces geological methods for mineral deposit exploration and their evaluation, as well as their application during the geological phase of mineral resource exploration. The scope of the course includes: Classification of mineral deposits.Economic aspects of mineral deposits. Nature and morphology of ore bodies. Metallogenesis, metallogenic provinces, and periods. Geological criteria for mineral deposit exploration. Magmatic control factors.Structural control factors. Geological models of mineral deposits as a basis for exploration planning. Reconnaissance.Selection and determination of areas for mineral deposit exploration. Application of geophysical methods and remote sensing in mineral deposit exploration. Exploration indicators (alteration, alteration mineral assemblages, ore outcrops, and remnants of old mining). Exploration indicators (indicator elements, indicator minerals).Geochemical exploration methods. Sampling media (river sediments, soil, lake sediments, sedimentary cover, water, gases, vegetation, rocks). Statistical processing of geochemical exploration results. Sampling of mineral resources. Mining law. Categorization and classification of mineral resources. Calculation of mineral resources. Preparation of mineral resource reports.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	45
Preparaton for classes	10
Prepararation for an exam/credit	11
Preparation of a project	15
Preparation of a report/summary/presentation/paper	10
Credit/Exam	4
Student workload	**Hours** 125

Wrocław University of Science and Technology

Project Management, Appraisal and Risk Evaluation

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.51HS.04924.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects from the fields of humanities or social sciences

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 1	Exam **Activities and hours** Lecture: 15 Laboratory: 30 Project: 15	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	discusses the concepts of demand and supply and their impact on the market, characterizes the concepts of costs in economics and accounting and explains their differences.	K2_GIG_W03, K2_GIG_W05
PEU_W02	characterizes the contents of financial statements and presents the method of ratio analysis of financial statements	K2_GIG_W03, K2_GIG_W11
PEU_W03	understands the concepts of Future Value and Present Value of cash flows, characterizes the main methods of capital budgeting and project evaluation, as well as the main methods of investment project risk assessment.	K2_GIG_W03

In terms of skills		
PEU_U01	analyzes the causes and consequences of changes in demand and supply, interprets cost data presented in various cost classification systems, demonstrates the ability to make short-term decisions based on cost data.	K2_GIG_U04, K2_GIG_U08
PEU_U02	can read information presented in financial statements and analyse them using financial ratios.	K2_GIG_U04, K2_GIG_U06
PEU_U03	is able to calculate Present Value of cash flows, can perform capital budgeting procedure, assess the investment project as well as the risk involved.	K2_GIG_U03, K2_GIG_U06
PEU_U04	is able to create basic project documentation and initiate the project. Can utilise the basic methods of project management, monitoring and risk assessment.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U09
PEU_U05	is able to utilise the basic methods of group conflict management, basic methods of group management and leadership, can assess effectiveness of group management	K2_GIG_U08, K2_GIG_U09
In terms of social competences		
PEU_K01	demonstrates the ability to think and act in a systematic, creative and entrepreneurial manner, has an attitude of economic acting and decision making on the basis of financial data and forecasts.	K2_GIG_K01

Program content ensuring learning outcomes

The course combines two groups of topics: basics of mineral resources economics and financial management and introduction to project management.
Part A: Supply and demand mechanism, Concept of costs in microeconomics and accounting. Cost accounting for reporting and management purposes. Content of financial statements and their analysis. Concept of change in the value of money over time. Methods of investment project evaluation. Analysis of the profitability of investment projects in risk conditions.
Part B: Introduction to basic concepts, methods and tools of project management. Presentation of selected areas of project management: project scope management, project time management, project cost management, project risk management. Planning, scheduling and control of projects using Microsoft Project. Issues of effective communication in project teams, group behavior and leadership.

Calculation of ECTS points

Activity form	Activity hours
Lecture	15
Laboratory	30
Project	15
Preparation of a project	10
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	6
Prepararation for an exam/credit	10
Credit/Exam	4

Student workload	**Hours** 100

Wrocław University of Science and Technology

Research Methodology

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST	**Subject code** W6GIG/000ILWS.51PS.05021.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 1	Graded credit **Activities and hours** Lecture: 30 Classes: 15 Project: 30	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	identifies and critically assesses scientific databases to find research results and current knowledge.	K2_GIG_W03, K2_GIG_W08, K2_GIG_W14, K2_GIG_W15, K2_GIG_W16, K2_GIG_W18

PEU_W02	explains database analyses and recognises the methods for processing the results to find the facts.	K2_GIG_W03, K2_GIG_W05, K2_GIG_W07, K2_GIG_W08, K2_GIG_W10, K2_GIG_W15
In terms of skills		
PEU_U01	searches for and assesses the reliability of various sources of scientific knowledge and data.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U10, K2_GIG_U13
PEU_U02	prepares a research plan, designs an experiment, and analyses the databases to reach the objectives.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U07, K2_GIG_U10
PEU_U03	organizes and carries out a workshop to present the research results and creates a scientific report or article.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U07, K2_GIG_U09, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	declares an awareness of the importance of the non-technical consequences of engineering activities, including their impact on the environment and the related responsibility for decisions.	K2_GIG_K01, K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

The application of scientific databases to find research results and knowledge. Critical source assessment. Formulation of research objectives. Processing and analysis of research results. Development of relevant scientific method. The presentation of the research results in a scientifically credible way.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Classes	15
Project	30
Preparaton for classes	8
Preparation of a project	8
Preparation of a report/summary/presentation/paper	12
Credit/Exam	2
Conducting literature research	6
Prepararation for an exam/credit	6

Self-study of class topics	8
Student workload	**Hours** 125

Wrocław University of Science and Technology

Environmental Management

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.51PS.04928.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 30 h, 2 ECTS, Graded credit • Seminar: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student possesses systematic knowledge of the origins of environmental management systems, review and standardization of environmental management systems.	K2_GIG_W04, K2_GIG_W12
PEU_W02	The student determines the possibilities of practical applications of tools supporting the implementation of the environmental management system.	K2_GIG_W18
PEU_W03	The student presents the basic formal and legal principles regarding the use and application of management systems, tools and executive management.	K2_GIG_W13
PEU_W04	The student explains rational and sustainable management of environmental components.	K2_GIG_W13, K2_GIG_W18
In terms of skills		

PEU_U01	The student uses linguistic resources appropriate for a specialized language in the field of environmental management and is able to use them in linguistic activities in order to communicate in a professional environment related to the field of study; is able to obtain the necessary information and interpret and critically evaluate it, reads and understands professional literature, is able to formulate and comprehensively justify opinions, present problems related to the studied discipline, and participate in scientific and professional discussions.	K2_GIG_U05, K2_GIG_U10, K2_GIG_U12
PEU_U02	The student applies methods and appropriate IT tools in the systemic management of environmental elements.	K2_GIG_U11, K2_GIG_U12
In terms of social competences		
PEU_K01	The student is open to acting in a creative and entrepreneurial way.	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Getting to know systems of environmental management both in Poland and other EU countries.
Getting to know rational and sustainable management of environmental components.
Getting to know the genesis of environmental management systems, review and standardization of environmental management systems.
Getting to know benefits and obligations arising from the implementation of an environmental management system.
Presenting the relationship between an environmental management system and a quality management system.
Presenting an overview of informative methods of supporting the implementation of environmental management systems (possibilities and practical usage of computerised systems of environmental information management, decision support in the area of environmental protection and choice of methods and tools used to support the implementation of an environmental management system).

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Seminar	15
Self-study of class topics	6
Preparation of a report/summary/presentation/paper	14
Preparaton for classes	6
Credit/Exam	4
Student workload	**Hours** 75

Wrocław University of Science and Technology

Environmental Management

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.51PS.04928.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 30 h, 2 ECTS, Graded credit • Seminar: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student possesses systematic knowledge of the origins of environmental management systems, review and standardization of environmental management systems..	K2_GIG_W04, K2_GIG_W12
PEU_W02	The student determines the possibilities of practical applications of tools supporting the implementation of the environmental management system.	K2_GIG_W18
PEU_W03	The student presents the basic formal and legal principles regarding the use and application of management systems, tools and executive management.	K2_GIG_W13
PEU_W04	The student explains rational and sustainable management of environmental components.	K2_GIG_W13, K2_GIG_W18
In terms of skills		

PEU_U01	The student uses linguistic resources appropriate for a specialized language in the field of environmental management and is able to use them in linguistic activities in order to communicate in a professional environment related to the field of study; is able to obtain the necessary information and interpret and critically evaluate it, reads and understands professional literature, is able to formulate and comprehensively justify opinions, present problems related to the studied discipline, and participate in scientific and professional discussions.	K2_GIG_U05, K2_GIG_U10, K2_GIG_U12
PEU_U02	The student applies methods and appropriate IT tools in the systemic management of environmental elements.	K2_GIG_U11, K2_GIG_U12
In terms of social competences		
PEU_K01	The student is open to acting in a creative and entrepreneurial way.	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Getting to know systems of environmental management both in Poland and other EU countries.
Getting to know rational and sustainable management of environmental components.
Getting to know the genesis of environmental management systems, review and standardization of environmental management systems.
Getting to know benefits and obligations arising from the implementation of an environmental management system.
Presenting the relationship between an environmental management system and a quality management system.
Presenting an overview of informative methods of supporting the implementation of environmental management systems (possibilities and practical usage of computerised systems of environmental information management, decision support in the area of environmental protection and choice of methods and tools used to support the implementation of an environmental management system).

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Seminar	15
Self-study of class topics	6
Preparation of a report/summary/presentation/paper	14
Preparaton for classes	6
Credit/Exam	4
Student workload	**Hours** 75

Wrocław University of Science and Technology

Geophisical Exploration Methods I

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Mineral Resources Exploration - Track University of Miskolc - WUST	**Subject code** W6GIG/000EMWS.51PS.04975.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 1	Exam **Activities and hours** Lecture: 30 Laboratory: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student presents the different surface geophysical and boreholes geophysical methods appropriate for solving exploration tasks related to natural resources. Discusses the problem-solving (research-planning and management) techniques best fitting to practices of geophysical prospecting and exploration.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
PEU_W02	Characterizes the methods of acquisition and data collection in geophysical exploration.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
In terms of skills		

PEU_U01	The student designs prospecting and exploration of geological structures by geophysical methods. Evaluates and interprets the results and assesses the need of further geophysical measurements	K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	The student is open and receptive to the knowledge and acceptance of professional and technological methodological developments in the fields of technical earth sciences, to the acquisition of their management, and to the participation in their development.	K2_GIG_K01, K2_GIG_K03

Program content ensuring learning outcomes

This course introduces students to the theoretical foundations and practical skills of planning and conducting geophysical surveys in various geological environments and types of deposits. The course covers both surface geophysical methods and methods used in boreholes, enabling students to design and carry out geophysical surveys and evaluate the obtained data.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	30
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	6
Prepararation for an exam/credit	10
Conducting empirical studies	10
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Petroleum Geology

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Mineral Resources Exploration - Track University of Zagreb - WUST	**Subject code** W6GIG/000EZWS.51PS.05007.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects

Semester	**Examination**	**Number of ECTS points**
Semester 1	Exam **Activities and hours** Lecture: 30 Project: 45	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student defines and explains the role of biomarkers in identifying the origin of parent rocks and interprets the results of pyrolysis to draw conclusions about the generative and maturation properties of the parent rocks.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W08, K2_GIG_W11
In terms of skills		
PEU_U01	The student analyzes the role of biomarkers in determining the origin of hydrocarbons, including the origin of organic matter and the sedimentary environment, and interprets the results of biomarker analyses, arguing their significance in a geological context.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U10, K2_GIG_U13

In terms of social competences		
PEU_K01	The student is responsible for shaping a culture of workplace safety in analytical laboratories and cares for the health and lives of other employees. The student respects safety principles and acts in accordance with them, protecting oneself and others while working with advanced analytical techniques.	K2_GIG_K03

Program content ensuring learning outcomes

The curriculum aims to equip students with specialized knowledge and skills in petroleum and gas geology. It prepares future engineers for all aspects of oil, gas, and geothermal water exploration and exploitation. Additionally, the program emphasizes professional collaboration with engineers from related fields, which is crucial for teamwork.
Students acquire advanced skills in:
Exploration and exploitation of oil and gas.
Geological and geophysical analysis of deposits.
Management of extraction projects.
Utilization of modern technologies in petroleum geology.
Working in interdisciplinary engineering teams.
The curriculum content is designed to ensure the achievement of learning outcomes that will prepare students for effective performance in the oil and gas industry.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	45
Preparaton for classes	16
Preparation of a project	15
Prepararation for an exam/credit	5
Preparation of a report/summary/presentation/paper	10
Credit/Exam	4
Student workload	**Hours** 125

Wrocław University of Science and Technology

Environmental Management

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.51PS.04928.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 30 h, 2 ECTS, Graded credit • Seminar: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student possesses systematic knowledge of the origins of environmental management systems, review and standardization of environmental management systems..	K2_GIG_W04, K2_GIG_W12
PEU_W02	The student determines the possibilities of practical applications of tools supporting the implementation of the environmental management system.	K2_GIG_W18
PEU_W03	The student presents the basic formal and legal principles regarding the use and application of management systems, tools and executive management.	K2_GIG_W13
PEU_W04	The student explains rational and sustainable management of environmental components.	K2_GIG_W13, K2_GIG_W18
In terms of skills		

PEU_U01	The student uses linguistic resources appropriate for a specialized language in the field of environmental management and is able to use them in linguistic activities in order to communicate in a professional environment related to the field of study; is able to obtain the necessary information and interpret and critically evaluate it, reads and understands professional literature, is able to formulate and comprehensively justify opinions, present problems related to the studied discipline, and participate in scientific and professional discussions.	K2_GIG_U05, K2_GIG_U10, K2_GIG_U12
PEU_U02	The student applies methods and appropriate IT tools in the systemic management of environmental elements.	K2_GIG_U11, K2_GIG_U12
In terms of social competences		
PEU_K01	The student is open to acting in a creative and entrepreneurial way.	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Getting to know systems of environmental management both in Poland and other EU countries.
Getting to know rational and sustainable management of environmental components.
Getting to know the genesis of environmental management systems, review and standardization of environmental management systems.
Getting to know benefits and obligations arising from the implementation of an environmental management system.
Presenting the relationship between an environmental management system and a quality management system.
Presenting an overview of informative methods of supporting the implementation of environmental management systems (possibilities and practical usage of computerised systems of environmental information management, decision support in the area of environmental protection and choice of methods and tools used to support the implementation of an environmental management system).

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Seminar	15
Self-study of class topics	6
Preparation of a report/summary/presentation/paper	14
Preparaton for classes	6
Credit/Exam	4
Student workload	**Hours** 75

Wrocław University of Science and Technology

Operations Research

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.51HS.04927.25

Lecture languages
English

Mandatoriness
Elective

Block
Subjects from the fields of humanities or social sciences

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 1 ECTS, Graded credit • Laboratory: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	presents the linear programming method, the types of variables in the model, constraints, and the solution approach, as well as the scope of applications, and distinguishes between linear and nonlinear optimization.	K2_GIG_W06
PEU_W02	explains project planning models (CPM and PERT), as well as resource and cost management models.	K2_GIG_W06
PEU_W03	presents the concept of mass service system models and describes simulation models of industrial processes.	K2_GIG_W06
In terms of skills		
PEU_U01	constructs optimization models for production systems and transportation issues.	K2_GIG_U02, K2_GIG_U10

PEU_U02	develops a project schedule based on the CPM and PERT methods.	K2_GIG_U02, K2_GIG_U10
PEU_U03	prepares a simulation model of a technological process using the specified software.	K2_GIG_U02, K2_GIG_U10
In terms of social competences		
PEU_K01	is open to various approaches in decision-making problem-solving and has the ability to work in a team.	K2_GIG_K01

Program content ensuring learning outcomes

Linear and nonlinear optimization models.
Network programming and project scheduling.
Simulations and models of stochastic processes.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	15
Preparaton for classes	5
Self-study of class topics	10
Preparation of a report/summary/presentation/paper	15
Prepararation for an exam/credit	13
Credit/Exam	2
Student workload	**Hours** 75

Wrocław University of Science and Technology

Environmental Management

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.51PS.04928.25

Lecture languages
English

Mandatoriness
Elective

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 30 h, 2 ECTS, Graded credit • Seminar: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student possesses systematic knowledge of the origins of environmental management systems, review and standardization of environmental management systems..	K2_GIG_W04, K2_GIG_W12
PEU_W02	The student determines the possibilities of practical applications of tools supporting the implementation of the environmental management system.	K2_GIG_W18
PEU_W03	The student presents the basic formal and legal principles regarding the use and application of management systems, tools and executive management.	K2_GIG_W13
PEU_W04	The student explains rational and sustainable management of environmental components.	K2_GIG_W13, K2_GIG_W18
In terms of skills		

PEU_U01	The student uses linguistic resources appropriate for a specialized language in the field of environmental management and is able to use them in linguistic activities in order to communicate in a professional environment related to the field of study; is able to obtain the necessary information and interpret and critically evaluate it, reads and understands professional literature, is able to formulate and comprehensively justify opinions, present problems related to the studied discipline, and participate in scientific and professional discussions.	K2_GIG_U05, K2_GIG_U10, K2_GIG_U12
PEU_U02	The student applies methods and appropriate IT tools in the systemic management of environmental elements.	K2_GIG_U11, K2_GIG_U12
In terms of social competences		
PEU_K01	The student is open to acting in a creative and entrepreneurial way.	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Getting to know systems of environmental management both in Poland and other EU countries.
Getting to know rational and sustainable management of environmental components.
Getting to know the genesis of environmental management systems, review and standardization of environmental management systems.
Getting to know benefits and obligations arising from the implementation of an environmental management system.
Presenting the relationship between an environmental management system and a quality management system.
Presenting an overview of informative methods of supporting the implementation of environmental management systems (possibilities and practical usage of computerised systems of environmental information management, decision support in the area of environmental protection and choice of methods and tools used to support the implementation of an environmental management system).

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Seminar	15
Self-study of class topics	6
Preparation of a report/summary/presentation/paper	14
Preparaton for classes	6
Credit/Exam	4
Student workload	**Hours** 75

Wrocław University of Science and Technology

Operations Research

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMFS.51HS.04927.25

Lecture languages
English

Mandatoriness
Elective

Block
Subjects from the fields of humanities or social sciences

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 1 ECTS, Graded credit • Laboratory: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	presents the linear programming method, the types of variables in the model, constraints, and the solution approach, as well as the scope of applications, and distinguishes between linear and nonlinear optimization.	K2_GIG_W06
PEU_W02	explains project planning models (CPM and PERT), as well as resource and cost management models.	K2_GIG_W06
PEU_W03	presents the concept of mass service system models and describes simulation models of industrial processes.	K2_GIG_W06
In terms of skills		
PEU_U01	constructs optimization models for production systems and transportation issues.	K2_GIG_U02, K2_GIG_U10

PEU_U02	develops a project schedule based on the CPM and PERT methods.	K2_GIG_U02, K2_GIG_U10
PEU_U03	prepares a simulation model of a technological process using the specified software.	K2_GIG_U02, K2_GIG_U10
In terms of social competences		
PEU_K01	is open to various approaches in decision-making problem-solving and has the ability to work in a team.	K2_GIG_K01

Program content ensuring learning outcomes

Linear and nonlinear optimization models.
Network programming and project scheduling.
Simulations and models of stochastic processes.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	15
Preparaton for classes	5
Self-study of class topics	10
Preparation of a report/summary/presentation/paper	15
Prepararation for an exam/credit	13
Credit/Exam	2
Student workload	**Hours** 75

Wrocław University of Science and Technology

Environmental Management

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMFS.51PS.04928.25

Lecture languages
English

Mandatoriness
Elective

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 30 h, 2 ECTS, Graded credit • Seminar: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student possesses systematic knowledge of the origins of environmental management systems, review and standardization of environmental management systems.	K2_GIG_W04, K2_GIG_W12
PEU_W02	The student determines the possibilities of practical applications of tools supporting the implementation of the environmental management system.	K2_GIG_W18
PEU_W03	The student presents the basic formal and legal principles regarding the use and application of management systems, tools and executive management.	K2_GIG_W13
PEU_W04	The student explains rational and sustainable management of environmental components.	K2_GIG_W13, K2_GIG_W18
In terms of skills		

PEU_U01	The student uses linguistic resources appropriate for a specialized language in the field of environmental management and is able to use them in linguistic activities in order to communicate in a professional environment related to the field of study; is able to obtain the necessary information and interpret and critically evaluate it, reads and understands professional literature, is able to formulate and comprehensively justify opinions, present problems related to the studied discipline, and participate in scientific and professional discussions.	K2_GIG_U05, K2_GIG_U10, K2_GIG_U12
PEU_U02	The student applies methods and appropriate IT tools in the systemic management of environmental elements.	K2_GIG_U11, K2_GIG_U12
In terms of social competences		
PEU_K01	The student is open to acting in a creative and entrepreneurial way.	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Getting to know systems of environmental management both in Poland and other EU countries.
Getting to know rational and sustainable management of environmental components.
Getting to know the genesis of environmental management systems, review and standardization of environmental management systems.
Getting to know benefits and obligations arising from the implementation of an environmental management system.
Presenting the relationship between an environmental management system and a quality management system.
Presenting an overview of informative methods of supporting the implementation of environmental management systems (possibilities and practical usage of computerised systems of environmental information management, decision support in the area of environmental protection and choice of methods and tools used to support the implementation of an environmental management system).

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Seminar	15
Self-study of class topics	6
Preparation of a report/summary/presentation/paper	14
Preparaton for classes	6
Credit/Exam	4
Student workload	**Hours** 75

Wrocław University of Science and Technology

Circular Economy for Materials Processing

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.51PS.05022.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 1	Exam **Activities and hours** Lecture: 30 Project: 30 Seminar: 15	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	recognises and explains the concepts of circular economy, materials flow (raw materials, processing, manufacturing until end-of-life recycling and re-usage), issues and drivers for changes.	K2_GIG_W02, K2_GIG_W03, K2_GIG_W04, K2_GIG_W05, K2_GIG_W08, K2_GIG_W11, K2_GIG_W12, K2_GIG_W13

PEU_W02	recognizes and describes the impacts (environmental, economic and social) of the current practice of raw materials processing from a sustainability perspective.	K2_GIG_W11, K2_GIG_W12, K2_GIG_W13
In terms of skills		
PEU_U01	creates new business opportunities to re-enter materials into the circular economy.	K2_GIG_U04, K2_GIG_U08, K2_GIG_U10, K2_GIG_U12, K2_GIG_U13
PEU_U02	applies and evaluates processing technologies to accelerate the implementation during business creation.	K2_GIG_U08, K2_GIG_U10, K2_GIG_U12, K2_GIG_U13
PEU_U03	interprets the impacts (environmental, economic and social) of the current practice of materials processing from a sustainability aspect.	K2_GIG_U10, K2_GIG_U12, K2_GIG_U13
PEU_U04	organizes teamwork to develop a project.	K2_GIG_U09
In terms of social competences		
PEU_K01	declares their awareness of the consequences of non-technical effects of engineering activities, including their impact on the environment and, thus, responsibility for decisions.	K2_GIG_K03

Program content ensuring learning outcomes

The circular economy and resource efficiency are important aspects of sustainability in the minerals industry. The circular economy concepts are considered in the design, development and operation of mineral production processes for, for example, metals during use, at the end-of-life stage and in recycling. Topics and case studies are drawn from industrial plants.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Seminar	15
Credit/Exam	4
Prepararation for an exam/credit	8
Preparation of a project	14
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	6
Self-study of class topics	5

Conducting literature research	3
Student workload	**Hours** 125

Wrocław University of Science and Technology

Computer Aided Geological Modelling & Geostatistics - Part Geostatistics

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.51PM.04919.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects of basic education - mathematics

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Estimation methods, principles of geostatistics, kriging estimators	K2_GIG_W15
PEU_W02	Geostatistical modelling of the selected deposit parameters (domain analysis, variogram modelling)	K2_GIG_W06, K2_GIG_W08, K2_GIG_W15
In terms of skills		
PEU_U01	Application of relevant estimation methods for quality modelling of a deposit	K2_GIG_U02, K2_GIG_U04, K2_GIG_U08

Program content ensuring learning outcomes

Geology of the seam. Structural model of the stratified deposit. Methods of the prediction of the surface layer parameters. Spatial distribution of samples values. Regionalized variable. BLUE Estimator of the mean value: Kriging.

Domain analysis with the use of the statistical methods. Determination of the empirical variogram. Anisotropy analysis. Variogram modelling. Kriging Neighborhood Analysis - defining optimal parameters of the estimation procedure.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Preparaton for classes	15
Prepararation for an exam/credit	10
Self-study of class topics	10
Student workload	**Hours** 50

Wrocław University of Science and Technology

Digital Mine

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.51PS.04990.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 1 ECTS, Graded credit • Laboratory: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	characterizes issues related to automation systems, control systems and measurement systems in various aspects of the mining industry.	K2_GIG_W07, K2_GIG_W12, K2_GIG_W18, K2_GIG_W19
PEU_W02	explains the importance of automation and robotics systems in modern mining.	K2_GIG_W07, K2_GIG_W12, K2_GIG_W18, K2_GIG_W19
In terms of skills		
PEU_U01	is able to select and integrate elements of a specialized measuring and control system including: control unit, executive system, measuring system as well as peripheral and communication modules	K2_GIG_U04, K2_GIG_U07

PEU_U02	designs improvements in the existing design solutions for automation and robotics components and systems	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08

Program content ensuring learning outcomes

Creation of utility applications in the C / C ++ and LabVIEW environment
Knowledge about embedded systems, their construction, selection of components, designing, programming and their exploitation.
Advances of technology & methods of future mining operations.
Building social competencies including emotional intelligence skills involving the cooperation in the group of students

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	15
Preparation of a project	10
Prepararation for an exam/credit	5
Self-study of class topics	5
Student workload	**Hours** 50

Wrocław University of Science and Technology

Computer Aided Geological Modelling & Geostatistics - Part Geostatistics

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMFS.51PM.04919.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects of basic education - mathematics

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Estimation methods, principles of geostatistics, kriging estimators	K2_GIG_W15
PEU_W02	Geostatistical modelling of the selected deposit parameters (domain analysis, variogram modelling)	K2_GIG_W06, K2_GIG_W08, K2_GIG_W15
In terms of skills		
PEU_U01	Application of relevant estimation methods for quality modelling of a deposit	K2_GIG_U02, K2_GIG_U04, K2_GIG_U08

Program content ensuring learning outcomes

Geology of the seam. Structural model of the stratified deposit. Methods of the prediction of the surface layer parameters. Spatial distribution of samples values. Regionalized variable. BLUE Estimator of the mean value: Kriging.

Domain analysis with the use of the statistical methods. Determination of the empirical variogram. Anisotropy analysis. Variogram modelling. Kriging Neighborhood Analysis - defining optimal parameters of the estimation procedure.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Preparaton for classes	15
Prepararation for an exam/credit	10
Self-study of class topics	10
Student workload	**Hours** 50

Wrocław University of Science and Technology

Digital Mine

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.51PS.04990.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 1 ECTS, Graded credit • Laboratory: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	characterizes issues related to automation systems, control systems and measurement systems in various aspects of the mining industry.	K2_GIG_W07, K2_GIG_W12, K2_GIG_W18, K2_GIG_W19
PEU_W02	explains the importance of automation and robotics systems in modern mining.	K2_GIG_W07, K2_GIG_W12, K2_GIG_W18, K2_GIG_W19
In terms of skills		
PEU_U01	is able to select and integrate elements of a specialized measuring and control system including: control unit, executive system, measuring system as well as peripheral and communication modules	K2_GIG_U04, K2_GIG_U07

PEU_U02	designs improvements in the existing design solutions for automation and robotics components and systems	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08

Program content ensuring learning outcomes

Creation of utility applications in the C / C ++ and LabVIEW environment
Knowledge about embedded systems, their construction, selection of components, designing, programming and their exploitation.
Advances of technology & methods of future mining operations.
Building social competencies including emotional intelligence skills involving the cooperation in the group of students

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	15
Preparation of a project	10
Prepararation for an exam/credit	5
Self-study of class topics	5
Student workload	**Hours** 50

Wrocław University of Science and Technology

Numerical Methods and Optimization

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Mineral Resources Exploration - Track University of Miskolc - WUST	**Subject code** W6GIG/000EMWS.51HS.04976.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Subjects from the fields of humanities or social sciences
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 1	Graded credit **Activities and hours** Lecture: 15 Laboratory: 15	2.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Analyses and compares different numerical techniques when choosing the most appropriate one for computational problems. Develops and tests optimisation models as a decision support tool	K2_GIG_W06, K2_GIG_W09
In terms of skills		
PEU_U01	Understands the relation between engineering mathematics. Applies algorithmic thinking to problem solving.	K2_GIG_U02, K2_GIG_U04, K2_GIG_U13
In terms of social competences		

PEU_K01	Supports innovative skills and knowledge in solving professional problems related to numerical methods and optimization. Declares independent work and makes decisions cautiously.	K2_GIG_K01, K2_GIG_K03

Program content ensuring learning outcomes

The program includes unconstrained and constrained optimization, including convex optimization, which is fundamental for many mathematical and engineering problems. Students will learn techniques for minimizing single-variable functions, such as the golden section method and the parabolic method, as well as multi-variable function minimization techniques, including Nelder-Mead, Newton, modified Newton, quasi-Newton methods, and line search minimization.
The course will cover penalty function methods used in constrained optimization, as well as multi-criteria and multi-aspect decision problems, including Pareto efficient solutions, which are key for decision analysis in complex systems.
Students will become familiar with linear programming, which is the basis for many optimization problems, and soft computing methods, including fuzzy systems, genetic algorithms, and neural networks, which are modern techniques used in data analysis and artificial intelligence.
The program also includes numerical solutions for ordinary differential equations and systems of equations, including Runge-Kutta methods, predictor-corrector methods, and finite differences, which are fundamental for analyzing dynamic systems.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	15
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	8
Credit/Exam	2
Student workload	**Hours** 50

Wrocław University of Science and Technology

Engineering Geological Investigations

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Zagreb - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EZWS.51PS.05008.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 1	Exam **Activities and hours** Lecture: 30 Project: 45	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Identifies weathering profiles in various types of rocks and applies appropriate geological engineering investigation methods. Classifies and describes soils and rock masses according to various engineering recommendations and standards.	K2_GIG_W02, K2_GIG_W07, K2_GIG_W10
In terms of skills		
PEU_U01	Evaluates the results of conducted research and tests, analyzes geotechnical reports and the results of engineering-geological studies, and prepares an engineering-geological profile and technical drawings of the tunnel.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U10

In terms of social competences		
PEU_K01	Respects standards and complies with environmental protection regulations while analyzing geotechnical reports and the results of engineering-geological investigations. Cares for the environment by considering ecological aspects during the classification and categorization of soils and rock masses based on their geomechanical properties.	K2_GIG_K03

Program content ensuring learning outcomes

The course provides basic knowledge about engineering geological investigations for the purpose of design in civil engineering and mining.
This course covers all important aspects of engineering geological investigations, like:
Types of engineering geological investigations
Methods of engineering geological investigations
Methods of detailed engineering geological investigations
Genetic classification of soil and rock mass, rock mass weathering and engineering geological profile
Classification and categorization of rock mass
Engineering geological mapping of tunnels
Methods and results of regional engineering geological investigations

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	45
Preparaton for classes	15
Preparation of a report/summary/presentation/paper	20
Prepararation for an exam/credit	11
Credit/Exam	4
Student workload	**Hours** 125

Wrocław University of Science and Technology

Digital Mine

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.51PS.04990.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 1 ECTS, Graded credit • Laboratory: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	characterizes issues related to automation systems, control systems and measurement systems in various aspects of the mining industry.	K2_GIG_W07, K2_GIG_W12, K2_GIG_W18, K2_GIG_W19
PEU_W02	explains the importance of automation and robotics systems in modern mining.	K2_GIG_W07, K2_GIG_W12, K2_GIG_W18, K2_GIG_W19
In terms of skills		
PEU_U01	is able to select and integrate elements of a specialized measuring and control system including: control unit, executive system, measuring system as well as peripheral and communication modules	K2_GIG_U04, K2_GIG_U07

PEU_U02	designs improvements in the existing design solutions for automation and robotics components and systems	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08

Program content ensuring learning outcomes

Creation of utility applications in the C / C ++ and LabVIEW environment
Knowledge about embedded systems, their construction, selection of components, designing, programming and their exploitation.
Advances of technology & methods of future mining operations.
Building social competencies including emotional intelligence skills involving the cooperation in the group of students

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	15
Preparation of a project	10
Prepararation for an exam/credit	5
Self-study of class topics	5
Student workload	**Hours** 50

Wrocław University of Science and Technology

Technology and Innovation Management Introduction

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.51PS.05023.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 1	Exam **Activities and hours** Lecture: 15 Classes: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	describes and explains various methods of technology and innovation strategy as well as the process of the creation of new products and services.	K2_GIG_W03, K2_GIG_W07, K2_GIG_W09, K2_GIG_W13, K2_GIG_W18
PEU_W02	identifies the main innovation and technology management concepts and their linkages to the innovation process, innovation and technology strategy and innovative organization management.	K2_GIG_W03, K2_GIG_W05, K2_GIG_W07, K2_GIG_W09, K2_GIG_W10, K2_GIG_W18

PEU_W03	describes and explains sustainability and innovation basics.	K2_GIG_W05, K2_GIG_W07, K2_GIG_W09, K2_GIG_W10, K2_GIG_W13
In terms of skills		
PEU_U01	analyzes and designs the technology and innovation strategy of a company.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U05, K2_GIG_U06, K2_GIG_U10
PEU_U02	analyzes and evaluates the usability of various methods of innovation and technology.	K2_GIG_U03, K2_GIG_U05, K2_GIG_U06, K2_GIG_U10, K2_GIG_U13
PEU_U03	verifies and uses the main innovation and technology management concepts to innovative organization management.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	demonstrates the ability to think and act creatively and entrepreneurially.	K2_GIG_K01, K2_GIG_K02
PEU_K02	declares an awareness of the importance of the non-technical consequences of engineering activities, including their impact on the environment and the related responsibility for decisions.	K2_GIG_K03

Program content ensuring learning outcomes

Innovation as a core business process. Innovative organisation. Development of technology and innovation strategy. Innovation networks. Decision-making in technological and market uncertainty. Creation of new products and services. Innovation performance and learning. Sustainability and innovation.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Classes	30
Credit/Exam	4
Preparation of a project	10
Preparation of a report/summary/presentation/paper	4
Preparaton for classes	8
Prepararation for an exam/credit	4

Student workload	Hours 75

Wrocław University of Science and Technology

Computer Aided Geological Modelling & Geostatistics - Part Geological Modeling

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.51PK.04920.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 1	• Laboratory: 45 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Creating and validating 3-D models of various geological structures in the comprehensive dedicated software environment	K2_GIG_W06, K2_GIG_W08, K2_GIG_W15
In terms of skills		
PEU_U01	Evaluating 3-D objects against structural and quality block models (volumes, tonnages, grades)	K2_GIG_U03, K2_GIG_U04, K2_GIG_U08
PEU_U02	Describing the interpretation and applied approach, creating models, evaluation results, recommendations for possible enhancements	K2_GIG_U03, K2_GIG_U04, K2_GIG_U08

Program content ensuring learning outcomes

Quality model of the deposit – block model of the parameter layers. Estimation and evaluation of the block model. Reserves modelling and evaluation. Mineral resources. International reporting. The JORC Code.

Calculation of ECTS points

Activity form	**Activity hours**
Laboratory	45
Preparation of a project	5
Student workload	**Hours** 50

Wrocław University of Science and Technology

Computer Aided Geological Modelling & Geostatistics - Part Geostatistics

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.51PM.04919.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects of basic education - mathematics

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Estimation methods, principles of geostatistics, kriging estimators	K2_GIG_W15
PEU_W02	Geostatistical modelling of the selected deposit parameters (domain analysis, variogram modelling)	K2_GIG_W06, K2_GIG_W08, K2_GIG_W15
In terms of skills		
PEU_U01	Application of relevant estimation methods for quality modelling of a deposit	K2_GIG_U02, K2_GIG_U04, K2_GIG_U08

Program content ensuring learning outcomes

Geology of the seam. Structural model of the stratified deposit. Methods of the prediction of the surface layer parameters. Spatial distribution of samples values. Regionalized variable. BLUE Estimator of the mean value: Kriging.

Domain analysis with the use of the statistical methods. Determination of the empirical variogram. Anisotropy analysis. Variogram modelling. Kriging Neighborhood Analysis - defining optimal parameters of the estimation procedure.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Preparaton for classes	15
Prepararation for an exam/credit	10
Self-study of class topics	10
Student workload	**Hours** 50

Wrocław University of Science and Technology

Computer Aided Geological Modelling & Geostatistics - Part Geological Modeling

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMFS.51PK.04920.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 1	• Laboratory: 45 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Creating and validating 3-D models of various geological structures in the comprehensive dedicated software environment	K2_GIG_W06, K2_GIG_W08, K2_GIG_W15
In terms of skills		
PEU_U01	Evaluating 3-D objects against structural and quality block models (volumes, tonnages, grades)	K2_GIG_U03, K2_GIG_U04, K2_GIG_U08
PEU_U02	Describing the interpretation and applied approach, creating models, evaluation results, recommendations for possible enhancements	K2_GIG_U03, K2_GIG_U04, K2_GIG_U08

Program content ensuring learning outcomes

Quality model of the deposit – block model of the parameter layers. Estimation and evaluation of the block model. Reserves modelling and evaluation. Mineral resources. International reporting. The JORC Code.

Calculation of ECTS points

Activity form	**Activity hours**
Laboratory	45
Preparation of a project	5
Student workload	**Hours** 50

Wrocław University of Science and Technology

Computer Aided Geological Modelling & Geostatistics - Part Geostatistics

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.51PM.04919.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects of basic education - mathematics

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Estimation methods, principles of geostatistics, kriging estimators	K2_GIG_W15
PEU_W02	Geostatistical modelling of the selected deposit parameters (domain analysis, variogram modelling)	K2_GIG_W06, K2_GIG_W08, K2_GIG_W15
In terms of skills		
PEU_U01	Application of relevant estimation methods for quality modelling of a deposit	K2_GIG_U02, K2_GIG_U04, K2_GIG_U08

Program content ensuring learning outcomes

Geology of the seam. Structural model of the stratified deposit. Methods of the prediction of the surface layer parameters. Spatial distribution of samples values. Regionalized variable. BLUE Estimator of the mean value: Kriging.

Domain analysis with the use of the statistical methods. Determination of the empirical variogram. Anisotropy analysis. Variogram modelling. Kriging Neighborhood Analysis - defining optimal parameters of the estimation procedure.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Preparaton for classes	15
Prepararation for an exam/credit	10
Self-study of class topics	10
Student workload	**Hours** 50

Wrocław University of Science and Technology

Engineering Physics

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Mineral Resources Exploration - Track University of Miskolc - WUST	**Subject code** W6GIG/000EMWS.51PS.04977.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects

Semester	**Examination**	**Number of ECTS points**
Semester 1	Exam **Activities and hours** Lecture: 30 Seminar: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	To combine the technical and scientific knowledge required for the high-level integration in earth sciences engineering disciplines, regarding the theoretical background of continuum physics.	K2_GIG_W02
In terms of skills		
PEU_U01	To apply general and specific theories of applied physics, to solve engineering tasks in geophysical exploration.	K2_GIG_U01, K2_GIG_U13
In terms of social competences		

PEU_K01	Student applies creative skills and knowledge in solving professional problems in the fields of geophysical engineering., To develop professional decisions in the field of operation entrusted to him/her.	K2_GIG_K02

Program content ensuring learning outcomes

Within the framework of the Earth Science Engineering MSc program, the students gain the deepening knowledge in those fields of the continuum physics, which are necessary to understand the geological processes and geophysical methods. This is primarily a theoretical course, giving strong background for later geophysical courses in order to understand and interpret the physical processes that are used in geophysical prospecting and exploration works.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Seminar	30
Prepararation for an exam/credit	10
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	16
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Exploration Geochemistry

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Mineral Resources Exploration - Track University of Zagreb - WUST	**Subject code** W6GIG/000EZWS.51PS.05009.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 1	Graded credit **Activities and hours** Lecture: 30 Project: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	To explain the behaviour of chemical elements in surface environments and the processes that control the geochemical anomaly. To select a suitable sampling medium, the proper sample preparation procedure, and the analytical method, as well as analyte in order to find the geochemical anomaly caused by the weathering of the ore body.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W18
In terms of skills		

PEU_U01	To apply univariate, bivariate and multivariate statistical methods in the interpretation of geochemical data. To construct geochemical maps. Design preliminary, regional and detailed geochemical survey of mineral resources.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U09, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	Student will develop communication skills through oral presentation and writing reports related to project assignments.To systematize and combine the results of geochemical prospecting with other data and prepare and present a geological report	K2_GIG_K02

Program content ensuring learning outcomes

Students will be introduced to the basic principles of geochemical prospecting, i.e., finding the geochemical anomaly caused by the weathering of the ore deposit. Students will be introduced to the behavior of trace elements in surface environments, sampling media (soil, water, sediment, plant rocks), chemical analysis of geological materials (AAS, ICP), statistical methods and interpretation of geochemical data. Students will develop their communication skills through oral presentation and writing reports related to project assignments.
Students will acquire a basic knowledge about importance of geochemical prospecting.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Credit/Exam	2
Preparaton for classes	13
Prepararation for an exam/credit	15
Preparation of a project	10
Student workload	**Hours** 100

Wrocław University of Science and Technology

Computer Aided Geological Modelling & Geostatistics - Part Geostatistics

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.51PM.04919.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects of basic education - mathematics

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Estimation methods, principles of geostatistics, kriging estimators	K2_GIG_W15
PEU_W02	Geostatistical modelling of the selected deposit parameters (domain analysis, variogram modelling)	K2_GIG_W06, K2_GIG_W08, K2_GIG_W15
In terms of skills		
PEU_U01	Application of relevant estimation methods for quality modelling of a deposit	K2_GIG_U02, K2_GIG_U04, K2_GIG_U08

Program content ensuring learning outcomes

Geology of the seam. Structural model of the stratified deposit. Methods of the prediction of the surface layer parameters.

Spatial distribution of samples values. Regionalized variable. BLUE Estimator of the mean value: Kriging.
Domain analysis with the use of the statistical methods. Determination of the empirical variogram. Anisotropy analysis.
Variogram modelling. Kriging Neighborhood Analysis - defining optimal parameters of the estimation procedure.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Preparaton for classes	15
Prepararation for an exam/credit	10
Self-study of class topics	10
Student workload	**Hours** 50

Wrocław University of Science and Technology

Solid-Liquid Separation

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.51PS.05024.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 1	Exam **Activities and hours** Lecture: 15 Classes: 15 Laboratory: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	recognises and describes fundamental phenomena in solid-liquid separation.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W07, K2_GIG_W08, K2_GIG_W18
PEU_W02	defines and explains different methods and equipment used for solid-liquid separation.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W07

PEU_W03	defines different filter media used in filtration and makes a preliminary selection of a medium for different cases.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W07
In terms of skills		
PEU_U01	searches for and sizes suitable equipment for separation processes based on suspension properties and data from laboratory tests.	K2_GIG_U04, K2_GIG_U08, K2_GIG_U10
PEU_U02	analyses the effects of the characteristics of the solid material and the liquid on the separation and post-treatment processes.	K2_GIG_U04, K2_GIG_U08, K2_GIG_U10
PEU_U03	performs an experimental test on a laboratory scale and creates a scientific report.	K2_GIG_U04, K2_GIG_U08, K2_GIG_U10
In terms of social competences		
PEU_K01	declares an awareness of the importance of the non-technical consequences of engineering activities, including their impact on the environment and the related responsibility for decisions.	K2_GIG_K03

Program content ensuring learning outcomes

Fundamentals of solid-liquid separation, filtration methods, operation of filters, cake formation and washing, deliquoring, design and modelling of filters, and scale-up. Filter media and blinding. Experimental design in filtration test work.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Classes	15
Laboratory	30
Credit/Exam	4
Conducting literature research	6
Conducting empirical studies	15
Preparation of a report/summary/presentation/paper	6
Prepararation for an exam/credit	6
Preparation of a project	3
Student workload	**Hours** 100

Wrocław University of Science and Technology

Engineering Geophysics

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.51PF.04921.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects of basic education - physics

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 1 ECTS, Graded credit • Project: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	recognizes, names and explains engineering problems in different fields.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
PEU_W02	identifies, describes, categorises and selects geophysical survey methods.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
PEU_W03	presents, explains, and evaluates case studies on engineering and environmental problems solved by geophysical methods.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
In terms of skills		

PEU_U01	analyses and solves complex practical problems (case studies) in engineering, environmental protection and geoengineering by applying geophysical knowledge and using modern geophysical data acquisition and interpretation.	K2_GIG_U04, K2_GIG_U13
PEU_U02	organizes teamwork, creates field research plans and monitors the work progress.	K2_GIG_U13
PEU_U03	analyses, evaluates, processes and interprets the results of geophysical investigations and makes recommendations related to engineering problems in mining, civil engineering, engineering geology, municipal and nuclear waste disposal sites, archaeology, with engineering properties of soils and rocks, hydrogeology, monitoring seepage in river embankments or dams.	K2_GIG_U04, K2_GIG_U13
PEU_U04	solves analytical geophysical problems/tasks and conducts auto-didactical education related to the detailed handling of typical software.	K2_GIG_U04, K2_GIG_U13

Program content ensuring learning outcomes

The essence and subject matter of descriptive and applied geophysics, geophysical methods used in deep and near-surface measurements. Geophysical methods to study engineering problems and elements and conditions of the environment. Techniques, geophysical survey methodologies and the construction and principles of operation of geophysical instruments used for engineering and environmental studies. Simple geophysical field surveys. Interpretation of the field data. Solving geophysical problems and tasks and critically evaluating the results. Analysing and critically evaluating examples of the application of geophysical methods in solving engineering and environmental problems and their results (case study analysis).

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	15
Preparation of a report/summary/presentation/paper	12
Preparaton for classes	8
Credit/Exam	4
Prepararation for an exam/credit	8
Self-study of class topics	7
Preparation of a project	6
Student workload	**Hours** 75

Wrocław University of Science and Technology

Computer Aided Geological Modelling & Geostatistics - Part Geological Modeling

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.51PK.04920.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 1	• Laboratory: 45 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Creating and validating 3-D models of various geological structures in the comprehensive dedicated software environment	K2_GIG_W06, K2_GIG_W08, K2_GIG_W15
In terms of skills		
PEU_U01	Evaluating 3-D objects against structural and quality block models (volumes, tonnages, grades)	K2_GIG_U03, K2_GIG_U04, K2_GIG_U08
PEU_U02	Describing the interpretation and applied approach, creating models, evaluation results, recommendations for possible enhancements	K2_GIG_U03, K2_GIG_U04, K2_GIG_U08

Program content ensuring learning outcomes

Quality model of the deposit – block model of the parameter layers. Estimation and evaluation of the block model. Reserves modelling and evaluation. Mineral resources. International reporting. The JORC Code.

Calculation of ECTS points

Activity form	**Activity hours**
Laboratory	45
Preparation of a project	5
Student workload	**Hours** 50

Wrocław University of Science and Technology

Engineering Geophysics

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMFS.51PF.04921.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects of basic education - physics

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 1 ECTS, Graded credit • Project: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	recognizes, names and explains engineering problems in different fields.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
PEU_W02	identifies, describes, categorises and selects geophysical survey methods.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
PEU_W03	presents, explains, and evaluates case studies on engineering and environmental problems solved by geophysical methods.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
In terms of skills		

PEU_U01	analyses and solves complex practical problems (case studies) in engineering, environmental protection and geoengineering by applying geophysical knowledge and using modern geophysical data acquisition and interpretation.	K2_GIG_U04, K2_GIG_U13
PEU_U02	organizes teamwork, creates field research plans and monitors the work progress.	K2_GIG_U13
PEU_U03	analyses, evaluates, processes and interprets the results of geophysical investigations and makes recommendations related to engineering problems in mining, civil engineering, engineering geology, municipal and nuclear waste disposal sites, archaeology, with engineering properties of soils and rocks, hydrogeology, monitoring seepage in river embankments or dams.	K2_GIG_U04, K2_GIG_U13
PEU_U04	solves analytical geophysical problems/tasks and conducts auto-didactical education related to the detailed handling of typical software.	K2_GIG_U04, K2_GIG_U13

Program content ensuring learning outcomes

The essence and subject matter of descriptive and applied geophysics, geophysical methods used in deep and near-surface measurements. Geophysical methods to study engineering problems and elements and conditions of the environment. Techniques, geophysical survey methodologies and the construction and principles of operation of geophysical instruments used for engineering and environmental studies. Simple geophysical field surveys. Interpretation of the field data. Solving geophysical problems and tasks and critically evaluating the results. Analysing and critically evaluating examples of the application of geophysical methods in solving engineering and environmental problems and their results (case study analysis).

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	15
Preparation of a report/summary/presentation/paper	12
Preparaton for classes	8
Credit/Exam	4
Prepararation for an exam/credit	8
Self-study of class topics	7
Preparation of a project	6
Student workload	**Hours** 75

Wrocław University of Science and Technology

Computer Aided Geological Modelling & Geostatistics - Part Geological Modeling

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.51PK.04920.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 1	• Laboratory: 45 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Creating and validating 3-D models of various geological structures in the comprehensive dedicated software environment	K2_GIG_W06, K2_GIG_W08, K2_GIG_W15
In terms of skills		
PEU_U01	Evaluating 3-D objects against structural and quality block models (volumes, tonnages, grades)	K2_GIG_U03, K2_GIG_U04, K2_GIG_U08
PEU_U02	Describing the interpretation and applied approach, creating models, evaluation results, recommendations for possible enhancements	K2_GIG_U03, K2_GIG_U04, K2_GIG_U08

Program content ensuring learning outcomes

Quality model of the deposit – block model of the parameter layers. Estimation and evaluation of the block model. Reserves modelling and evaluation. Mineral resources. International reporting. The JORC Code.

Calculation of ECTS points

Activity form	**Activity hours**
Laboratory	45
Preparation of a project	5
Student workload	**Hours** 50

Wrocław University of Science and Technology

Geodesy, Spatial Informatics

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.51PS.04978.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 1	Exam **Activities and hours** Lecture: 30 Seminar: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Knows in detail the geological and geophysical methods suitable for exploring natural resources.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W15, K2_GIG_W16
In terms of skills		
PEU_U01	Able to convey knowledge authentically by preparing presentations and written documents in a foreign language,	K2_GIG_U04, K2_GIG_U10, K2_GIG_U13

Program content ensuring learning outcomes

The students will acquire the principles of modern geomatics, its measuring methods and the application of IT in the subject. They will be prepared to apply the modern measuring techniques, the remote data-acquiring methods and use them to solve practical problems. They will learn the application fields of geo-informatics and GIS programs. The students will be competent in the application of modern geodetic technology and geo-informatics in their field. The students enable to process their professional data and organize them into geo-information databases.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Seminar	30
Preparaton for classes	15
Preparation of a report/summary/presentation/paper	15
Prepararation for an exam/credit	6
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Remote Sensing of Mineral Resources

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Mineral Resources Exploration - Track University of Zagreb - WUST	**Subject code** W6GIG/000EZWS.51PS.05010.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 1	Graded credit **Activities and hours** Lecture: 15 Laboratory: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Describe the basic principles and methods of remote sensing for surface mineral raw materials. Use multispectral and hyperspectral images for analysis at surface raw materials Describe the characteristics of electromagnetic radiation for the purposes of remote sensing of mineral resources.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W08, K2_GIG_W15
In terms of skills		
PEU_U01	Develop a controlled and uncontrolled classification of mineral resources from satellite images Apply at least one software tool for interpretation and processing in remote sensing of mineral resources.	K2_GIG_U01, K2_GIG_U03, K2_GIG_U04, K2_GIG_U13

In terms of social competences		
PEU_K01	Solves problems independently or in a group.	K2_GIG_K03

Program content ensuring learning outcomes

Students will acquire basic knowledge from remote sensing, with an emphasis on their application in mineral exploration. To enable students to independently collect and analyse multispectral, hyperspectral and radar satellite images required for analysis at surface mineral resources. Introduce students to the automatic supervised and unsupervised classification of satellite images in the analysis of surface mineral raw materials.
Through the course students will acquire basic knowledge about application of remote sensing in mineral raw materials exploration.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	30
Preparaton for classes	5
Preparation of a report/summary/presentation/paper	5
Prepararation for an exam/credit	8
Preparation of a project	10
Credit/Exam	2
Student workload	**Hours** 75

Wrocław University of Science and Technology

Computer Aided Geological Modelling & Geostatistics - Part Geological Modeling

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.51PK.04920.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 1	• Laboratory: 45 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Creating and validating 3-D models of various geological structures in the comprehensive dedicated software environment	K2_GIG_W06, K2_GIG_W08, K2_GIG_W15
In terms of skills		
PEU_U01	Evaluating 3-D objects against structural and quality block models (volumes, tonnages, grades)	K2_GIG_U03, K2_GIG_U04, K2_GIG_U08
PEU_U02	Describing the interpretation and applied approach, creating models, evaluation results, recommendations for possible enhancements	K2_GIG_U03, K2_GIG_U04, K2_GIG_U08

Program content ensuring learning outcomes

Quality model of the deposit – block model of the parameter layers. Estimation and evaluation of the block model. Reserves modelling and evaluation. Mineral resources. International reporting. The JORC Code.

Calculation of ECTS points

Activity form	**Activity hours**
Laboratory	45
Preparation of a project	5
Student workload	**Hours** 50

Wrocław University of Science and Technology

Occupational Health and Safety

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.51PK.04923.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 1 ECTS, Graded credit • Project: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Possesses general knowledge of rules of occupational risk assessment formulation	K2_GIG_W11, K2_GIG_W12, K2_GIG_W14
PEU_W02	Possesses knowledge of evaluating and determining the admissibility of occupational risk	K2_GIG_W17
PEU_W03	Possesses general knowledge of corrective and preventive actions regarding hazards of typical work posts in the mining industry	K2_GIG_W12, K2_GIG_W14
In terms of skills		
PEU_U01	Is able to identify hazards of harmful, dangerous and nuisance factors of typical work posts in the mining industry	K2_GIG_U11
PEU_U02	Is able to estimate and determine risk acceptability with methods according to STER software and the RISC SCORE method.	K2_GIG_U11

PEU_U03	Is able to plan corrective and preventive actions for hazards of typical work posts in the mining industry	K2_GIG_U11
In terms of social competences		
PEU_K01	Is able to work in a team and together complete occupational risk assessment and develop its results and the required documentation in the form of a team report	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Introduction to Mining Safety and Health Regulations. Overview of key regulations governing occupational safety and health in the mining industry. The importance of compliance with international safety standards.
Occupational hazards and risks. Safety management system for mining operations
Hazard Identification in Mining Operations. Analysis of common physical hazards in mining operations. Chemical, ergonomic, and psychological hazards.
Occupational Risk Assessment in Mining. Overview of the methods of identification, evaluation and management of risks
Health risk assessment in the mining industry. Methods for assessing occupational health risks, including exposure monitoring and health surveillance.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	15
Preparaton for classes	4
Preparation of a project	10
Preparation of a report/summary/presentation/paper	6
Student workload	**Hours** 50

Wrocław University of Science and Technology

Engineering Geophysics

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.51PF.04921.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects of basic education - physics

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 1 ECTS, Graded credit • Project: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	recognises, names and explains engineering problems in different fields.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
PEU_W02	identifies, describes, categorises and selects geophysical survey methods.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
PEU_W03	presents, explains, and evaluates case studies on engineering and environmental problems solved by geophysical methods.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
In terms of skills		

PEU_U01	analyses and solves complex practical problems (case studies) in engineering, environmental protection and geoengineering by applying geophysical knowledge and using modern geophysical data acquisition and interpretation.	K2_GIG_U04, K2_GIG_U13
PEU_U02	organizes teamwork, creates field research plans and monitors the work progress.	K2_GIG_U13
PEU_U03	analyses, evaluates, processes and interprets the results of geophysical investigations and makes recommendations related to engineering problems in mining, civil engineering, engineering geology, municipal and nuclear waste disposal sites, archaeology, with engineering properties of soils and rocks, hydrogeology, monitoring seepage in river embankments or dams.	K2_GIG_U04, K2_GIG_U13
PEU_U04	solves analytical geophysical problems/tasks and conducts auto-didactical education related to the detailed handling of typical software.	K2_GIG_U04, K2_GIG_U13

Program content ensuring learning outcomes

The essence and subject matter of descriptive and applied geophysics, geophysical methods used in deep and near-surface measurements. Geophysical methods to study engineering problems and elements and conditions of the environment. Techniques, geophysical survey methodologies and the construction and principles of operation of geophysical instruments used for engineering and environmental studies. Simple geophysical field surveys. Interpretation of the field data. Solving geophysical problems and tasks and critically evaluating the results. Analysing and critically evaluating examples of the application of geophysical methods in solving engineering and environmental problems and their results (case study analysis).

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	15
Preparation of a report/summary/presentation/paper	12
Preparaton for classes	8
Credit/Exam	4
Prepararation for an exam/credit	8
Self-study of class topics	7
Preparation of a project	6
Student workload	**Hours** 75

Wrocław University of Science and Technology

Principles and Application of InSAR and GIS in Mining

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMFS.51PK.04922.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 30 h, 2 ECTS, Exam • Laboratory: 45 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Defines expanded concepts in the use of geo-information systems to collect and process data used in modeling both natural and anthropogenic phenomena and processes.	K2_GIG_W15, K2_GIG_W16, K2_GIG_W18
PEU_W02	Describes the principles of construction and functioning of geoinformation systems in the mining industry and public administration.	K2_GIG_W15, K2_GIG_W16, K2_GIG_W18
In terms of skills		
PEU_U01	Uses advanced GIS tools in mining, studies of natural phenomena, the impact of mining on the environment and space development,	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08
PEU_U02	Formulates and solve spatial tasks in the GIS environment.	K2_GIG_U04, K2_GIG_U07

PEU_U03	Interprets the results obtained and draw conclusions.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08

Program content ensuring learning outcomes

1. Satellite radar interferometry, the possibility of using it in the ground deformation measurements.
   Determination of surface displacements based on satellite radar data.
   Use of GIS in advanced analysis of objects, phenomena and processes occurring in space.
   Formulation and solving tasks using GIS analytical functions.
   Use of spatial data and services in accordance with the INSPIRE Directive

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	45
Preparation of a report/summary/presentation/paper	10
Prepararation for an exam/credit	5
Credit/Exam	5
Self-study of class topics	5
Student workload	**Hours** 100

Wrocław University of Science and Technology

Engineering Geophysics

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.51PF.04921.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects of basic education - physics

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 1 ECTS, Graded credit • Project: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	recognizes, names and explains engineering problems in different fields.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
PEU_W02	identifies, describes, categorises and selects geophysical survey methods.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
PEU_W03	presents, explains, and evaluates case studies on engineering and environmental problems solved by geophysical methods.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
In terms of skills		

PEU_U01	analyses and solves complex practical problems (case studies) in engineering, environmental protection and geoengineering by applying geophysical knowledge and using modern geophysical data acquisition and interpretation.	K2_GIG_U04, K2_GIG_U13
PEU_U02	organizes teamwork, creates field research plans and monitors the work progress.	K2_GIG_U13
PEU_U03	analyses, evaluates, processes and interprets the results of geophysical investigations and makes recommendations related to engineering problems in mining, civil engineering, engineering geology, municipal and nuclear waste disposal sites, archaeology, with engineering properties of soils and rocks, hydrogeology, monitoring seepage in river embankments or dams.	K2_GIG_U04, K2_GIG_U13
PEU_U04	solves analytical geophysical problems/tasks and conducts auto-didactical education related to the detailed handling of typical software.	K2_GIG_U04, K2_GIG_U13

Program content ensuring learning outcomes

The essence and subject matter of descriptive and applied geophysics, geophysical methods used in deep and near-surface measurements. Geophysical methods to study engineering problems and elements and conditions of the environment. Techniques, geophysical survey methodologies and the construction and principles of operation of geophysical instruments used for engineering and environmental studies. Simple geophysical field surveys. Interpretation of the field data. Solving geophysical problems and tasks and critically evaluating the results. Analysing and critically evaluating examples of the application of geophysical methods in solving engineering and environmental problems and their results (case study analysis).

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	15
Preparation of a report/summary/presentation/paper	12
Preparaton for classes	8
Credit/Exam	4
Prepararation for an exam/credit	8
Self-study of class topics	7
Preparation of a project	6
Student workload	**Hours** 75

Wrocław University of Science and Technology

Computer Science for Engineers

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.51PS.04979.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Laboratory: 30 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	Analyzes fundamental concepts of object-oriented programming, such as classes, objects, methods, and properties, and designs and implements advanced programming structures using design patterns and software design principles.	K2_GIG_U04, K2_GIG_U13
In terms of social competences		
PEU_K01	Demonstrates the ability to think and act creatively, proposing innovative solutions to engineering problems. Takes on the challenge of implementing new technologies and methods in Earth sciences engineering.	K2_GIG_K01, K2_GIG_K03

Program content ensuring learning outcomes

The program ensures the development of object-oriented programming skills, including:
Gaining knowledge of fundamental concepts of object-oriented programming: classes, objects, methods, properties.

Designing and implementing advanced programming structures using design patterns and software design principles.
Using numerical methods to analyze and solve differential, algebraic, and other mathematical problems.
Optimizing technological processes and analyzing errors.
Designing and implementing user interfaces using graphics and animation.
Creating applications that enable user interaction with the program and data visualization.
Effectively using the Maple programming language: variables, sets, arrays, functions.
Implementing algorithms, creating 2D and 3D plots, and using files in Maple.
Creating clear and efficient code, testing, and documentation.
Generating technical documentation and publishing user manuals.
Developing awareness of the impact of engineering activities on the environment and responsibility for decisions made.
Identifying and solving problems related to the non-technical impacts of engineering activities in a responsible manner.

Calculation of ECTS points

Activity form	**Activity hours**
Laboratory	30
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	8
Credit/Exam	2
Student workload	**Hours** 50

Wrocław University of Science and Technology

GIS in Exploration of Mineral Resources

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Mineral Resources Exploration - Track University of Zagreb - WUST	**Subject code** W6GIG/000EZWS.51PS.05011.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 1	Graded credit **Activities and hours** Lecture: 15 Laboratory: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	To apply statistical methods and spatial analyses in interpretation of laboratory and field measurements To use information technology in computation and modelling of geological phenomena and processes To interpret the results of geological and geochemical prospecting, geophysical and remote sensing investigation of mineral deposits using geographic information system in the analysis of spatial data.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W08, K2_GIG_W14, K2_GIG_W15
In terms of skills		

PEU_U01	To construct general and thematic geological maps, as well as geological cross-sections with accompanying descriptions To interpret and summarize the results of field, laboratory and office research and prepare and present a geological expert report using other relevant data sources	K2_GIG_U01, K2_GIG_U03, K2_GIG_U04, K2_GIG_U13
In terms of social competences		
PEU_K01	Independently collects and analyzes mineral resources using GIS software, addresses current issues, and adheres to standards.	K2_GIG_K01

Program content ensuring learning outcomes

Master all significant options in GIS software while solving specific examples from the profession. Acquiring the knowledge needed to develop your own GIS projects. Advanced use of geoinformatics on computer and mobile platform. Visualization of GIS projects for the purpose of making cartographic contents of diploma theses.
Through the course students will acquire basic knowledge about application of GIS software in mineral exploration.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	30
Preparaton for classes	13
Preparation of a project	15
Credit/Exam	2
Student workload	**Hours** 75

Wrocław University of Science and Technology

Engineering Geophysics

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.51PF.04921.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects of basic education - physics

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 1 ECTS, Graded credit • Project: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	recognizes, names and explains engineering problems in different fields.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
PEU_W02	identifies, describes, categorises and selects geophysical survey methods.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
PEU_W03	presents, explains, and evaluates case studies on engineering and environmental problems solved by geophysical methods.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
In terms of skills		

PEU_U01	analyses and solves complex practical problems (case studies) in engineering, environmental protection and geoengineering by applying geophysical knowledge and using modern geophysical data acquisition and interpretation.	K2_GIG_U04, K2_GIG_U13
PEU_U02	organizes teamwork, creates field research plans and monitors the work progress.	K2_GIG_U13
PEU_U03	analyses, evaluates, processes and interprets the results of geophysical investigations and makes recommendations related to engineering problems in mining, civil engineering, engineering geology, municipal and nuclear waste disposal sites, archaeology, with engineering properties of soils and rocks, hydrogeology, monitoring seepage in river embankments or dams.	K2_GIG_U04, K2_GIG_U13
PEU_U04	solves analytical geophysical problems/tasks and conducts auto-didactical education related to the detailed handling of typical software.	K2_GIG_U04, K2_GIG_U13

Program content ensuring learning outcomes

The essence and subject matter of descriptive and applied geophysics, geophysical methods used in deep and near-surface measurements. Geophysical methods to study engineering problems and elements and conditions of the environment. Techniques, geophysical survey methodologies and the construction and principles of operation of geophysical instruments used for engineering and environmental studies. Simple geophysical field surveys. Interpretation of the field data. Solving geophysical problems and tasks and critically evaluating the results. Analysing and critically evaluating examples of the application of geophysical methods in solving engineering and environmental problems and their results (case study analysis).

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	15
Preparation of a report/summary/presentation/paper	12
Preparaton for classes	8
Credit/Exam	4
Prepararation for an exam/credit	8
Self-study of class topics	7
Preparation of a project	6
Student workload	**Hours** 75

Wrocław University of Science and Technology

Artificial Inventiveness

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.51PS.05026.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Elective

Block
Specialty subjects

Semester	Examination	Number of ECTS points
Semester 1	Graded credit **Activities and hours** Lecture: 15 Project: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	identifies inventive problems in the complex process of product development.	K2_GIG_W01, K2_GIG_W03, K2_GIG_W08, K2_GIG_W18
PEU_W02	defines step-by-step actions when creative and out-of-box ideas are needed.	K2_GIG_W01, K2_GIG_W03, K2_GIG_W08, K2_GIG_W18

PEU_W03	recognises several tools for systematic idea generation (Function modelling, Ideal final result, Function-oriented search, and Contradictions analysis)	K2_GIG_W03, K2_GIG_W08, K2_GIG_W18
In terms of skills		
PEU_U01	evaluates and applies several tools for systematic idea generation (Function modelling, Ideal final result, Function-oriented search, Contradictions analysis).	K2_GIG_U04, K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
PEU_U02	demonstrates acting step-by-step when creative and out-of-box ideas are needed.	K2_GIG_U04, K2_GIG_U13
In terms of social competences		
PEU_K01	demonstrates the ability to think and act creatively and entrepreneurially.	K2_GIG_K01
PEU_K02	declares an awareness of the importance of the non-technical consequences of engineering activities, including their impact on the environment and the related responsibility for decisions.	K2_GIG_K03

Program content ensuring learning outcomes

Creativity and systematic tools of ideation. Theory for Inventive Problem Solving tools for idea generation. Function Definition, Ideal Final Result, Function-oriented Search, and Contradictions. The subject is a brief introduction to creativity and idea generation with elements of theory, everyday life examples, and tests for self-check.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	30
Credit/Exam	2
Preparation of a project	8
Preparation of a report/summary/presentation/paper	4
Conducting literature research	4
Self-study of class topics	8
Preparaton for classes	4
Student workload	**Hours** 75

Wrocław University of Science and Technology

Entrepreneurship and Career Opportunities in Raw Material Sector

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.51PS.05027.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Elective

Block
Specialty subjects

Semester	Examination	Number of ECTS points
Semester 1	Graded credit **Activities and hours** Lecture: 15 Project: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	recognizes and describes entrepreneurship and career opportunities in the raw material sector.	K2_GIG_W01, K2_GIG_W03, K2_GIG_W18
PEU_W02	defines and explains the primary sector of the raw materials value chain (geology, mining, mineral processing, metallurgy, and the environment).	K2_GIG_W01, K2_GIG_W03, K2_GIG_W08, K2_GIG_W18
In terms of skills		

PEU_U01	applies and verifies design thinking tools to enhance the engineering creativity and innovation capacity.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
PEU_U02	modifies and evaluates skills and competencies to improve the mindset of entrepreneurship.	K2_GIG_U07, K2_GIG_U13
In terms of social competences		
PEU_K01	demonstrates the ability to think and act in a creative and entrepreneurial manner.	K2_GIG_K01
PEU_K02	declares awareness of the importance of non-technical effects of engineering activities, including their impact on the environment and the related responsibility for decisions made.	K2_GIG_K03

Program content ensuring learning outcomes

Most industrial sectors are facing a new era that is forcing companies to transform their operations, create new business models and support a digital culture. In this context, the industry is facing a changing talent landscape that requires new skill sets in its workforce. Companies need to ensure that their workforce is well-formed to support this transformation process. Entrepreneurial skills and innovative thinking for engineers will be taught through examples from the raw materials sector. Case studies will provide an understanding of the skills and competencies of the future workforce and the current trends of the industrial revolution.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	30
Credit/Exam	2
Preparation of a report/summary/presentation/paper	6
Prepararation for an exam/credit	4
Preparation of a project	6
Conducting literature research	6
Preparaton for classes	6
Student workload	**Hours** 75

Wrocław University of Science and Technology

Sustainable Water Use

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.51PS.05028.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Elective

Block
Specialty subjects

Semester	Examination	Number of ECTS points
Semester 1	Graded credit **Activities and hours** Lecture: 15 Project: 31	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	defines the key concepts of water pollution control.	K2_GIG_W01, K2_GIG_W03, K2_GIG_W08, K2_GIG_W18
PEU_W02	recognizes the main factors affecting water footprint and sustainability of water use.	K2_GIG_W01, K2_GIG_W03, K2_GIG_W08, K2_GIG_W18
PEU_W03	explains the operation of essential process technology and equipment related to the control of water pollution.	K2_GIG_W03, K2_GIG_W08

PEU_W04	recognizes and distinguishes the means to protect groundwater and reduce the environmental load of surface waters.	K2_GIG_W03, K2_GIG_W08
PEU_W05	identifies and depicts methods for the environmentally friendly management of side-product flows from water treatment.	K2_GIG_W01, K2_GIG_W03, K2_GIG_W08
In terms of skills		
PEU_U01	applies risk analysis methods related to water issues.	K2_GIG_U04, K2_GIG_U10, K2_GIG_U13
PEU_U02	implements different methods for water footprint calculation.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
PEU_U03	analyses and gives grounded proposals for water treatment methods and processes applicable to different situations.	K2_GIG_U07, K2_GIG_U10
PEU_U04	analyses and evaluates the sustainability of water management systems.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	demonstrates the ability to think and act in a creative and entrepreneurial manner.	K2_GIG_K01
PEU_K02	declares awareness of the importance of non-technical effects of engineering activities, including their impact on the environment and the related responsibility for decisions made.	K2_GIG_K03

Program content ensuring learning outcomes

Sustainability challenges of water use. Water footprint. Water risk assessment. Water supply, water use in different sectors and loading of water systems. Wastewater treatment in industry and municipalities. Sludge treatment. Production of drinking water. Protection of groundwater deposits. Legislation on water quality and sludge treatment. Economic efficiency of different water treatment methods. Reclaimed water.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	31
Credit/Exam	2
Preparaton for classes	12
Conducting literature research	5
Self-study of class topics	5
Prepararation for an exam/credit	5

Student workload	Hours 75

Wrocław University of Science and Technology

Principles and Application of InSAR and GIS in Mining

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.51PK.04922.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 30 h, 2 ECTS, Exam • Laboratory: 45 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Defines expanded concepts in the use of geo-information systems to collect and process data used in modeling both natural and anthropogenic phenomena and processes.	K2_GIG_W15, K2_GIG_W16, K2_GIG_W18
PEU_W02	Describes the principles of construction and functioning of geoinformation systems in the mining industry and public administration.	K2_GIG_W15, K2_GIG_W16, K2_GIG_W18
In terms of skills		
PEU_U01	Uses advanced GIS tools in mining, studies of natural phenomena, the impact of mining on the environment and space development,	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08
PEU_U02	Formulates and solve spatial tasks in the GIS environment.	K2_GIG_U04, K2_GIG_U07

PEU_U03	Interprets the results obtained and draw conclusions.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08

Program content ensuring learning outcomes

1. Satellite radar interferometry, the possibility of using it in the ground deformation measurements.
   Determination of surface displacements based on satellite radar data.
   Use of GIS in advanced analysis of objects, phenomena and processes occurring in space.
   Formulation and solving tasks using GIS analytical functions.
   Use of spatial data and services in accordance with the INSPIRE Directive

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	45
Preparation of a report/summary/presentation/paper	10
Prepararation for an exam/credit	5
Credit/Exam	5
Self-study of class topics	5
Student workload	**Hours** 100

Wrocław University of Science and Technology

Principles and Application of InSAR and GIS in Mining

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.51PK.04922.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 30 h, 2 ECTS, Exam • Laboratory: 45 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Defines expanded concepts in the use of geo-information systems to collect and process data used in modeling both natural and anthropogenic phenomena and processes.	K2_GIG_W15, K2_GIG_W16, K2_GIG_W18
PEU_W02	Describes the principles of construction and functioning of geoinformation systems in the mining industry and public administration.	K2_GIG_W15, K2_GIG_W16, K2_GIG_W18
In terms of skills		
PEU_U01	Uses advanced GIS tools in mining, studies of natural phenomena, the impact of mining on the environment and space development,	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08
PEU_U02	Formulates and solve spatial tasks in the GIS environment.	K2_GIG_U04, K2_GIG_U07

PEU_U03	Interprets the results obtained and draw conclusions.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08

Program content ensuring learning outcomes

1. Satellite radar interferometry, the possibility of using it in the ground deformation measurements.
   Determination of surface displacements based on satellite radar data.
   Use of GIS in advanced analysis of objects, phenomena and processes occurring in space.
   Formulation and solving tasks using GIS analytical functions.
   Use of spatial data and services in accordance with the INSPIRE Directive

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	45
Preparation of a report/summary/presentation/paper	10
Prepararation for an exam/credit	5
Credit/Exam	5
Self-study of class topics	5
Student workload	**Hours** 100

Wrocław University of Science and Technology

Occupational Health and Safety

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMFS.51PK.04923.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 1 ECTS, Graded credit • Project: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Possesses general knowledge of rules of occupational risk assessment formulation	K2_GIG_W11, K2_GIG_W12, K2_GIG_W14
PEU_W02	Possesses knowledge of evaluating and determining the admissibility of occupational risk	K2_GIG_W17
PEU_W03	Possesses general knowledge of corrective and preventive actions regarding hazards of typical work posts in the mining industry	K2_GIG_W12, K2_GIG_W14
In terms of skills		
PEU_U01	Is able to identify hazards of harmful, dangerous and nuisance factors of typical work posts in the mining industry	K2_GIG_U11
PEU_U02	Is able to estimate and determine risk acceptability with methods according to STER software and the RISC SCORE method.	K2_GIG_U11

PEU_U03	Is able to plan corrective and preventive actions for hazards of typical work posts in the mining industry	K2_GIG_U11
In terms of social competences		
PEU_K01	Is able to work in a team and together complete occupational risk assessment and develop its results and the required documentation in the form of a team report	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Introduction to Mining Safety and Health Regulations. Overview of key regulations governing occupational safety and health in the mining industry. The importance of compliance with international safety standards.
Occupational hazards and risks. Safety management system for mining operations
Hazard Identification in Mining Operations. Analysis of common physical hazards in mining operations. Chemical, ergonomic, and psychological hazards.
Occupational Risk Assessment in Mining. Overview of the methods of identification, evaluation and management of risks
Health risk assessment in the mining industry. Methods for assessing occupational health risks, including exposure monitoring and health surveillance.
Prevention and Control of Occupational Diseases in Mining.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	15
Preparaton for classes	4
Preparation of a project	10
Preparation of a report/summary/presentation/paper	6
Student workload	**Hours** 50

Wrocław University of Science and Technology

Principles and Application of InSAR and GIS in Mining

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.51PK.04922.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 30 h, 2 ECTS, Exam • Laboratory: 45 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Defines expanded concepts in the use of geo-information systems to collect and process data used in modeling both natural and anthropogenic phenomena and processes.	K2_GIG_W15, K2_GIG_W16, K2_GIG_W18
PEU_W02	Describes the principles of construction and functioning of geoinformation systems in the mining industry and public administration.	K2_GIG_W15, K2_GIG_W16, K2_GIG_W18
In terms of skills		
PEU_U01	Uses advanced GIS tools in mining, studies of natural phenomena, the impact of mining on the environment and space development,	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08
PEU_U02	Formulates and solve spatial tasks in the GIS environment.	K2_GIG_U04, K2_GIG_U07

PEU_U03	Interprets the results obtained and draw conclusions.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08

Program content ensuring learning outcomes

Satellite radar interferometry, the possibility of using it in the ground deformation measurements.
Determination of surface displacements based on satellite radar data.
Use of GIS in advanced analysis of objects, phenomena and processes occurring in space.
Formulation and solving tasks using GIS analytical functions.
Use of spatial data and services in accordance with the INSPIRE Directive

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	45
Preparation of a report/summary/presentation/paper	10
Prepararation for an exam/credit	5
Credit/Exam	5
Self-study of class topics	5
Student workload	**Hours** 100

Wrocław University of Science and Technology

Data and Information Processing

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.51PS.04980.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 1	Graded credit **Activities and hours** Lecture: 30 Seminar: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Explains inversion methods used in geophysical data processing. Illustrates the application of signal theory in geophysical data analysis.	K2_GIG_W02, K2_GIG_W15, K2_GIG_W16
In terms of skills		
PEU_U01	Analyzes multidimensional Euclidean spaces in the context of geophysical data modeling. Designs solutions to geophysical problems using inversion methods and signal processing.	K2_GIG_U04, K2_GIG_U13
In terms of social competences		

PEU_K01	Demonstrates initiative in applying inversion and signal processing methods to solve geophysical problems. Takes on the challenge of selecting appropriate data processing techniques to maximize information.	K2_GIG_K01, K2_GIG_K03

Program content ensuring learning outcomes

Understanding the basics of inversion method-based geoinformation processing
Theoretical background and application of data processing tasks are princial for completion of geophysical measurements and interpretation works. The course provides both theory and practice in this topic.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Seminar	30
Preparaton for classes	10
Preparation of a report/summary/presentation/paper	20
Prepararation for an exam/credit	8
Credit/Exam	2
Student workload	**Hours** 100

Wrocław University of Science and Technology

Principles and Application of InSAR and GIS in Mining

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.51PK.04922.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 30 h, 2 ECTS, Exam • Laboratory: 45 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Defines expanded concepts in the use of geo-information systems to collect and process data used in modeling both natural and anthropogenic phenomena and processes.	K2_GIG_W15, K2_GIG_W16, K2_GIG_W18
PEU_W02	Describes the principles of construction and functioning of geoinformation systems in the mining industry and public administration.	K2_GIG_W15, K2_GIG_W16, K2_GIG_W18
In terms of skills		
PEU_U01	Uses advanced GIS tools in mining, studies of natural phenomena, the impact of mining on the environment and space development,	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08
PEU_U02	Formulates and solve spatial tasks in the GIS environment.	K2_GIG_U04, K2_GIG_U07

PEU_U03	Interprets the results obtained and draw conclusions.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08

Program content ensuring learning outcomes

1. Satellite radar interferometry, the possibility of using it in the ground deformation measurements.
   Determination of surface displacements based on satellite radar data.
   Use of GIS in advanced analysis of objects, phenomena and processes occurring in space.
   Formulation and solving tasks using GIS analytical functions.
   Use of spatial data and services in accordance with the INSPIRE Directive

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	45
Preparation of a report/summary/presentation/paper	10
Prepararation for an exam/credit	5
Credit/Exam	5
Self-study of class topics	5
Student workload	**Hours** 100

Wrocław University of Science and Technology

Occupational Health and Safety

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.51PK.04923.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 1 ECTS, Graded credit • Project: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Possesses general knowledge of rules of occupational risk assessment formulation	K2_GIG_W11, K2_GIG_W12, K2_GIG_W14
PEU_W02	Possesses knowledge of evaluating and determining the admissibility of occupational risk	K2_GIG_W17
PEU_W03	Possesses general knowledge of corrective and preventive actions regarding hazards of typical work posts in the mining industry	K2_GIG_W12, K2_GIG_W14
In terms of skills		
PEU_U01	Is able to identify hazards of harmful, dangerous and nuisance factors of typical work posts in the mining industry	K2_GIG_U11
PEU_U02	Is able to estimate and determine risk acceptability with methods according to STER software and the RISC SCORE method.	K2_GIG_U11

PEU_U03	Is able to plan corrective and preventive actions for hazards of typical work posts in the mining industry	K2_GIG_U11
In terms of social competences		
PEU_K01	Is able to work in a team and together complete occupational risk assessment and develop its results and the required documentation in the form of a team report	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Introduction to Mining Safety and Health Regulations. Overview of key regulations governing occupational safety and health in the mining industry. The importance of compliance with international safety standards.
Occupational hazards and risks. Safety management system for mining operations
Hazard Identification in Mining Operations. Analysis of common physical hazards in mining operations. Chemical, ergonomic, and psychological hazards.
Occupational Risk Assessment in Mining. Overview of the methods of identification, evaluation and management of risks
Health risk assessment in the mining industry. Methods for assessing occupational health risks, including exposure monitoring and health surveillance.
Prevention and Control of Occupational Diseases in Mining.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	15
Preparaton for classes	4
Preparation of a project	10
Preparation of a report/summary/presentation/paper	6
Student workload	**Hours** 50

Wrocław University of Science and Technology

Occupational Health and Safety

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.51PK.04923.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 1 ECTS, Graded credit • Project: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Possesses general knowledge of rules of occupational risk assessment formulation	K2_GIG_W11, K2_GIG_W12, K2_GIG_W14
PEU_W02	Possesses knowledge of evaluating and determining the admissibility of occupational risk	K2_GIG_W17
PEU_W03	Possesses general knowledge of corrective and preventive actions regarding hazards of typical work posts in the mining industry	K2_GIG_W12, K2_GIG_W14
In terms of skills		
PEU_U01	Is able to identify hazards of harmful, dangerous and nuisance factors of typical work posts in the mining industry	K2_GIG_U11
PEU_U02	Is able to estimate and determine risk acceptability with methods according to STER software and the RISC SCORE method.	K2_GIG_U11

PEU_U03	Is able to plan corrective and preventive actions for hazards of typical work posts in the mining industry	K2_GIG_U11
In terms of social competences		
PEU_K01	Is able to work in a team and together complete occupational risk assessment and develop its results and the required documentation in the form of a team report	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Introduction to Mining Safety and Health Regulations. Overview of key regulations governing occupational safety and health in the mining industry. The importance of compliance with international safety standards.
Occupational hazards and risks. Safety management system for mining operations
Hazard Identification in Mining Operations. Analysis of common physical hazards in mining operations. Chemical, ergonomic, and psychological hazards.
Occupational Risk Assessment in Mining. Overview of the methods of identification, evaluation and management of risks
Health risk assessment in the mining industry. Methods for assessing occupational health risks, including exposure monitoring and health surveillance.
Prevention and Control of Occupational Diseases in Mining.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	15
Preparaton for classes	4
Preparation of a project	10
Preparation of a report/summary/presentation/paper	6
Student workload	**Hours** 50

Wrocław University of Science and Technology

Graduate Research Seminar

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.51PS.04981.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Seminar: 30 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Presents accurate scientific communications in written and oral form in the field of applied Earth sciences. Selects appropriate solutions for citation. Cites various sources of literature in the field of applied Earth sciences, choosing appropriate and reliable sources of information.	K2_GIG_W01, K2_GIG_W07, K2_GIG_W10
In terms of skills		
PEU_U01	Creates accurate field reports in accordance with their content and formal requirements. Creates and demonstrates oral presentations of varying lengths in the field of applied Earth sciences. Creates charts and graphics with appropriate visual aids and approach.	K2_GIG_U01, K2_GIG_U08, K2_GIG_U13
In terms of social competences		

PEU_K01	Is sensitive to the knowledge and adherence to professional and ethical values. Takes on the challenge of working independently, showing initiative for work processes carried out under his/her control.	K2_GIG_K02

Program content ensuring learning outcomes

Introduction to methods of collecting and evaluating information, formal and ethical requirements of scientific communication, principles of preparing oral and poster presentations. During the course, these general requirements are adapted to the field of Earth sciences and engineering. Examples and exercises will use English-language publications and textual materials. Editorial and formal requirements of scientific publications. Planning the concept and structure of a scientific publication, preparing an outline, developing a concept map. Use of sources, citation styles. Ethics of scientific writing: how to avoid plagiarism, use of quotations. Information sources provided by the Central Library: paper versions, catalog search, electronic resources. Use of electronic information resources: search options, simple and complex searches, electronic libraries. Data visualization: charts, drawings, tables. Art of presentation: preparation for oral presentation. Art of presentation: preparation of a poster.

Calculation of ECTS points

Activity form	**Activity hours**
Seminar	30
Preparaton for classes	8
Preparation of a report/summary/presentation/paper	10
Credit/Exam	2
Student workload	**Hours** 50

Wrocław University of Science and Technology

Occupational Health and Safety

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.51PK.04923.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 1 ECTS, Graded credit • Project: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Possesses general knowledge of rules of occupational risk assessment formulation	K2_GIG_W11, K2_GIG_W12, K2_GIG_W14
PEU_W02	Possesses knowledge of evaluating and determining the admissibility of occupational risk	K2_GIG_W17
PEU_W03	Possesses general knowledge of corrective and preventive actions regarding hazards of typical work posts in the mining industry	K2_GIG_W12, K2_GIG_W14
In terms of skills		
PEU_U01	Is able to identify hazards of harmful, dangerous and nuisance factors of typical work posts in the mining industry	K2_GIG_U11

PEU_U02	Is able to estimate and determine risk acceptability with methods according to STER software and the RISC SCORE method.	K2_GIG_U11
PEU_U03	Is able to plan corrective and preventive actions for hazards of typical work posts in the mining industry	K2_GIG_U11
In terms of social competences		
PEU_K01	Is able to work in a team and together complete occupational risk assessment and develop its results and the required documentation in the form of a team report	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Introduction to Mining Safety and Health Regulations. Overview of key regulations governing occupational safety and health in the mining industry. The importance of compliance with international safety standards.
Occupational hazards and risks. Safety management system for mining operations
Hazard Identification in Mining Operations. Analysis of common physical hazards in mining operations. Chemical, ergonomic, and psychological hazards.
Occupational Risk Assessment in Mining. Overview of the methods of identification, evaluation and management of risks
Health risk assessment in the mining industry. Methods for assessing occupational health risks, including exposure monitoring and health surveillance.
Prevention and Control of Occupational Diseases in Mining.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	15
Preparaton for classes	4
Preparation of a project	10
Preparation of a report/summary/presentation/paper	6
Student workload	**Hours** 50

Wrocław University of Science and Technology

Foreign Language 2.1

Educational subject description sheet

Basic information

Field of study lektoraty	**Education cycle** 2025/2026
Speciality -	**Subject code** PWRSJOS.97JO.02684.25
Organizational unit Wrocław University of Science and Technology	**Lecture languages** English
Study level second degree	**Mandatoriness** Elective
Study form full-time studies	**Block** Foreign languages
Education profile general academic profile	

Semesters	**Activities, hours, ECTS and examination**
Semester 1, Semester 2, Semester 3	• Classes: 30 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	Student has knowledge, skills and competences consistent with the requirements specified for the minimum B2 level according to the Common European Framework of Reference for Languages; knows, understands and uses linguistic means (grammatical, lexical and stylistic) from academic, specialist and technical languages used in the field of study and in the academic and professional environment; communicates in an intercultural and professional environment; understands and has the ability to analyze foreign-language specialist texts; improves their skills in the area of specialized and academic languages.	SJO_S2_U01

Program content ensuring learning outcomes

B2 plus English, French, Spanish, GermanC1 plus English languageGeneral educational content

Formation and deepening of communicative competence in academic and professional settings.
Interaction appropriate to the appropriate level of linguistic competence, such as the student's own profile for academic and professional purposes. Deepening creative, receptive and interactive competence in a team.
Language in communication in specialized and professional fields in the modern world. Verbal and non-verbal communication - functioning freely in an intercultural environment, conducting discourse, polemics, analysis of specialized texts.

Calculation of ECTS points

Activity form	**Activity hours**
Classes	30
Preparaton for classes	30
Student workload	**Hours** 60

Wrocław University of Science and Technology

Foreign Language 2.2

Educational subject description sheet

Basic information

Field of study lektoraty	**Education cycle** 2025/2026
Speciality -	**Subject code** PWRSJOS.97JO.02690.25
Organizational unit Wrocław University of Science and Technology	**Lecture languages** English
Study level second degree	**Mandatoriness** Elective
Study form full-time studies	**Block** Foreign languages
Education profile general academic profile	

Semesters	**Activities, hours, ECTS and examination**
Semester 1, Semester 2, Semester 3	• Classes: 60 h, 3 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	Student has knowledge, skills and competences consistent with the requirements specified for the appropriate language level; knows, understands and uses linguistic means (grammatical, lexical and stylistic) defined at a certain level from everyday life with selected elements of academic, specialist and technical language used in the field of study and in the academic and professional environment; communicates in a family, social and intercultural environment, practicing communication skills; appreciates the need to improve their skills in effective communication, develops competences in the area of communication language, basics of specialist and academic language	SJO_S2_U01

Program content ensuring learning outcomes

A1; A2; B1 French, Spanish, Japanese, German, Polish as a foreign language, Russian
General educational content
Formation and deepening of communicative competence in a family, social and intercultural environment and for a specific level for academic and professional needs.
Interaction appropriate to the appropriate level of language competence, e.g., the student's own profile and interests; presenting oneself, one's interests and ideas in environmental, academic and professional contexts. Developing creative, receptive and interactive competence in a group.
Language in communication in the modern world. Verbal and non-verbal communication - sensitivity to cultural differences, starting a conversation, joining in a discussion, moving on to the next points, summarizing statements, using characteristic phrases and expressions for a certain language level; taking part in various forms of interaction.

Calculation of ECTS points

Activity form	**Activity hours**
Classes	60
Preparaton for classes	30
Student workload	**Hours** 90

Wrocław University of Science and Technology

Modelling of Unit Operations

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.52PS.05019.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Graded credit **Activities and hours** Lecture: 30 Laboratory: 45	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	recognises and describes the most common unit operations of chemical engineering, including batch reactors and continuously stirred tank reactors (CSTRs), both in dynamic and steady-state.	K2_GIG_W01, K2_GIG_W06, K2_GIG_W18
PEU_W02	identifies and explains tubular plug flow reactors, flash distillations, and modelling of the temperature dependence of reactions and elements of heat transfer.	K2_GIG_W01, K2_GIG_W06, K2_GIG_W18
PEU_W03	recognises, differentiates and explains the chemical processes in chemical engineering.	K2_GIG_W01, K2_GIG_W06, K2_GIG_W18

In terms of skills		
PEU_U01	uses Matlab (mathematical and simulation software) in chemical engineering and applied mathematics.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
PEU_U02	elaborates steady-state and transient unit operations with mathematical models, validates the models and estimates their parameters from experimental data.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U13
PEU_U03	applies modeling (simulation) in process development and design, including sizing, optimization, and scaling-up.	K2_GIG_U04, K2_GIG_U05, K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	demonstrates the ability to think and act creatively and entrepreneurially.	K2_GIG_K01
PEU_K02	declares an awareness of the importance of the non-technical consequences of engineering activities, including their impact on the environment and the related responsibility for decisions.	K2_GIG_K03

Program content ensuring learning outcomes

Modeling and parameter estimation using Matlab in chemical engineering and applied mathematics in general. The most common unit operations of chemical engineering, including batch reactors, continuous stirred tank reactors (CSTR’s), both in dynamic and steady state; tubular plug flow reactors, flash distillations, and modeling of temperature dependence of reactions and elements of heat transfer. The models are limited to ones that do not require solving partial differential equations (PDE’s).

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	45
Preparaton for classes	10
Conducting empirical studies	18
Prepararation for an exam/credit	8
Credit/Exam	2
Preparation of a report/summary/presentation/paper	12
Student workload	**Hours** 125

Wrocław University of Science and Technology

Sedimentology

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.52PS.05005.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 30 Project: 45	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student conducts complex sedimentological research, including the construction of layer sequences, differentiation of facies, and interpretation of depositional environments. The student formulates strategies for presenting vertical successions (sedimentary columns) and correlation possibilities, and presents the results of depositional environment analyses in the form of reports and presentations.	K2_GIG_W01, K2_GIG_W02
In terms of skills		

PEU_U01	The student creates general and thematic geological maps and geological profiles with accompanying descriptions, uses specialized language to describe and analyze depositional environments and their characteristic features, and prepares and presents reports on vertical successions (sedimentary columns) and correlation possibilities.	K2_GIG_U01, K2_GIG_U13
In terms of social competences		
PEU_K01	The student declares readiness to communicate to the public about the achievements of the mining and mineral engineering industry, ensuring clarity and accuracy.	K2_GIG_K02

Program content ensuring learning outcomes

Upon completion of the course, the student will acquire skills in:
Defining sedimentary fractions.
Recognizing sedimentary processes.
Identifying the basic features of modern and paleo-depositional environments.
Recognizing and interpreting characteristic sedimentary sequences.
Analyzing all elements present in the sedimentary environment.
Interpreting possible depositional environments.
This course provides students with knowledge about sedimentary processes and their interpretation.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	45
Preparaton for classes	10
Prepararation for an exam/credit	16
Preparation of a project	20
Credit/Exam	4
Student workload	**Hours** 125

Wrocław University of Science and Technology

Physical Geology

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.52PS.04973.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 30 Project: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student differentiates processes described by general and detailed theories of physical geology required for practicing Earth sciences. The student classifies the internal connections between geological processes and, based on their knowledge, understands the structure of the raw materials extraction sector, technologies used for the extraction and preparation of mineral resources, as well as the scope of geo-environmental tasks, their external socio-economic environment, and regulatory system.	K2_GIG_W08, K2_GIG_W10
In terms of skills		

PEU_U01	The student applies general and specific scientific theories of internal and external geologial processes, to systematize them. Characterizes complex geological processes and explains them in the appropriate context.	K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	Student percieves the professional methodological developments in the fields of applied earth sciences. Applies creativity skills and knowledge in understanding and interpreting complex geological structures and processes., Student will plan the work independently, and rules on to lead workgroups	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

The main objectives of the course are deepening the students' abilities for geological interpretation, making them familiar with the reconstruction of rock-forming processes, introducing them to facial analysis and the stratigraphic methods.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Preparaton for classes	10
Prepararation for an exam/credit	6
Preparation of a report/summary/presentation/paper	5
Preparation of a project	15
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Advanced Process Design

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.52PS.05020.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Graded credit **Activities and hours** Lecture: 15 Classes: 30 Project: 30	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	recognises and assesses design activities required during the process design.	K2_GIG_W02, K2_GIG_W07
PEU_W02	depicts and explains the relation between process and product design.	K2_GIG_W06, K2_GIG_W07, K2_GIG_W08, K2_GIG_W10, K2_GIG_W11, K2_GIG_W14

PEU_W03	depicts and explains the design of processes: their aims and steps.	K2_GIG_W06, K2_GIG_W07, K2_GIG_W08, K2_GIG_W10, K2_GIG_W14
PEU_W04	identifies and explains the role of modern simulation packages during the process life cycle.	K2_GIG_W02, K2_GIG_W07, K2_GIG_W08, K2_GIG_W10, K2_GIG_W11
In terms of skills		
PEU_U01	applies simulation packages to support every step during the process design.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U05, K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
PEU_U02	validates models and estimates their parameters from experimental data.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U05, K2_GIG_U07, K2_GIG_U13
PEU_U03	applies and analyzes models in process development and design.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U09, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	demonstrates the ability to think and act in a creative and entrepreneurial manner.	K2_GIG_K01
PEU_K02	declares their awareness of the consequences of non-technical effects of engineering activities, including their impact on the environment and, thus, responsibility for decisions.	K2_GIG_K03

Program content ensuring learning outcomes

Chemical and physical properties. Determination of chemical components in process simulation. Property estimation methods. Chemical process material and energy balances, sizing, costing, and economic evaluation. Process performance analysis, process evaluation and optimization. Chemical process synthesis, biorefinery process synthesis: objectives and steps. Synthesis of separation sequences. Energy integration in process design.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Classes	30
Project	30
Credit/Exam	2

Preparation of a project	15
Preparation of a report/summary/presentation/paper	6
Prepararation for an exam/credit	6
Preparaton for classes	8
Conducting literature research	6
Self-study of class topics	7
Student workload	**Hours** 125

Wrocław University of Science and Technology

Mineral Deposits Exploration

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Mineral Resources Exploration - Track WUST - University of Zagreb	**Subject code** W6GIG/000EWZS.52PS.05006.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 2	Exam **Activities and hours** Lecture: 30 Project: 45	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	To describe all phases of raw materials exploration, from prospecting of deposits to the preparation of reports on raw materials reserves. To select basic geological, geochemical, geophysical, and statistical methods in exploration of selected mineral raw materials deposits.	K2_GIG_W01, K2_GIG_W08, K2_GIG_W11, K2_GIG_W15
In terms of skills		

PEU_U01	To apply statistical methods and spatial analyses in interpretation of laboratory and field measurements. To use information technology in computation and modelling of geological phenomena and processes. To identify the properties of geological materials and processes within hydrogeological, engineering geological and petroleum engineering investigation and mineral exploration.	K2_GIG_U01, K2_GIG_U13
In terms of social competences		
PEU_K01	Respects standards and regulations (legal) related to geological research, geological hazards, environmental protection, water exploitation, mineral resource exploitation, or construction conditions. Supports the creation of geological reports for the economy and strategic documents.	K2_GIG_K03

Program content ensuring learning outcomes

The course introduces geological methods for mineral deposit exploration and their evaluation, as well as their application during the geological phase of mineral resource exploration. The scope of the course includes: Classification of mineral deposits.Economic aspects of mineral deposits. Nature and morphology of ore bodies. Metallogenesis, metallogenic provinces, and periods. Geological criteria for mineral deposit exploration. Magmatic control factors.Structural control factors. Geological models of mineral deposits as a basis for exploration planning. Reconnaissance.Selection and determination of areas for mineral deposit exploration. Application of geophysical methods and remote sensing in mineral deposit exploration. Exploration indicators (alteration, alteration mineral assemblages, ore outcrops, and remnants of old mining). Exploration indicators (indicator elements, indicator minerals).Geochemical exploration methods. Sampling media (river sediments, soil, lake sediments, sedimentary cover, water, gases, vegetation, rocks). Statistical processing of geochemical exploration results. Sampling of mineral resources. Mining law. Categorization and classification of mineral resources. Calculation of mineral resources. Preparation of mineral resource reports.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	45
Preparaton for classes	10
Prepararation for an exam/credit	11
Preparation of a project	15
Preparation of a report/summary/presentation/paper	10
Credit/Exam	4
Student workload	**Hours** 125

Wrocław University of Science and Technology

Applied Remote Sensing in Geosciences

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMFS.52PS.04929.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 60 Laboratory: 60	6.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student characterizes measurement techniques used in remote sensing based on the knowledge of available sensors and their associated physical principles, as well as the application of spatial modeling techniques to predict spatiotemporal attributes.	K2_GIG_W07, K2_GIG_W12, K2_GIG_W18
In terms of skills		
PEU_U01	The student processes remote sensing data using standard software and selects the appropriate remote sensing method based on knowledge of available sensors and their associated physical principles.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08, K2_GIG_U10

In terms of social competences		
PEU_K01	The student is sensitive to the non-technical impacts of engineering activities, especially those affecting the environment, and respects the principles of sustainable development and ecological responsibility.	K2_GIG_K03

Program content ensuring learning outcomes

This module covers the introduction to and working on selected applications of remote sensing in geosciences by the means of selected case studies.
Topics covered include:
- review of theoretical foundation of remote sensing
- data acquisition techniques (terestrial , airborne, spaceborne)
- spatio-temporal analysis of data
- Geoscientific background related to the case studies.

Practical exercises will be conducted applying multi-spectral and radar data for change detection of ground properties and ground deformations. Students will conduct individual project assignments and present their results.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	60
Laboratory	60
Preparaton for classes	8
Preparation of a report/summary/presentation/paper	5
Preparation of a project	13
Credit/Exam	4
Student workload	**Hours** 150

Wrocław University of Science and Technology

Spatial Planning

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.52PS.03757.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 2	• Lecture: 45 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Quotes relevant laws and regulations concerning spatial planning in Austria and Europe, selects appropriate spatial planning tools using practical examples, and characterizes the functional and legal aspects of spatial planning.	K2_GIG_W04, K2_GIG_W11
In terms of social competences		
PEU_K01	Declares awareness of the impact of engineering activities on the environment and society, and defends the principles of sustainable development in the context of spatial planning.	K2_GIG_K03

Program content ensuring learning outcomes

On completion of this course the participants shall be able to: • Use the planning instruments of Spatial Planning federal, regional and local • Know how and where to get information about sources of data and accuracy of these data • Use data sets and services of the Austrian Provinces and Municipalities • Work with cadaster and land register and know how to use

this information • Solve spatial planning tasks associated with Mining License Procedures

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	45
Credit/Exam	2
Prepararation for an exam/credit	3
Student workload	**Hours** 50

Wrocław University of Science and Technology

Mineralogy and Geochemistry

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.52PS.04974.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 30 Laboratory: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Distinguishes the main internal and external processes of mineral formation and geochemical processes, as well as the distribution of chemical elements on Earth.	K2_GIG_W02, K2_GIG_W10
PEU_W02	Selects the appropriate approach to identifying geochemical characteristics of minerals, rocks, and waters.	K2_GIG_W08, K2_GIG_W10
In terms of skills		
PEU_U01	Analyzes general and detailed scientific theories in the fields of mineralogy and geochemistry, systematizes them to characterize complex mineral formation processes.	K2_GIG_U08, K2_GIG_U10, K2_GIG_U13

In terms of social competences		
PEU_K01	Is engaged in the practice of sustainable natural resource management through the study of mineral and rock formation processes.	K2_GIG_K03

Program content ensuring learning outcomes

This course provides an understanding of the principles of the distribution of chemical elements in the Earth. Additionally, it covers the most important thermodynamic processes related to solid materials, the geochemical classification of elements, and the geochemical aspects of the genesis of the most important minerals and mineral assemblages. The course will also introduce topics in isotope geochemistry, which study the chemical evolution of the Earth, as well as the geochemical characteristics of water, organic matter, igneous, sedimentary, and metamorphic rocks, which help describe the processes of mineral and rock formation in the Earth's crust and mantle.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	30
Preparaton for classes	10
Preparation of a report/summary/presentation/paper	10
Prepararation for an exam/credit	6
Conducting empirical studies	10
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Research Methodology

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.52PS.05021.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Graded credit **Activities and hours** Lecture: 30 Classes: 15 Project: 30	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	identifies and critically assesses scientific databases to find research results and current knowledge.	K2_GIG_W03, K2_GIG_W08, K2_GIG_W14, K2_GIG_W15, K2_GIG_W16, K2_GIG_W18

PEU_W02	explains database analyses and recognises the methods for processing the results to find the facts.	K2_GIG_W03, K2_GIG_W05, K2_GIG_W07, K2_GIG_W08, K2_GIG_W10, K2_GIG_W15
In terms of skills		
PEU_U01	searches for and assesses the reliability of various sources of scientific knowledge and data.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U10, K2_GIG_U13
PEU_U02	prepares a research plan, designs an experiment, and analyses the databases to reach the objectives.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U07, K2_GIG_U10
PEU_U03	organizes and carries out a workshop to present the research results and creates a scientific report or article.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U07, K2_GIG_U09, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	declares an awareness of the importance of the non-technical consequences of engineering activities, including their impact on the environment and the related responsibility for decisions.	K2_GIG_K01, K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

The application of scientific databases to find research results and knowledge. Critical source assessment. Formulation of research objectives. Processing and analysis of research results. Development of relevant scientific method. The presentation of the research results in a scientifically credible way.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Classes	15
Project	30
Preparaton for classes	8
Preparation of a project	8
Preparation of a report/summary/presentation/paper	12
Credit/Exam	2
Conducting literature research	6
Prepararation for an exam/credit	6

Self-study of class topics	8
Student workload	**Hours** 125

Wrocław University of Science and Technology

Petroleum Geology

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.52PS.05007.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 30 Project: 45	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Interpret the results of analyses and measurements: laboratory and field (from outcrops and from wells) Bring conclusions about the generative-maturation properties of source rocks based on the results of pyrolysis Discuss the interconnectedness of the elements of the petrogeological system Describe the main elements of the drilling rig and the work of geologists during the drilling of deep wells.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W08, K2_GIG_W11
In terms of skills		

PEU_U01	Analyse the role of biomarkers in determining the origin of hydrocarbons (origin of organic matter and sedimentation environment). Estimate geological (total) reserves of hydrocarbon based on a simple reservoir model constructed in a computer software.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	Student will learn how to have professional interaction with engineers of related professions. Student will work in teamwork.	K2_GIG_K03

Program content ensuring learning outcomes

The goal is to acquire specific knowledge and skills in the field of petroleum geology, which are intended to prepare the students, future engineers for all aspects of exploration and exploitation of oil, gas, condensate and geothermal waters as well as for professional interaction with engineers of related professions in teamwork.
Students aquire specific skills in the area of exploration and exploitation of oil and gas.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	45
Preparaton for classes	13
Preparation of a project	20
Prepararation for an exam/credit	13
Credit/Exam	4
Student workload	**Hours** 125

Wrocław University of Science and Technology

Underground Mine Surveying

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg	**Subject code** W6GIG/000GMFS.52PS.04930.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 2	Exam **Activities and hours** Lecture: 30 Classes: 45	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student defines geodetic and geotechnical methods used in surveying campaigns in underground mines. The student identifies appropriate geodetic instruments for specific applications in surveying campaigns.	K2_GIG_W07, K2_GIG_W14
In terms of skills		
PEU_U01	The student applies the theory of error propagation in the context of planning and critical analysis of measurement results for underground surveying campaigns,	K2_GIG_U04, K2_GIG_U07, K2_GIG_U10
In terms of social competences		

PEU_K01	The student accepts responsibility for engineering decisions and their environmental impact.	K2_GIG_K03

Program content ensuring learning outcomes

Legal regulations with respect to underground mine surveying
Application of the theory of error propagation and GUM - Guide to the Expression of Uncertainty in Measurement for precision surveying design and evaluation of results
Transfer of coordinates and directional angels from surface to underground (mechanical and optical shaft plumbing, gyroscopic measurements, application of inertial systems)
Alignment control in underground drifts and tunnels
Underground geodetic infrastructure and mine mapping
Drill hole surveying
Recent developments in underground positioning and navigation

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Classes	45
Preparaton for classes	10
Self-study of class topics	10
Preparation of a report/summary/presentation/paper	10
Prepararation for an exam/credit	16
Credit/Exam	4
Student workload	**Hours** 125

Wrocław University of Science and Technology

Risk Management in Mines

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.52HS.04947.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects from the fields of humanities or social sciences

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 30 Laboratory: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Characterizes various types of risks associated with mining, including safety, technical, and economic risks.	K2_GIG_W09, K2_GIG_W14
PEU_W02	Formulates risk management strategies, including risk elimination and monitoring. Explains the risk management process in the context of mining.	K2_GIG_W05, K2_GIG_W09, K2_GIG_W11, K2_GIG_W14, K2_GIG_W17
In terms of skills		

PEU_U01	The student has an appreciation of the inherent risks in mining. Identifies and quantifies mining risks. Justifies the importance of risk management in the context of mining.	K2_GIG_U11, K2_GIG_U12

Program content ensuring learning outcomes

Introduction into the objectives and methodsof risk management in mines
Definitions: hazard, risk, damage, severitynumber, risk number
Types of risks in mining: safety, human,geological, technical, economic, contractual,political, time, environmental
Safety risk-safety statistics
Acceptable and tolerable risks
Methods of risk identification: brain storming,risk check lists, expert risk evaluation
Methods of risk analysis: Regression andcorrelation analysis, probabilistic eventanalysis, fault tree analysis, Delphi-method,Monte Carlo simulation, scenario building
Risk classification: risk matrix-severity andprobability; risk register
Risk treatment: eliminate
Monitoring: physical, environmental, financial,human
Human factor in risk management

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	30
Credit/Exam	4
Preparation of a report/summary/presentation/paper	5
Preparaton for classes	6
Student workload	**Hours** 75

Wrocław University of Science and Technology

Geophisical Exploration Methods I

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.52PS.04975.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 30 Laboratory: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student presents various methods of surface geophysics and borehole geophysics suitable for solving exploration tasks related to mineral resource deposits. They also characterize methods of data acquisition and collection in geophysical studies.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
In terms of skills		
PEU_U01	The student designs prospecting and exploration of geological structures by geophysical methods. Evaluates and interprets the results and assesses the need of further geophysical measurements	K2_GIG_U07, K2_GIG_U10, K2_GIG_U13

PEU_U02	Adapts modern data acquisition techniques in geophysical prospecting and exploration	K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	The student is open and receptive to the knowledge and acceptance of professional and technological methodological developments in the fields of technical earth sciences, to the acquisition of their management, and to the participation in their development.	K2_GIG_K01, K2_GIG_K03

Program content ensuring learning outcomes

The course intruduces the principal theoretical background and practical skills to plan and perform geophysical explorations for different geological environments and deposit types
It presents the surface geophysical methods and the geophysical methods used in boreholes for the purpose that students can design and execute geophysical research and evaluate data. Topics presented include:
Classification of applied geophysics methods. Gravity methods: measured quantities, basic corrections and data processing methods. Filtering gravity maps.
Evaluation of measurement data for causative bodies with simple geometries. Geological and environmental geological applications. Magnetic methods: measured quantities, basic corrections and data processing methods.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	30
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	6
Prepararation for an exam/credit	10
Conducting empirical studies	10
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Circular Economy for Materials Processing

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.52PS.05022.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 30 Project: 30 Seminar: 15	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	recognises and explains the concepts of circular economy, materials flow (raw materials, processing, manufacturing until end-of-life recycling and re-usage), issues and drivers for changes.	K2_GIG_W02, K2_GIG_W03, K2_GIG_W04, K2_GIG_W05, K2_GIG_W08, K2_GIG_W11, K2_GIG_W12, K2_GIG_W13

PEU_W02	recognizes and describes the impacts (environmental, economic and social) of the current practice of raw materials processing from a sustainability perspective.	K2_GIG_W11, K2_GIG_W12, K2_GIG_W13
In terms of skills		
PEU_U01	creates new business opportunities to re-enter materials into the circular economy.	K2_GIG_U04, K2_GIG_U08, K2_GIG_U10, K2_GIG_U12, K2_GIG_U13
PEU_U02	applies and evaluates processing technologies to accelerate the implementation during business creation.	K2_GIG_U08, K2_GIG_U10, K2_GIG_U12, K2_GIG_U13
PEU_U03	interprets the impacts (environmental, economic and social) of the current practice of materials processing from a sustainability aspect.	K2_GIG_U10, K2_GIG_U12, K2_GIG_U13
PEU_U04	organizes teamwork to develop a project.	K2_GIG_U09
In terms of social competences		
PEU_K01	declares their awareness of the consequences of non-technical effects of engineering activities, including their impact on the environment and, thus, responsibility for decisions.	K2_GIG_K03

Program content ensuring learning outcomes

The circular economy and resource efficiency are important aspects of sustainability in the minerals industry. The circular economy concepts are considered in the design, development and operation of mineral production processes for, for example, metals during use, at the end-of-life stage and in recycling. Topics and case studies are drawn from industrial plants.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Seminar	15
Credit/Exam	4
Prepararation for an exam/credit	8
Preparation of a project	14
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	6
Self-study of class topics	5

Conducting literature research	3
Student workload	**Hours** 125

Wrocław University of Science and Technology

Engineering Geological Investigations

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.52PS.05008.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 30 Project: 45	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student identifies weathering profiles in various types of rocks and applies appropriate geological-engineering research methods and selects the appropriate level of field studies for different types of geotechnical engineering studies and projects.	K2_GIG_W02, K2_GIG_W07, K2_GIG_W10
In terms of skills		
PEU_U01	The student evaluates the results of conducted studies and tests, prepares an engineering-geological profile and technical drawings of a tunnel, and conducts reconnaissance engineering-geological mapping.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U10

In terms of social competences		
PEU_K01	The student respects standards and complies with environmental protection regulations while analyzing geotechnical reports and the results of engineering-geological investigations.	K2_GIG_K03

Program content ensuring learning outcomes

The course provides basic knowledge about engineering geological investigations for the purpose of design in civil engineering and mining.
This course covers all important aspects of engineering geological investigations, like:
Types of engineering geological investigations
Methods of engineering geological investigations
Methods of detailed engineering geological investigations
Genetic classification of soil and rock mass, rock mass weathering and engineering geological profile
Classification and categorization of rock mass
Engineering geological mapping of tunnels
Methods and results of regional engineering geological investigations

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	45
Preparaton for classes	15
Preparation of a report/summary/presentation/paper	20
Prepararation for an exam/credit	11
Credit/Exam	4
Student workload	**Hours** 125

Wrocław University of Science and Technology

Geomonitoring

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg	**Subject code** W6GIG/000GMFS.52PS.04931.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 2	Exam **Activities and hours** Lecture: 30 Laboratory: 45	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student characterizes geodetic and geotechnical measurement methods used to monitor the geogenic/ antropogenic processes	K2_GIG_W10, K2_GIG_W16
In terms of skills		
PEU_U01	On the basis of measurement and data acquisition techniques student discusses monitoring design aspects and statistical and model based inference strategies	K2_GIG_U04, K2_GIG_U07, K2_GIG_U10, K2_GIG_U12
In terms of social competences		

PEU_K01	The student accepts responsibility for engineering decisions and their impact on the environment. The student ensures the minimization of negative effects of engineering activities on the environment.	K2_GIG_K03

Program content ensuring learning outcomes

The aim is to infer an understanding of geo-processes and their relevant spatio-temporal dynamics, including change detection.
Students are able to build on their knowledge about geodetic and geotechnical measurement methods on the one hand and their understanding about the geogenic/ antropogenic process to monitor on the other hand to generate reliable and effective monitoring concepts for spatial, temporal and spatio-temporal processes.
Students are able to critically analyze monitoring concepts and interpret monitoring results.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	45
Preparation of a report/summary/presentation/paper	15
Prepararation for an exam/credit	15
Self-study of class topics	16
Credit/Exam	4
Student workload	**Hours** 125

Wrocław University of Science and Technology

Regional Hydrogeology

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Zagreb - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EZWS.52PS.05012.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 30 Project: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Define the concept of scale in hydrogeology and explain its effect through permeability properties Describe the basic concept of the Earth's thermal regime and relate it to the genesis and dynamics of thermal waters Describe the geochemical cycle Interpret the chemical composition of water Define and graphically represent hydrochemical facies Analyze the spring hydrograph Explain how to determine groundwater reserves Describe the hydrogeological systems of Croatia	K2_GIG_W01, K2_GIG_W02, K2_GIG_W10, K2_GIG_W15
In terms of skills		

PEU_U01	Apply hydrogeological maps in the description of hydrogeological features of the area Assess the significance of a particular hydrogeological system for a water supply	K2_GIG_U01, K2_GIG_U04, K2_GIG_U13
In terms of social competences		
PEU_K01	The student protects groundwater resources.	K2_GIG_K03

Program content ensuring learning outcomes

Hydrogeological interpretations on a regional scale and the acquisition of skills in presenting hydrogeological features and calculating groundwater reserves. The student will acquire basic knowledge about the aquifer systems of the Republic of Croatia and strategic groundwater reserves.
Students aquire specific skills in the area of hydrogeological interpretation on regional scale.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Preparaton for classes	8
Preparation of a project	15
Prepararation for an exam/credit	8
Preparation of a report/summary/presentation/paper	5
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Deposit Modelling and Associated Software

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben	**Subject code** W6GIG/000GMLS.52PS.04948.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 2	Graded credit **Activities and hours** Lecture: 15 Laboratory: 30	2.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student presents the principles of creating geological and geometrical models. Lists required steps and input parameter to create a deposit model.	K2_GIG_W06, K2_GIG_W15
In terms of skills		
PEU_U01	A student uses basic mining design software tools and creates a three-dimensional project of an open-pit mine.	K2_GIG_U04
In terms of social competences		

PEU_K01	Accepts the importance of sustainable development in the context of deposit modeling, understanding the impact of engineering decisions on the environment.	K2_GIG_K03

Program content ensuring learning outcomes

This course focuses on advanced techniques for mineral deposit modeling, combining theory with practical skills necessary for effective planning and conducting geophysical surveys. The objectives of deposit modeling include understanding and applying general modeling principles, which are crucial for creating accurate and useful geological models. The course presents presentation techniques, including 2D and 3D models, which are essential for visualizing and interpreting geophysical data. Students will become familiar with interpolation methods and an introduction to geostatistics, which are fundamental for the spatial analysis of geological data. The course also covers the handling of raw data, i.e., input databases, which are the basis for further analysis and modeling. The integration of modeling with operational processes is a key element of the course, including forecasting and model validation, which allows for the practical application of research results in real operational processes. The practical part of the course focuses on computer-aided modeling and deposit exploitation planning, enabling students to acquire practical skills in modern tools and techniques used in geology.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	30
Credit/Exam	2
Preparaton for classes	3
Student workload	**Hours** 50

Wrocław University of Science and Technology

Geological Interpretation and Prospecting

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.52PS.04998.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 30 Project: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student presents problem-solving techniques (planning and managing exploration) and the best available practices for conducting mineral resource exploration. Additionally, the student characterizes methods for assessing the economic potential of mineral resource occurrences based on available data sets.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
In terms of skills		

PEU_U01	The student estimates and accounts for uncertainty in sampling, processing, analyzing, and interpreting exploration data, and analyzes and synthesizes information regarding various deposit exploration methods, including geological and geochemical methods, to assess the economic potential of mineral resource occurrences.	K2_GIG_U04, K2_GIG_U06, K2_GIG_U09, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	Student considers the complexity of the decision making in mineral resource exploration tasks, regarding social, economic and sustainability issues.	K2_GIG_K01

Program content ensuring learning outcomes

Program Content Ensuring Achievement of Learning Outcomes Includes:
Integration of information from various research methods to assess the economic potential of mineral resource occurrences.
Building the ability to apply practical methods in mineral exploration.
Developing teamwork skills.
Training in various exploration tasks under real field conditions.
The course covers key aspects of implementation, performance, and quality assurance of tasks related to geological prospecting and exploration. It serves as a capstone course for the entire master's program.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Preparaton for classes	10
Preparation of a project	15
Prepararation for an exam/credit	11
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Technology and Innovation Management Introduction

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.52PS.05023.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 15 Classes: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	describes and explains various methods of technology and innovation strategy as well as the process of the creation of new products and services.	K2_GIG_W03, K2_GIG_W07, K2_GIG_W09, K2_GIG_W13, K2_GIG_W18
PEU_W02	identifies the main innovation and technology management concepts and their linkages to the innovation process, innovation and technology strategy and innovative organization management.	K2_GIG_W03, K2_GIG_W05, K2_GIG_W07, K2_GIG_W09, K2_GIG_W10, K2_GIG_W18

PEU_W03	describes and explains sustainability and innovation basics.	K2_GIG_W05, K2_GIG_W07, K2_GIG_W09, K2_GIG_W10, K2_GIG_W13
In terms of skills		
PEU_U01	analyses and designs the technology and innovation strategy of a company.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U05, K2_GIG_U06, K2_GIG_U10
PEU_U02	analyses and evaluates the usability of various methods of innovation and technology.	K2_GIG_U03, K2_GIG_U05, K2_GIG_U06, K2_GIG_U10, K2_GIG_U13
PEU_U03	verifies and uses the main innovation and technology management concepts to innovative organization management.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	demonstrates the ability to think and act creatively and entrepreneurially.	K2_GIG_K01, K2_GIG_K02
PEU_K02	declares an awareness of the importance of the non-technical consequences of engineering activities, including their impact on the environment and the related responsibility for decisions.	K2_GIG_K03

Program content ensuring learning outcomes

Innovation as a core business process. Innovative organisation. Development of technology and innovation strategy. Innovation networks. Decision-making in technological and market uncertainty. Creation of new products and services. Innovation performance and learning. Sustainability and innovation.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Classes	30
Credit/Exam	4
Preparation of a project	10
Preparation of a report/summary/presentation/paper	4
Preparaton for classes	8
Prepararation for an exam/credit	4

Student workload	Hours 75

Wrocław University of Science and Technology

Exploration Geochemistry

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.52PS.05009.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Graded credit **Activities and hours** Lecture: 30 Project: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student explains the behavior of chemical elements in surface environments and the processes controlling geochemical anomalies. They select the appropriate sampling medium, proper sample preparation procedures, and analytical methods, as well as the analyte, to identify geochemical anomalies caused by ore deposit weathering.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W18
In terms of skills		

PEU_U01	The student applies one-dimensional, two-dimensional, and multidimensional statistical methods in the interpretation of geochemical data. They construct geochemical maps and design preliminary, regional, and detailed geochemical surveys of mineral resources.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U09, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	The student develops communication skills through oral presentations and writing reports related to project tasks. They systematize and integrate the results of geochemical surveys with other data, and prepare and present a geological report.	K2_GIG_K02

Program content ensuring learning outcomes

Students will be introduced to the basic principles of geochemical prospecting, i.e., finding the geochemical anomaly caused by the weathering of the ore deposit. Students will be introduced to the behavior of trace elements in surface environments, sampling media (soil, water, sediment, plant rocks), chemical analysis of geological materials (AAS, ICP), statistical methods and interpretation of geochemical data. Students will develop their communication skills through oral presentation and writing reports related to project assignments.
Students will acquire a basic knowledge about importance of geochemical prospecting.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Credit/Exam	4
Preparaton for classes	10
Prepararation for an exam/credit	6
Preparation of a project	10
Preparation of a report/summary/presentation/paper	10
Student workload	**Hours** 100

Wrocław University of Science and Technology

Operations Management

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg	**Subject code** W6GIG/000GMFS.52PS.01765.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects

Semester	**Examination**	**Number of ECTS points**
Semester 2	Exam **Activities and hours** Lecture: 60 Classes: 60	6.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	A student characterizes various production and service processes in enterprises, classifies different types of production processes, and explains process analysis techniques.	K2_GIG_W05, K2_GIG_W06, K2_GIG_W09
In terms of skills		
PEU_U01	The student analyzes complex problems related to operations management, structures them and develops solution alternatives.	K2_GIG_U02, K2_GIG_U03, K2_GIG_U07, K2_GIG_U08, K2_GIG_U10
In terms of social competences		

PEU_K01	A student demonstrates initiative in solving operational problems and respects legal regulations and industry standards.	K2_GIG_K01, K2_GIG_K03

Program content ensuring learning outcomes

This course addresses the management of operations in manufacturing and service firms. Diverse activities, such as determining the size and type of production process, purchasing the appropriate raw materials, planning and scheduling the flow of materials and the nature and content of inventories, assuring product quality, and deciding on the production hardware and how it gets used, comprise this function of the company. Managing operations well requires both strategic and tactical skills. During the term, we will consider such topics as: process analysis,
workforce issues, materials management, quality and productivity, technology, and strategic planning, together with relevant analytical techniques. This course will provide a survey of these issues

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	60
Classes	60
Self-study of class topics	10
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	6
Credit/Exam	4
Student workload	**Hours** 150

Wrocław University of Science and Technology

Seismotectonics

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Zagreb - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EZWS.52PS.05013.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 30 Project: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student distinguishes types of stress and their distribution in the Earth's crust in relation to types of tectonic plate boundaries, regional and local geodynamic processes. They explain general terms in seismology (seismicity, seismic waves, earthquake magnitude, seismic hazard and risk, earthquake cycle, and elastic rebound theory).	K2_GIG_W02, K2_GIG_W10, K2_GIG_W14
In terms of skills		

PEU_U01	The student calculates the location of an earthquake's epicenter based on the analysis of seismograms from seismic stations, moment magnitude values, and assesses the earthquake's intensity. They use analytical methods and computer tools for the analysis of seismograms and earthquake-related calculations.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	Student demonstrates the ability to think and act creatively by creating seismotectonic profiles and presenting results related to seismicity, seismic hazards, and tectonic activity and their impact.	K2_GIG_K01

Program content ensuring learning outcomes

To describe the basics on seismotectonics in different geodynamic settings on Earth, in particular in Croatia, in circum Adriatic region and in the Eastern Mediterranean, and to provide students general knowledge on field and lab methods used in evaluation of seismicity and seismic hazard, assessment of recent tectonic movements on local and regional scale, active stress regimes in the Earth’s crust, and in identification and characterization of active, seismogenic faults and seismogenic sources.
The course cover all the important data and seismotectonic properties of certain areas.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Preparation of a project	10
Preparaton for classes	10
Prepararation for an exam/credit	6
Preparation of a report/summary/presentation/paper	10
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Underground Mining

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.52PS.04949.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 30 Classes: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Characterizes underground mining methods, such as room-and-pillar methods, longwall methods, stope filling methods, and caving methods. Selects appropriate mining methods for specific geotechnical conditions of the deposit.	K2_GIG_W07, K2_GIG_W09, K2_GIG_W19
In terms of skills		
PEU_U01	Selects an appropriate mining method and an appropriate mine access	K2_GIG_U04, K2_GIG_U07, K2_GIG_U09

Program content ensuring learning outcomes

Underground mining methods.
Mine development.
Stoping methods for tabular deposits.
Rock Mechanic design of room and pillarsystem.
Pillar extraction mining.
Longwall mining.
Cut and fill mining methods.
Shrinkage stoping.
Open stoping.
Caving methods
Backfill

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Classes	30
Credit/Exam	4
Preparaton for classes	6
Preparation of a project	15
Prepararation for an exam/credit	10
Preparation of a report/summary/presentation/paper	5
Student workload	**Hours** 100

Wrocław University of Science and Technology

Geophysical Interpretation and Prospecting

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Mineral Resources Exploration - Track WUST - University of Miskolc	**Subject code** W6GIG/000EWMS.52PS.04999.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 2	Exam **Activities and hours** Lecture: 30 Project: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Plans the exploration workflow of different natural resources by having a firm understanding of the linkage among the different geophysical methods and their underlying physical principles.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W09, K2_GIG_W11, K2_GIG_W15
In terms of skills		
PEU_U01	Able to construct the most probable geological model based on the available geophysical and geological data.	K2_GIG_U04, K2_GIG_U10, K2_GIG_U13

In terms of social competences		
PEU_K01	Motivated to carry out activities in often changing working, geographical and cultural environment., Makes decisions carefully, in consultation with other professionals from the field of earth sciences. Committed to the practice of sustainable natural resource management.	K2_GIG_K02

Program content ensuring learning outcomes

In the scope of this subject students acquire knowledge about the closing phase of geological-geophysical exploration and study the linkage and hierarchy of different geophysical methods. They learn how to determine the most probable geological model by using geophysical measurement results and other geoscientific information jointly. They study the points of view of exploration and measurement planning related to the interpretation of data acquited
The course goes through the key points of performance and quality assurrance of geophysica prospection and exploration tasks. This is a synthetizing course for the whole master programme.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Preparaton for classes	10
Preparation of a project	15
Preparation of a report/summary/presentation/paper	5
Prepararation for an exam/credit	6
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Solid-Liquid Separation

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.52PS.05024.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 15 Classes: 15 Laboratory: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	recognises and describes fundamental phenomena in solid-liquid separation.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W07, K2_GIG_W08, K2_GIG_W18
PEU_W02	defines and explains different methods and equipment used for solid-liquid separation.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W07

PEU_W03	defines different filter media used in filtration and makes a preliminary selection of a medium for different cases.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W07
In terms of skills		
PEU_U01	searches for and sizes suitable equipment for separation processes based on suspension properties and data from laboratory tests.	K2_GIG_U04, K2_GIG_U08, K2_GIG_U10
PEU_U02	analyses the effects of the characteristics of the solid material and the liquid on the separation and post-treatment processes.	K2_GIG_U04, K2_GIG_U08, K2_GIG_U10
PEU_U03	performs an experimental test on a laboratory scale and creates a scientific report.	K2_GIG_U04, K2_GIG_U08, K2_GIG_U10
In terms of social competences		
PEU_K01	declares an awareness of the importance of the non-technical consequences of engineering activities, including their impact on the environment and the related responsibility for decisions.	K2_GIG_K03

Program content ensuring learning outcomes

Fundamentals of solid-liquid separation, filtration methods, operation of filters, cake formation and washing, deliquoring, design and modelling of filters, and scale-up. Filter media and blinding. Experimental design in filtration test work.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Classes	15
Laboratory	30
Credit/Exam	4
Conducting literature research	6
Conducting empirical studies	15
Preparation of a report/summary/presentation/paper	6
Prepararation for an exam/credit	6
Preparation of a project	3
Student workload	**Hours** 100

Wrocław University of Science and Technology

Remote Sensing of Mineral Resources

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Mineral Resources Exploration - Track WUST - University of Zagreb	**Subject code** W6GIG/000EWZS.52PS.05010.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 2	Exam **Activities and hours** Lecture: 15 Laboratory: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	A student describes the fundamental principles and methods of remote sensing for surface mineral resources and utilizes multispectral and hyperspectral images to analyze surface mineral resources.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W08, K2_GIG_W15
In terms of skills		
PEU_U01	Develop a controlled and uncontrolled classification of mineral resources from satellite images Apply at least one software tool for interpretation and processing in remote sensing of mineral resources.	K2_GIG_U01, K2_GIG_U03, K2_GIG_U04, K2_GIG_U13

In terms of social competences		
PEU_K01	Solves problems independently or in a group.	K2_GIG_K03

Program content ensuring learning outcomes

Students will acquire basic knowledge from remote sensing, with an emphasis on their application in mineral exploration. To enable students to independently collect and analyse multispectral, hyperspectral and radar satellite images required for analysis at surface mineral resources. Introduce students to the automatic supervised and unsupervised classification of satellite images in the analysis of surface mineral raw materials.
Through the course students will acquire basic knowledge about application of remote sensing in mineral raw materials exploration.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	30
Preparaton for classes	16
Credit/Exam	4
Preparation of a report/summary/presentation/paper	10
Student workload	**Hours** 75

Wrocław University of Science and Technology

Structural Geology

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.52PS.04982.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 30 Project: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Characterizes and identifies structural features, assigns and justifies structural data.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10, K2_GIG_W15
In terms of skills		
PEU_U01	Interprets and analyzes the mechanics of structural processes.	K2_GIG_U10, K2_GIG_U13
PEU_U02	Creates geological maps and profiles.	K2_GIG_U04, K2_GIG_U07

In terms of social competences		
PEU_K01	Values the use of clear terminology and prioritizes observed data over theory with a critical approach. Is responsible for data analysis using graphical and computer tools.	K2_GIG_K03

Program content ensuring learning outcomes

The course provides a background in the fundamentals of structural geology. It introduces the methods of interpreting structural observations and determining the 3-D distribution of the lithological units, the physical properties controlling the development of fractures, folds and other structural features. The course also introduces the students to building up, constructing and analysing spatial models.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Preparation of a project	15
Preparaton for classes	10
Preparation of a report/summary/presentation/paper	5
Prepararation for an exam/credit	6
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Geomodelling – Geostatistics for Natural Resource Modelling

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMFS.52PS.04932.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 30 Laboratory: 45	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student explains the theoretical foundations of spatial data analysis, building geostatistical models, and estimation. They explain the model of the random spatial function and the assumptions of stationarity and ergodicity.	K2_GIG_W06, K2_GIG_W08, K2_GIG_W18
In terms of skills		
PEU_U01	The student applies geostatistical methods in the context of estimating natural resources/reserves and utilizes the acquired knowledge in practical mining cases.	K2_GIG_U04, K2_GIG_U10

Program content ensuring learning outcomes

The objective of this course is to equip students with advanced knowledge and skills in resource modeling and estimation in mining. Students will learn to conduct explorative data analysis, analyze spatial continuity, apply various methods of spatial estimation, and integrate secondary information into spatial modeling. Additionally, the course covers modeling spatial uncertainty and geostatistical considerations in reserve estimation. Students will also gain familiarity with international reporting standards for resources and reserves, such as the JORC Code, enabling them to professionally and compliantly report the results of their analyses.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	45
Preparaton for classes	10
Preparation of a project	15
Preparation of a report/summary/presentation/paper	10
Prepararation for an exam/credit	11
Credit/Exam	4
Student workload	**Hours** 125

Wrocław University of Science and Technology

Industrial Mineral Deposits and Applications

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Zagreb - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EZWS.52PS.05014.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 45 Seminar: 30	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	A student identifies and describes types of industrial mineral deposits, compares and recommends the use of industrial minerals in agriculture and various branches of industry.	K2_GIG_W01, K2_GIG_W07, K2_GIG_W12
In terms of skills		
PEU_U01	A student classifies ore and industrial minerals, categorizes industrial minerals, and develops an exploration plan for deposits, considering exploration methods and the assessment of deposit potential for industrial applications.	K2_GIG_U01, K2_GIG_U10, K2_GIG_U13
In terms of social competences		

PEU_K01	A student acknowledges the impact of activities related to the extraction and processing of industrial minerals on the natural environment and proposes solutions to minimize negative effects. They support the economic and social value of projects related to industrial minerals, considering long-term benefits and risks.	K2_GIG_K01, K2_GIG_K02

Program content ensuring learning outcomes

The course introduces the physicochemical and geological conditions of the formation of major industrial mineral deposits and their applications in industry. The course covers all important data regarding industrial minerals and their applications. Course content includes: Definitions of terms: (1) ore mineral and (2) industrial mineral. Classifications of industrial minerals. Physicochemical conditions of clay deposit formation. Industrial clays: kaolins, bentonites, sepiolites, and palygorskites. Mineralogy and geology of kaolin deposits. Applications of kaolin in industry. Mineralogy and geology of bentonite, sepiolite, and palygorskite deposits. Industrial applications. Construction clays and their industrial applications. Physicochemical conditions of bauxite deposit formation. Lateritic and karst bauxites. Industrial applications of bauxites. Quartz mineral resources (quartz crystals, quartz sands and sandstones, SiO2 as a chemical and biogenic sediment, diatomaceous earth, flint). Feldspar deposits. Industrial applications of quartz mineral resources and feldspar. Physicochemical conditions of evaporite formation. Gypsum and anhydrite deposits. Halite, sylvite, soda, borate, Mg and Li salt deposits. Physicochemical conditions of phosphate formation. Apatite and phosphorite deposits. Industrial applications of phosphates. Barite, fluorite, and refractory material deposits. Industrial applications of barite, fluorite, and refractory materials. Pyrite and sulfur deposits. Industrial applications of pyrite and sulfur. Physicochemical conditions of zeolite formation. Zeolite deposits. Industrial applications of zeolites. Pigments and their industrial applications. Graphite deposits. Industrial applications of graphite.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	45
Seminar	30
Preparaton for classes	10
Preparation of a report/summary/presentation/paper	10
Preparation of a project	15
Prepararation for an exam/credit	11
Credit/Exam	4
Student workload	**Hours** 125

Wrocław University of Science and Technology

Mining Subsidence Engineering

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.52PS.04950.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 30 Laboratory: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	It defines mining damage in technical and legal terms, explains the principles of subsidence engineering in mining, and distinguishes them from rock mechanics issues.	K2_GIG_W07, K2_GIG_W10, K2_GIG_W16
In terms of skills		
PEU_U01	Student plans, assembles and analyses deformation profiles and monitoring networks of ground movement	K2_GIG_U07
In terms of social competences		

PEU_K01	Accepts the rules and legal regulations concerning mining damages. Is sensitive to the needs and expectations of landowners affected by mining damages.	K2_GIG_K03

Program content ensuring learning outcomes

- Definition of mine damages (legal and technical aspects),
- Basic principles of Mining Subsidence Engineering and differences to Mining Rock Mechanics
- The dynamics of ground movement and the critical areas of extraction in a subsidence trough according to Lehmann
- Important angles of ground movement
- influence of shallow and deep underground mining
- vertical and horizontal ground movement (ground movement elements)
- fundamentals of pre-calculation of ground movement,

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	30
Credit/Exam	4
Preparation of a report/summary/presentation/paper	11
Student workload	**Hours** 75

Wrocław University of Science and Technology

Geoelectric Lectureship

Educational subject description sheet

Basic information

Field of study Mining and Geology **Speciality** Mineral Resources Exploration - Track WUST - University of Miskolc **Organizational unit** Faculty of Geoengineering, Mining and Geology **Study level** second degree 4 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** W6GIG/000EWMS.52PS.05000.25 **Group of classes** Yes **Lecture languages** English **Mandatoriness** Obligatory in specialty **Block** Specialty subjects

Semester	**Examination**	**Number of ECTS points**
Semester 2	Graded credit **Activities and hours** Lecture: 30 Project: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	To identify the different geological structures and near surface objects/problems that can be mapped by geoelectric methods.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
In terms of skills		
PEU_U01	Be able to plan and implement the suitable geoelectric survey for exploration purposes or for different near surface problems (i.e., contamination mapping).	K2_GIG_U04, K2_GIG_U10
In terms of social competences		

PEU_K01	Perceives the professional and technological methodological developments in the fields of applied geophysics., Plans the work independently, and rules on to lead workgroups, is accountable for the work processes carried out under his / her control.	K2_GIG_K03

Program content ensuring learning outcomes

Engineering Master Program. The main goal of the specialization is to train engineers who, by developing geophysical methods and applying these methods in practice, effectively promote the exploration and extraction of mineral resources and the protection of the environment. The surface potential methods of geophysics are relatively inexpensive and effective means in achieving this goal. These methods can be successfully applied in the first phases of geological exploration and environmental studies. The curriculum contains the structure and applications of special gravitational, magnetic, electrical and electromagnetic geophysical methods in line with the achievement of objectives.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Preparation of a project	15
Preparaton for classes	10
Preparation of a report/summary/presentation/paper	10
Prepararation for an exam/credit	3
Credit/Exam	2
Student workload	**Hours** 100

Wrocław University of Science and Technology

GIS in Exploration of Mineral Resources

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.52PS.05011.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Graded credit **Activities and hours** Lecture: 15 Laboratory: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	To apply statistical methods and spatial analyses in interpretation of laboratory and field measurements To use information technology in computation and modelling of geological phenomena and processes To interpret the results of geological and geochemical prospecting, geophysical and remote sensing investigation of mineral deposits using geographic information system in the analysis of spatial data.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W08, K2_GIG_W14, K2_GIG_W15
In terms of skills		

PEU_U01	To construct general and thematic geological maps, as well as geological cross-sections with accompanying descriptions To interpret and summarize the results of field, laboratory and office research and prepare and present a geological expert report using other relevant data sources	K2_GIG_U01, K2_GIG_U03, K2_GIG_U04, K2_GIG_U13
In terms of social competences		
PEU_K01	Independently collects and analyzes mineral resources using GIS software, addresses current issues, and adheres to standards.	K2_GIG_K01

Program content ensuring learning outcomes

Master all significant options in GIS software while solving specific examples from the profession. Acquiring the knowledge needed to develop your own GIS projects. Advanced use of geoinformatics on computer and mobile platform. Visualization of GIS projects for the purpose of making cartographic contents of diploma theses.
Through the course students will acquire basic knowledge about application of GIS software in mineral exploration.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	30
Preparaton for classes	13
Preparation of a project	15
Credit/Exam	2
Student workload	**Hours** 75

Wrocław University of Science and Technology

Mineral Deposits

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.52PS.04983.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 30 Laboratory: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	A student identifies and describes possible continuations of specific deposits, comparing them with existing data, and recognizes and distinguishes different types of raw materials, explaining their significance and applications.	K2_GIG_W08, K2_GIG_W09, K2_GIG_W10
In terms of skills		
PEU_U01	A student demonstrates and distinguishes different types of raw material deposits, recognizes and identifies field samples, thereby effectively contributing to exploration.	K2_GIG_U01, K2_GIG_U10, K2_GIG_U13
In terms of social competences		

PEU_K01	A student is capable of developing skills in synthesizing and integrating various geological and geophysical data, creating a geological model based on field exploration data, and takes on the challenge of tracking new exploratory concepts and results, integrating them into their technological repertoire.	K2_GIG_K03

Program content ensuring learning outcomes

The course introduces the geology of raw material deposits, their spatial distribution, and their quantity and quality for different commodities. Students get familiar with the different groups of commodities – ores, industrial minerals, solid fossil energy minerals, construction materials, and their use and history. In the next period, the students will learn the ore-forming geological processes and their appearances, which create the different deposits. They will also learn the genetic classification of the deposits with national and international examples. This prepares the students to recognize the geological features of mineralizations, alterations, and tectonic deformations. The course covers all the important mines and ore districts in Europe and worldwide. During the laboratory classes, the students can learn the natural occurrences of ores, non-ores, and industrial minerals. They will learn the physical and chemical properties, and texture of the different raw material types, and how to identify and distinguish them. To properly use geological maps and sections in 3D, the students will do exercises to develop their capabilities. During the related field trips, the students will examine real deposits in the field.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	30
Preparaton for classes	10
Preparation of a report/summary/presentation/paper	10
Conducting empirical studies	10
Prepararation for an exam/credit	6
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Fluid Dynamics in Chemical Engineering

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.52PS.05029.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Graded credit **Activities and hours** Lecture: 30 Classes: 15 Project: 30	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	describes and explains the theoretical basics of CFD (Computational Fluid Dynamics) in chemical engineering.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W07, K2_GIG_W10
PEU_W02	depicts and explains design methods and scale-up of fluid mixers, rheology, and mixing effects in chemical reactors.	K2_GIG_W02, K2_GIG_W07, K2_GIG_W10

PEU_W03	recognises and explains the basics of fluid rheology.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W07, K2_GIG_W10
In terms of skills		
PEU_U01	selects, sizes and scales up different mixing devices (stirred tanks, in-line mixers) for blending and multiphase mixing (solid-liquid mixing, liquid and gas dispersions) based on short-cut design methods,	K2_GIG_U01, K2_GIG_U04, K2_GIG_U07, K2_GIG_U13
PEU_U02	adapts the basics of fluid rheology to the mixing design.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U07, K2_GIG_U13
PEU_U03	solves fundamental fluid mixing problems with CFD programs (COMSOL software).	K2_GIG_U04, K2_GIG_U13
PEU_U04	calculates heat transfer, chemical reactions, and laminar and turbulent flow in CFD.	K2_GIG_U01, K2_GIG_U04
PEU_U05	analyses relevant cases in Power-to-X chemical production technologies.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U13
In terms of social competences		
PEU_K01	demonstrates the ability to think and act in a creative and entrepreneurial manner.	K2_GIG_K01

Program content ensuring learning outcomes

Design methods and scale-up of fluid mixers, rheology, and mixing effects in chemical reactors. Theoretical basics of CFD (Computational Fluid Dynamics) in chemical engineering aspects and ability to solve basic mixing problems with CFD. COMSOL software for Multiphysics Simulation (FEM). Heat transfer, chemical reactions, laminar and turbulent flow in CFD.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Classes	15
Project	30
Credit/Exam	2
Prepararation for an exam/credit	15
Preparation of a report/summary/presentation/paper	7
Preparation of a project	8
Preparaton for classes	10
Conducting literature research	8

Student workload	**Hours** 125

Wrocław University of Science and Technology

Analytical Methods in Ore Deposits

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Mineral Resources Exploration - Track University of Zagreb - WUST	**Subject code** W6GIG/000EZWS.52PS.05015.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 2	Exam **Activities and hours** Lecture: 30 Laboratory: 45	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Explains the application of various methods and principles of sample preparation and instrument characteristics.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W10
In terms of skills		
PEU_U01	Prepares geological samples for selected methods (cutting, grinding, polishing, crushing, dissolving, diluting, etc.), interprets the results of radiogenic isotope studies to determine the age of the parent rock, mineralization, and subsequent events, and determines the paragenesis of minerals, structures, and textures in ordinary and reflected polarized light.	K2_GIG_U07, K2_GIG_U13

In terms of social competences		
PEU_K01	Takes on the challenge and shows initiative in conveying geological information in a widely understandable manner, presenting various perspectives.	K2_GIG_K01

Program content ensuring learning outcomes

The aim of this course is to review the most important analytical methods and applications in the mineral deposits investigation in order to determine mineralogical, geochemical and isotopic composition and reconstruction of genetic processes. The course covers: microscopy in transmitted and reflected light, electron microscopy and electron microprobe, microthermometry of fluid inclusions, ion chromatography, vitrinite reflection, crystallinity of chlorite, illite and graphite, atomic absorption and emission spectroscopy, inductively coupled plasma mass spectrometry (ICP-MS), stable and radiogenic isotopes.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	45
Preparation of a report/summary/presentation/paper	15
Prepararation for an exam/credit	16
Preparaton for classes	15
Credit/Exam	4
Student workload	**Hours** 125

Wrocław University of Science and Technology

Geotechnical Monitoring and Instrumentation

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.52PS.04951.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Graded credit **Activities and hours** Lecture: 15 Laboratory: 15	1.5

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	A student defines concepts related to geotechnical monitoring, such as ground stability, subsidence, and deformations, and illustrates the application of various monitoring devices, such as inclinometers, piezometers, and tensometers.	K2_GIG_W07, K2_GIG_W10, K2_GIG_W18
In terms of skills		
PEU_U01	A student investigates the stability of soil and engineering structures using advanced monitoring techniques, justifies the selection of appropriate geotechnical monitoring techniques based on specific field conditions, interprets geotechnical measurement results, and assesses their impact on the stability of structures.	K2_GIG_U07

Program content ensuring learning outcomes

General principles of monitoring, presentation of various methods and techniques used in geotechnical monitoring.
Detailed aspects of geotechnical monitoring, including advanced techniques and tools used for monitoring ground stability and engineering structures.
Operation and interpretation of data from various monitoring devices. Effective application of acquired knowledge in practical engineering projects.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	15
Credit/Exam	2
Preparation of a report/summary/presentation/paper	5
Student workload	**Hours** 37

Wrocław University of Science and Technology

Global Environmental Geophysics

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.52PS.05001.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Semester	Examination	Number of ECTS points
Semester 2	Graded credit **Activities and hours** Lecture: 15 Seminar: 15	2.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student characterizes the fundamental principles of global environmental geophysics, including earthquakes, the gravitational and magnetic fields of planets, radioactivity, and plate tectonics relationships, and defines and justifies radiometric dating methods and their reliability.	K2_GIG_W02, K2_GIG_W10, K2_GIG_W12
In terms of skills		
PEU_U01	The student evaluates earthquakes, calculates parameters such as focal depth, epicenter, magnitude, released energy, and analyzes radiometric dating results.	K2_GIG_U01, K2_GIG_U05, K2_GIG_U08
In terms of social competences		

PEU_K01	The student takes on the challenge of solving professional problems in the fields of global environmental geophysics in an innovative way and is capable of making decisions carefully, in consultation with representatives of other disciplines.	K2_GIG_K03

Program content ensuring learning outcomes

The curriculum in Global Environmental Geophysics prepares graduates to embark on careers in general geophysics and enables effective communication with experts in the field of global environmental geophysics. The course provides detailed theoretical foundations necessary for understanding and studying large-scale geophysical processes.
Course Content Ensuring Learning Outcomes:
Introduction to Global Environmental Geophysics: Overview of fundamental concepts and methods used in this field.
Theoretical Foundations of Geophysical Processes: Detailed explanation of large-scale geophysical processes.
Research Methods in Environmental Geophysics: Review of techniques and tools used to study geophysical processes.
Applications of Environmental Geophysics: Practical examples of applying geophysical knowledge to solve environmental problems.
Communication and Collaboration in Geophysics: Skills necessary for effective collaboration with other specialists in the field of geophysics.
This program provides students with solid theoretical and practical foundations essential for effective performance in the field of global environmental geophysics.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Seminar	15
Preparaton for classes	8
Preparation of a report/summary/presentation/paper	10
Credit/Exam	2
Student workload	**Hours** 50

Wrocław University of Science and Technology

Artificial Inventiveness

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.52PS.05026.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Elective

Block
Specialty subjects

Semester	Examination	Number of ECTS points
Semester 2	Graded credit **Activities and hours** Lecture: 15 Project: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	identifies inventive problems in the complex process of product development.	K2_GIG_W01, K2_GIG_W03, K2_GIG_W08, K2_GIG_W18
PEU_W02	defines step-by-step actions when creative and out-of-the-box ideas are needed.	K2_GIG_W01, K2_GIG_W03, K2_GIG_W08, K2_GIG_W18

PEU_W03	recognises several tools for systematic idea generation (Function modelling, Ideal final result, Function-oriented search, and Contradictions analysis)	K2_GIG_W03, K2_GIG_W08, K2_GIG_W18
In terms of skills		
PEU_U01	evaluates and applies several tools for systematic idea generation (Function modelling, Ideal final result, Function-oriented search, Contradictions analysis).	K2_GIG_U04, K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
PEU_U02	demonstrates acting step-by-step when creative and out-of-the-box ideas are needed.	K2_GIG_U04, K2_GIG_U13
In terms of social competences		
PEU_K01	demonstrates the ability to think and act creatively and entrepreneurially.	K2_GIG_K01
PEU_K02	declares an awareness of the importance of the non-technical consequences of engineering activities, including their impact on the environment and the related responsibility for decisions.	K2_GIG_K03

Program content ensuring learning outcomes

Creativity and systematic tools of ideation. Theory for Inventive Problem Solving tools for idea generation. Function Definition, Ideal Final Result, Function-oriented Search, and Contradictions. The subject is a brief introduction to creativity and idea generation with elements of theory, everyday life examples, and tests for self-check.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	30
Credit/Exam	2
Preparation of a project	8
Preparation of a report/summary/presentation/paper	4
Conducting literature research	4
Self-study of class topics	8
Preparaton for classes	4
Student workload	**Hours** 75

Wrocław University of Science and Technology

Entrepreneurship and Career Opportunities in Raw Material Sector

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.52PS.05027.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Elective

Block
Specialty subjects

Semester	Examination	Number of ECTS points
Semester 2	Graded credit **Activities and hours** Lecture: 15 Project: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	recognises and describes entrepreneurship and career opportunities in the raw material sector.	K2_GIG_W01, K2_GIG_W03, K2_GIG_W18
PEU_W02	defines and explains the primary sector of the raw materials value chain (geology, mining, mineral processing, metallurgy, and the environment).	K2_GIG_W01, K2_GIG_W03, K2_GIG_W08, K2_GIG_W18
In terms of skills		

PEU_U01	applies and verifies design thinking tools to enhance the engineering creativity and innovation capacity.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
PEU_U02	modifies and evaluates skills and competencies to improve the mindset of entrepreneurship.	K2_GIG_U07, K2_GIG_U13
In terms of social competences		
PEU_K01	demonstrates the ability to think and act in a creative and entrepreneurial manner.	K2_GIG_K01
PEU_K02	declares awareness of the importance of non-technical effects of engineering activities, including their impact on the environment and the related responsibility for decisions made.	K2_GIG_K03

Program content ensuring learning outcomes

Most industrial sectors are facing a new era that is forcing companies to transform their operations, create new business models and support a digital culture. In this context, the industry is facing a changing talent landscape that requires new skill sets in its workforce. Companies need to ensure that their workforce is well-formed to support this transformation process. Entrepreneurial skills and innovative thinking for engineers will be taught through examples from the raw materials sector. Case studies will provide an understanding of the skills and competencies of the future workforce and the current trends of the industrial revolution.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	30
Credit/Exam	2
Preparation of a report/summary/presentation/paper	6
Prepararation for an exam/credit	4
Preparation of a project	6
Conducting literature research	6
Preparaton for classes	6
Student workload	**Hours** 75

Wrocław University of Science and Technology

Sustainable Water Use

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology	**Subject code** W6GIG/000IWLS.52PS.05028.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Elective
Education profile general academic profile	**Block** Specialty subjects

Semester	Examination	Number of ECTS points
Semester 2	Graded credit **Activities and hours** Lecture: 15 Project: 31	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	defines the key concepts of water pollution control.	K2_GIG_W01, K2_GIG_W03, K2_GIG_W08, K2_GIG_W18
PEU_W02	recognises the main factors affecting water footprint and sustainability of water use.	K2_GIG_W01, K2_GIG_W03, K2_GIG_W08, K2_GIG_W18
PEU_W03	explains the operation of essential process technology and equipment related to the control of water pollution.	K2_GIG_W03, K2_GIG_W08

PEU_W04	recognises and distinguishes the means to protect groundwater and reduce the environmental load of surface waters.	K2_GIG_W03, K2_GIG_W08
PEU_W05	identifies and depicts methods for the environmentally friendly management of side-product flows from water treatment.	K2_GIG_W01, K2_GIG_W03, K2_GIG_W08
In terms of skills		
PEU_U01	applies risk analysis methods related to water issues.	K2_GIG_U04, K2_GIG_U10, K2_GIG_U13
PEU_U02	implements different methods for water footprint calculation.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
PEU_U03	analyses and gives grounded proposals for water treatment methods and processes applicable to different situations.	K2_GIG_U07, K2_GIG_U10
PEU_U04	analyses and evaluates the sustainability of water management systems.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	demonstrates the ability to think and act in a creative and entrepreneurial manner.	K2_GIG_K01
PEU_K02	declares awareness of the importance of non-technical effects of engineering activities, including their impact on the environment and the related responsibility for decisions made.	K2_GIG_K03

Program content ensuring learning outcomes

Sustainability challenges of water use. Water footprint. Water risk assessment. Water supply, water use in different sectors and loading of water systems. Wastewater treatment in industry and municipalities. Sludge treatment. Production of drinking water. Protection of groundwater deposits. Legislation on water quality and sludge treatment. Economic efficiency of different water treatment methods. Reclaimed water.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	31
Credit/Exam	2
Preparaton for classes	12
Conducting literature research	5
Self-study of class topics	5
Prepararation for an exam/credit	5

Student workload	Hours 75

Wrocław University of Science and Technology

Ore Deposit & Economic Geology

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMFS.52PS.04934.25

Lecture languages
English

Mandatoriness
Elective

Block
Specialty subjects

Semester	Activities, hours, ECTS and examination
Semester 2	• Lecture: 30 h, 3 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Characterizes different environments of ore deposit formation. Demonstrates the relationships between geological processes and deposit formation. Presents hypotheses regarding deposit genesis.	K2_GIG_W10
In terms of social competences		
PEU_K01	Acknowledges the importance of interdisciplinary knowledge in economic geology. Defends the principles of sustainable development in deposit exploitation.	K2_GIG_K03

Program content ensuring learning outcomes

Offering engineers and non-geoscientists the opportunity to get some background knowledge on the genesis of ore deposits and resulting implications for exploration and processing.
An introduction to ore-forming environments. Major case studies of ore

and industrial mineral deposits will also be discussed. An integral part of the course is the study of hand specimens.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Preparaton for classes	15
Self-study of class topics	15
Prepararation for an exam/credit	13
Credit/Exam	2
Student workload	**Hours** 75

Wrocław University of Science and Technology

Introduction to Earth System Science

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMFS.52PS.04935.25

Lecture languages
English

Mandatoriness
Elective

Block
Specialty subjects

Semester	Activities, hours, ECTS and examination
Semester 2	• Lecture: 30 h, 3 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Characterizes methods of mineral resource exploration and geomechanical aspects, including tectonics, describes phenomena associated with mining operations, and illustrates aspects of geotechnical design.	K2_GIG_W10
In terms of social competences		
PEU_K01	Accepts responsibility for decisions made in the context of engineering activities and decides on the choice of methods and technologies, considering their environmental impact.	K2_GIG_K03

Program content ensuring learning outcomes

The course "Introduction to Earth System Science" introduces students to an interdisciplinary approach to Earth sciences, encompassing oceanography, atmospheric sciences, meteorology, geography, geology, hydrology, and environmental sciences. Students will gain knowledge about the interactions between various environmental components and the impact of

human activities on this complex system. The curriculum content ensures the achievement of learning outcomes.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Preparaton for classes	20
Self-study of class topics	15
Conducting literature research	8
Credit/Exam	2
Student workload	**Hours** 75

Wrocław University of Science and Technology

Introduction to Bayesian Analysis with R

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMFS.52PS.04936.25

Lecture languages
English

Mandatoriness
Elective

Block
Specialty subjects

Semester	Activities, hours, ECTS and examination
Semester 2	• Lecture: 30 h, 3 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Selects appropriate Bayesian methods to solve geoscientific problems, explains the principles of Gibbs sampling and the Metropolis-Hastings algorithm in a geoscientific context, and characterizes probabilistic models and conjugate distributions used in geoscientific analyses.	K2_GIG_W10
In terms of social competences		
PEU_K01	Is sensitive to the impact of analysis results on environmental decisions.	K2_GIG_K03

Program content ensuring learning outcomes

The course covers a wide range of topics related to advanced statistical and probabilistic analysis. Within the course, students will become familiar with Bayes' Theorem, which is a fundamental tool in statistics for updating probabilities based on new data. Bayesian inversion and Bayesian networks are also key topics that allow for modeling and analyzing complex

probabilistic systems. The course also includes probability models, which are essential for understanding various statistical distributions, including conjugate distributions and discrete solutions. Students will have the opportunity to delve into Markov Chain Monte Carlo methods, including Gibbs sampling and Metropolis-Hastings, which are advanced techniques used to generate samples from probability distributions.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Preparation of a project	20
Preparation of a report/summary/presentation/paper	10
Self-study of class topics	13
Credit/Exam	2
Student workload	**Hours** 75

Wrocław University of Science and Technology

Engineering Geology and Hydrogeology

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Mineral Resources Exploration - Track University of Miskolc - WUST	**Subject code** W6GIG/000EMWS.52PS.04984.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 2	Exam **Activities and hours** Lecture: 30 Laboratory: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student characterizes the basic methods, theories, and approaches in hydrogeology, mechanics, and geotechnics, and analyzes groundwater flow systems, the fundamentals of shallow and deep groundwater, water quality and hydraulics, as well as soil mechanics issues.	K2_GIG_W08, K2_GIG_W10, K2_GIG_W14
In terms of skills		

PEU_U01	The student utilizes analytical methods and computational tools for calculations and optimization of groundwater systems, analyzes soil samples, and designs technological processes and systems used in geoengineering, which includes planning and surveying areas using various hydrological methods.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	The student identifies complex hydrogeological and geotechnical problems and is responsible for providing decisions and plans based on hydrogeological data.	K2_GIG_K03

Program content ensuring learning outcomes

It introduces students to the key concepts of engineering geology, modern hydrogeology, and field hydrogeology, soil formation, soil classification methods, laboratory and field soil tests, water-to-rock underwater stress, and groundwater flow patterns.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	30
Preparaton for classes	10
Preparation of a project	10
Preparation of a report/summary/presentation/paper	12
Prepararation for an exam/credit	4
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Process Intensification

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.52PS.05030.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 30 Classes: 30 Seminar: 15	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	describes and explains intensified reactors and separation equipment, the combination of reaction and separation, hybrid separation, alternative energy sources, the transformation of batch processes to continuous ones, and principles and goals of process intensification.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W07, K2_GIG_W10
PEU_W02	recognizes and describes possibilities to intensify processes and apply novel technology to existing processes (the production of E-fuels, carbon-neutral products, energy storage, etc.).	K2_GIG_W01, K2_GIG_W02, K2_GIG_W07, K2_GIG_W10

PEU_W03	finds the relation between the product design and process design, and describes the advantages of process intensification and typical intensification methods.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W07, K2_GIG_W10
In terms of skills		
PEU_U01	applies intensified reactors and separation equipment, the combination of reaction and separation, hybrid separation, alternative energy sources, and the transformation of batch processes to continuous ones.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U13
PEU_U02	calculates, constructs and demonstrates the process design to intensify a process given by the teacher.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
PEU_U03	prepares a scientific report and presents the design results as part of teamwork.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	demonstrates the ability to think and act creatively and entrepreneurially.	K2_GIG_K01

Program content ensuring learning outcomes

Different process intensification methods and their theoretical background. Teaching involves lectures, assignments, meetings and seminars. The main work is carried out as a process design project assignment where students work in teams aiming to intensify a process given by the teacher. Each team writes a report and presents results in the seminar. The topics focus mainly on the intensification of different Power-to-X processes, such as the production of E-fuels, carbon-neutral products, energy storage, etc.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Classes	30
Seminar	15
Credit/Exam	4
Preparation of a project	16
Conducting literature research	5
Prepararation for an exam/credit	6
Preparation of a report/summary/presentation/paper	8
Self-study of class topics	9

Preparaton for classes	2
Student workload	**Hours** 125

Wrocław University of Science and Technology

Geophysical Exploration and Mineral Resources

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Zagreb - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EZWS.52PS.05016.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 2	• Lecture: 30 h, 3 ECTS, Exam

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Characterizes the principles of working with instruments for magnetometric exploration. Distinguishes the principles of working with instruments for electric and electromagnetic exploration.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
In terms of social competences		
PEU_K01	Interprets various geophysical data and draws conclusions about mineral deposits and their main characteristics.	K2_GIG_K01

Program content ensuring learning outcomes

Opanowanie specjalistycznych metod geofizycznych pomiaru i interpretacji stosowanych w poszukiwaniu złóż materiałów budowlanych i surowców mineralnych. Kurs obejmuje kluczowe aspekty metod geofizycznych stosowanych w prospekcji i eksploracji złóż mineralnych.

Calculation of ECTS points

Activity form	Activity hours
Lecture	30
Self-study of class topics	15
Prepararation for an exam/credit	8
Credit/Exam	4
Preparaton for classes	18
Student workload	**Hours** 75

Wrocław University of Science and Technology

CAD-Constructions in Tunneling

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.52PS.04952.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Graded credit **Activities and hours** Lecture: 15 Laboratory: 45	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Characterizes the fundamental issues related to digital elevation models (DEM) in underground construction. Defines concepts related to volume surfaces for determining earth masses.	K2_GIG_W18
In terms of skills		
PEU_U01	Constructs 3D models of tunnels and other underground structures. Develops detailed plans and technical drawings using AutoCAD and Civil3D. Verifies the correctness and accuracy of completed CAD projects.	K2_GIG_U04, K2_GIG_U07

Program content ensuring learning outcomes

Using AutoCAD and Civil 3D topics of underground construction and civil engineering are covered such as digital elevation models, volume surfaces for mass determination, cross sections for the use in FE-element analysis. Commands of editing, layer control, generating blocks and layouts will be introduced when necessary in the lecture.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	45
Credit/Exam	2
Preparation of a report/summary/presentation/paper	13
Student workload	**Hours** 75

Wrocław University of Science and Technology

Non-Metallic Industrial Minerals

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Mineral Resources Exploration - Track WUST - University of Miskolc	**Subject code** W6GIG/000EWMS.52PS.05002.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 2	Graded credit **Activities and hours** Lecture: 30 Laboratory: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	A student distinguishes different types of industrial minerals, their genesis, and their compositional, textural, and structural properties.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
In terms of skills		
PEU_U01	A student estimates industrial mineral deposits based on quantitative and qualitative parameters, spatial variability, and various types of uncertainties. They compare and evaluate different options for the use of industrial minerals based on their compositional characteristics.	K2_GIG_U07, K2_GIG_U10

In terms of social competences		
PEU_K01	A student solves problems innovatively and creatively, finding appropriate opportunities for the use of industrial minerals with various properties, while recognizing the professional and technological development of methodologies in the applied Earth sciences.	K2_GIG_K01

Program content ensuring learning outcomes

The introductory part is a short review on the geological settings and related petrological-geochemical knowledge, related non-metallic resources, industrial mineral groups. The first part dissects the grouping on genetical and industrial-application point of view mineral resources. During the semester detailed knowledge is offered on 1) native element, 2) sulphide, 3) halogenide, 4) oxide/hydroxide, 5) carbonate/nitrate, 6) borate, 7) sulphate, 8) phosphate and 9) silicate types of industrial minerals. Students get familiar with their mineralogy, deposits and formation, extraction and uses based on detailed international data. We also study the rock type industrial minerals, their generating and applications. In the case of silicates emphasis is put on clay minerals, feldspars and zeolites. Separate lecture+laboratory visit discusses the exploitation and beneficiation techniques. During the laboratory exercises and field trips students learn to recognize industrial minerals, to give mineralogical characterization, exploration and quality remarks, their natural types of occurrence.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	30
Preparaton for classes	8
Preparation of a report/summary/presentation/paper	10
Conducting empirical studies	20
Credit/Exam	2
Student workload	**Hours** 100

Wrocław University of Science and Technology

Analytical Technics in Mineralogy and Petrology

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Mineral Resources Exploration - Track University of Miskolc - WUST	**Subject code** W6GIG/000EMWS.52PS.04985.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 2	Graded credit **Activities and hours** Lecture: 15 Laboratory: 15	2.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The students learn how to work in teams, how to distribute the work and evaluate the results of the different analyses., They develop respect and critical (analytical) attitude towards geological data, and learn how to handle them.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
In terms of skills		

PEU_U01	The students can design data acquisition and collection sets alone to fulfil the requirements of certain, different exploration tasks, and evaluate, integrate and assess the measured data. Students can apply the different analytical methods an innovative way to maximize the available geological information from the available samples, and/or in the view of available resources.	K2_GIG_U04, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	The students learn how to work in teams, how to distribute the work and evaluate the results of the different analyses., They develop respect and critical (analytical) attitude towards geological data, and learn how to handle them.	K2_GIG_K03

Program content ensuring learning outcomes

The key target of the course is to introduce the different analytical methods used in mineralogy and geology for the students. There are laboratory classes with individual work about the learned methods nearby the theoretical classes. Thru these exercises the students learn what is the best available method to answer certain geological questions.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	15
Preparation of a report/summary/presentation/paper	10
Prepararation for an exam/credit	8
Credit/Exam	2
Student workload	**Hours** 50

Wrocław University of Science and Technology

Current Issues in Enabling Technologies for Circular Economy

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.52PS.05031.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Graded credit **Activities and hours** Lecture: 30 Classes: 15 Project: 30	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	depicts, differentiates, and explains the concepts of the circular economy (raw materials, processing, manufacturing, until end-of-life recycling and reuse) and the drivers for change from linear to circular economy.	K2_GIG_W01, K2_GIG_W07, K2_GIG_W10, K2_GIG_W12
PEU_W02	identifies, describes, and explains the processing technologies of materials in the context of the circular economy.	K2_GIG_W01, K2_GIG_W07, K2_GIG_W10, K2_GIG_W12
In terms of skills		

PEU_U01	analyses and evaluates materials processing technologies in the context of the circular economy.	K2_GIG_U01, K2_GIG_U10, K2_GIG_U12, K2_GIG_U13
PEU_U02	analyses, interprets and categorises the impact (environmental, economic, and social) of processing technologies, evaluating current (linear) materials processing practice compared to circular value chains.	K2_GIG_U01, K2_GIG_U10, K2_GIG_U12, K2_GIG_U13
PEU_U03	applies the transferable skills of life cycle thinking (eco-design) to evaluate processing technologies in circular value chains.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	is open to modern material processing technologies in the context of a circular economy and supports their use to protect the environment.	K2_GIG_K01, K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

The most important processing technologies that enable the implementation of circular economy, such as recycling and recovery as well as separation and purification technologies. The approach of the subject is mainly solution-based and thus aims to show practical examples of the utilization of different technologies in solving different challenges in the circular economy. A special emphasis is laid on topical themes, such as recycling and upgrading of plastic, electric, packaging and textile waste as well as on the production of biofuels. The subject also introduces the concept of ecodesign as a tool to manage the complex value chains in a circular economy.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Classes	15
Project	30
Preparaton for classes	12
Preparation of a report/summary/presentation/paper	14
Credit/Exam	2
Prepararation for an exam/credit	8
Conducting literature research	6
Self-study of class topics	8
Student workload	**Hours** 125

Wrocław University of Science and Technology

Analyses of Mineral Paragenesis

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Zagreb - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EZWS.52PS.05017.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 15 Laboratory: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student explains the formation processes of primary and secondary mineral parageneses in igneous rocks. They distinguish mineral parageneses and microstructures in crustal peridotites from those in mantle peridotites within ophiolite complexes.	K2_GIG_W01, K2_GIG_W02
In terms of skills		
PEU_U01	To apply phase diagrams in the interpretation of genesis of different microtextures, intergrowths and exsolutions inside of minerals in magmatic rocks.	K2_GIG_U01, K2_GIG_U13
In terms of social competences		

PEU_K01	Student interprets mineral paragenesis and draws conclusions about the genesis of rocks.	K2_GIG_K01

Program content ensuring learning outcomes

The goal of the course is to train the students in microscopic analysis of different generations of mineral parageneses in magmatic and metamorphic rocks and their interpretation in the light of petrogenesis and later evolution of these rocks in the certain geotectonic environment.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	30
Preparaton for classes	11
Prepararation for an exam/credit	10
Self-study of class topics	5
Credit/Exam	4
Student workload	**Hours** 75

Wrocław University of Science and Technology

Mine Surveying Project Study

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.52PS.04953.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 2	• Project: 45 h, 3 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	Selects appropriate tools and technologies for the implementation of geodetic projects.	K2_GIG_U03, K2_GIG_U07, K2_GIG_U10

Program content ensuring learning outcomes

Project study on various topics in the field of Mine Surveying and Mining Subsidence Engineering. The respective topics are selected in coordination with the students' experiences or with the current research and project activities of Chair of Mining Engineering.
The topics presented include: structuring the project, defining the sequence with milestones, forming working groups, combining interdisciplinary knowledge from mine surveying and mining subsidence engineering on a practical topic.

Calculation of ECTS points

Activity form	Activity hours
Project	45
Preparation of a project	28
Credit/Exam	2
Student workload	**Hours** 75

Wrocław University of Science and Technology

Geophysical Measurements

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Mineral Resources Exploration - Track University of Miskolc - WUST	**Subject code** W6GIG/000EMWS.52PS.04986.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects

Semester	**Examination**	**Number of ECTS points**
Semester 2	Exam **Activities and hours** Lecture: 30 Laboratory: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student characterizes processes described by general and detailed theories required for practicing Earth science engineering fields, highlighting their significance for understanding the properties of the Earth's crust. Additionally, the student discusses geological and geophysical methods suitable for natural resource exploration, indicating their application in resource assessment.	K2_GIG_W02, K2_GIG_W07, K2_GIG_W08
In terms of skills		

PEU_U01	A student addresses exploratory tasks and near-surface geophysical problems by planning and conducting geophysical measurements. They select appropriate measurement methods tailored to specific field conditions, which is essential for effective technology design.	K2_GIG_U08, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	The student evaluates the environmental impact of mining activities during sessions on the general principles and main tasks of resource exploration and the principles of geophysical research.	K2_GIG_K03

Program content ensuring learning outcomes

Within the frame of this subject the students specialized in geophysical engineering study the application of geophysical methods in the different exploration phases, as well as the principles and aspects of planning geophysical surveys. An additional aim of the subject is to familiarize the students with the working principles and use of geophysical measurement devices.
The syllabus elaborated for and applied to the education of the course strives to cover all the important parts of the specialities connected to the objectives. This well-considered construction of topics enables the lecturer to emphasize the essential relationships necessary for implementing the objectives, and the students to successfully extend their knowledge about what benefits come from the application of geophysical measurements in the fields of raw-material exploration and environmental investigations.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	30
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	10
Prepararation for an exam/credit	6
Conducting empirical studies	10
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Start-Ups and Venture Formation

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.52PS.05032.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 30 Project: 30 Seminar: 30	6.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	identifies and explains business start-up theories and processes.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W10, K2_GIG_W18
In terms of skills		
PEU_U01	critically analyses different business ventures and is skilled in testing business ideas and models.	K2_GIG_U07, K2_GIG_U13

PEU_U02	analyses business cases, prepares a business plan with its calculations, and pitches the plan successfully.	K2_GIG_U07, K2_GIG_U13
PEU_U03	organizes work as a team member in a development project.	K2_GIG_U07, K2_GIG_U13
In terms of social competences		
PEU_K01	demonstrates the ability to think and act in a creative and entrepreneurial manner.	K2_GIG_K01

Program content ensuring learning outcomes

Entrepreneurship theory and process, business ideas and opportunities, business models, entrepreneurial teams, start-ups and spin-offs, start-up process and development stages, start-up strategies and sequencing activities, start-up financing, testing of business ideas, business plans, and cases.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Seminar	30
Preparation of a project	25
Preparaton for classes	16
Prepararation for an exam/credit	8
Preparation of a report/summary/presentation/paper	7
Credit/Exam	4
Student workload	**Hours** 150

Wrocław University of Science and Technology

Field and Laboratory Practicum

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Zagreb - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EZWS.52PS.05018.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 2	• Project: 120 h, 6 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	To sample various geological materials (minerals, rocks, sediment, soil, water) for the purpose of exploration of the mineral deposits. To conduct field measurements of selected parameters in geological materials (eg pH, EC, redox potential, radioactivity) for the purpose of geochemical prospecting.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U13
In terms of social competences		
PEU_K01	Follows various field and laboratory methods and works used in the exploration of mineral deposits, being aware of the necessity to develop skills. Can convey their knowledge and the methods they use. Chooses methods that minimize adverse environmental impact.	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Students will be introduced to various field and laboratory methods used in exploration of mineral deposits. Students will be trained to recognize mineralization, visualize 3D geological structures, and reconstruct geological history. Most of the activities will be related to proper geological fieldwork: observation, personal filed book, interpretation and sampling. Furthermore, students will analyse the collected geological samples of water, soil, rocks, sediments, minerals in the laboratories. Finally, they will learn to combine and interpret obtained field and laboratory results with previous geological research and produce and present geological expert reports.

Calculation of ECTS points

Activity form	**Activity hours**
Project	120
Prepararation for an exam/credit	5
Preparation of a project	13
Preparation of a report/summary/presentation/paper	10
Credit/Exam	2
Student workload	**Hours** 150

Wrocław University of Science and Technology

Regulation of Mining Damages and Ensuring Land Use

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.52PS.04954.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 2	• Lecture: 30 h, 1.5 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Analyzes potential hazards associated with closed mines, assessing risks and proposing risk zones for spatial planning.	K2_GIG_W05, K2_GIG_W11, K2_GIG_W13
In terms of skills		
PEU_U01	Selects appropriate methods for protecting against mining damages, adapting them to specific geological conditions.	K2_GIG_U05
In terms of social competences		
PEU_K01	Recognizes the importance of conveying information to the public about the legal aspects of mining damages, ensuring clarity and comprehensibility of communications regarding applicable regulations.	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

• The legal of background and relevant laws in relation to mining damage
• Examples of mining damage
• Pseudo mining damage and “real” mining damage
• Different methods for mitigation of and protection against mining damage
• Calculation of diminished value due to mining damage, compensation of mining damage works
• Follow-up land use in the process of mine-closure
• Relation of mining, mining damage and spatial planning

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Credit/Exam	2
Preparaton for classes	5
Student workload	**Hours** 37

Wrocław University of Science and Technology

Geological Mapping

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Mineral Resources Exploration - Track University of Miskolc - WUST	**Subject code** W6GIG/000EMWS.52PS.04987.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 2	Exam **Activities and hours** Lecture: 30 Project: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	It characterizes methods for exploring mineral deposits and explains processes described by general and specific theories required for practicing in the fields of Earth sciences engineering (geological engineering, geophysical engineering, geoinformatics engineering), distinguishes internal connections between geological processes, and describes planning and interpretation procedures based on these processes.	K2_GIG_W08, K2_GIG_W10, K2_GIG_W11
In terms of skills		

PEU_U01	Develops complex planning, construction, inspection, and administrative tasks (plans for geological and geophysical surveys of natural resources, acquisition of environmental geology) with innovative application of theories and terminology describing technical knowledge about the Earth.Analyzes the structure of the raw material extraction sector, the technologies used for extraction and processing of mineral resources, as well as the scope of geo-environmental tasks, their external socio-economic environment, and the regulatory system.	K2_GIG_U04, K2_GIG_U10
In terms of social competences		
PEU_K01	Respects and adheres to ethical principles and written rules of work and professional culture in his activities, and is able to uphold them even while managing small work groups.	K2_GIG_K03

Program content ensuring learning outcomes

The subject provides knowledge on representing geological phenomena on topographic maps, preparing geological maps and cross-sections, creating their legends, and drafting explanatory reports. The purpose of preparing geological maps. Geological map and its additional parts (geological cross-sections, stratigraphic columns, and legend). Geological phenomena represented on geological maps: lithostratigraphic units, structural features. Different types of geological boundaries and their recognition in the field. Orientation in the field using a topographic map and GPS. Documentation of field observations in a field notebook and on a topographic map. Preparation of geological cross-sections. Preparation of covered and uncovered geological maps (without Quaternary sediments) with a stratigraphic column and legend. Drafting explanatory reports.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Preparaton for classes	10
Preparation of a report/summary/presentation/paper	12
Prepararation for an exam/credit	4
Preparation of a project	10
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Academic Entrepreneurship

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.52PS.05033.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 30 Project: 30 Seminar: 30	6.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	defines and develops awareness of their entrepreneurial mindset.	K2_GIG_W01, K2_GIG_W03, K2_GIG_W06, K2_GIG_W10
PEU_W02	identifies and explains entrepreneurial opportunities and routes for grasping them.	K2_GIG_W01, K2_GIG_W03, K2_GIG_W06, K2_GIG_W10
In terms of skills		

PEU_U01	analyses, evaluates and demonstrates new ways to commercialize their knowledge, skills and research activities.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U05, K2_GIG_U06, K2_GIG_U12
In terms of social competences		
PEU_K01	demonstrates the ability to think and act in a creative and entrepreneurial manner.	K2_GIG_K01
PEU_K02	declares the need to formulate and convey to the public – including through the mass media – information and opinions regarding the achievements of the mining industry, geoengineering and mineral engineering, and other aspects of the engineer's activity, makes efforts to convey such information and opinions in a generally understandable manner, presenting different points of view, is aware of the value and need to shape a culture of occupational safety and responsibility for the health and lives of other employees.	K2_GIG_K02
PEU_K03	declares awareness of the importance of the non-technical effects of engineering activities, including their impact on the environment and the related responsibility for decisions made.	K2_GIG_K03

Program content ensuring learning outcomes

The central concepts of entrepreneurship. The entrepreneurial mindset, motivations, resources and opportunity recognition. The anatomy of the venturing process. Commercializing academic skills and research activities. Communicating entrepreneurial ventures.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Seminar	30
Credit/Exam	4
Prepararation for an exam/credit	13
Conducting literature research	7
Preparation of a report/summary/presentation/paper	6
Preparaton for classes	11
Preparation of a project	9
Self-study of class topics	10
Student workload	**Hours** 150

Wrocław University of Science and Technology

Automatic Surface Inspection

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben	**Subject code** W6GIG/000GMLS.52PS.04955.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 2	Graded credit **Activities and hours** Lecture: 30 Laboratory: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student characterizes the basic principles of geotechnical monitoring and its significance in civil engineering. They select appropriate devices and techniques for monitoring various geotechnical aspects.	K2_GIG_W16
In terms of skills		
PEU_U01	Analyzes surface measurement results using advanced acquisition methods such as light scanning and 3D profiling.	K2_GIG_U10
In terms of social competences		

PEU_K01	Accepts the principles of sustainable development and their importance in the context of mining engineering	K2_GIG_K03

Program content ensuring learning outcomes

Will gain knowledge about advanced surface acquisition methods, such as light scanning, 3D profiling, ultrasound, eddy currents, and infrared thermography. This will enable the student to accurately assess surface conditions and identify potential defects in the context of geology and mining.
Will learn to apply advanced data analysis methods, including first and second-order statistics, feature extraction and selection, and pattern recognition. These skills will allow for the automatic evaluation of measurement results and their interpretation in the context of image processing, which is crucial in geodesy and mining engineering.
Will be able to integrate various measurement techniques and analysis methods for comprehensive surface assessment. This will enable the student to effectively use image processing tools in practical engineering applications, such as monitoring the condition of underground infrastructure and assessing rock mass stability.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	30
Credit/Exam	2
Preparation of a report/summary/presentation/paper	13
Student workload	**Hours** 75

Wrocław University of Science and Technology

Historical Geology

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.52PS.04988.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 30 Seminar: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Characterizes the epochs of Earth's development in the context of paleontology, plate tectonics, and other geological events.	K2_GIG_W08, K2_GIG_W10
In terms of skills		
PEU_U01	Classifies characteristic fossils and interprets processes and conditions of major historical periods.	K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	Demonstrates initiative to summarize and present the history of selected geographical areas. Is responsible for finding, selecting, and critically interpreting relevant literature sources.	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

The aim of the subject is to give knowledge (1) on the role of time in the geological processes, (2) on the different methods of age-determination, (3) on the structural evolution of the Earth and (4) on the history of life in the Earth with special emphasis on the utility of all these in prospecting raw materials) and how to reconstruct paleoenvironments in geology as basic information for raw material exploration
This is a fundamental course to understand the principles of stratigraphy, its applicability to solve complex geological problems and tasks.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Seminar	30
Preparaton for classes	10
Preparation of a project	10
Preparation of a report/summary/presentation/paper	10
Prepararation for an exam/credit	6
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Intelligent Product-Service Systems

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.52PS.05035.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Elective

Block
Specialty subjects

Semester	Examination	Number of ECTS points
Semester 2	Graded credit **Activities and hours** Lecture: 15 Laboratory: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	recognizes and explains trends in product-service systems and digital transformation affecting manufacturing business.	K2_GIG_W18
PEU_W02	defines and explains the concepts related to product data management, product life cycle management, and IoT-based data services.	K2_GIG_W02, K2_GIG_W18
PEU_W03	recognizes the company's products and service processes and understands their interaction with the company's overall operations.	K2_GIG_W01, K2_GIG_W18
In terms of skills		

PEU_U01	categorises and evaluates PSS (Product Service System), PLM (Product Lifecycle Management) and ERP (Enterprise Risk Management) systems' characteristics, technical features, and managerial functions and verifies their role in product development and business management.	K2_GIG_U01, K2_GIG_U03, K2_GIG_U04, K2_GIG_U13
In terms of social competences		
PEU_K01	demonstrates the ability to think and act creatively and entrepreneurially.	K2_GIG_K01

Program content ensuring learning outcomes

Product-Service Systems (PSS) and Product Lifecycle Management (PLM) trends and digital transformation. Challenges with lifecycle management, requirements management, and systems engineering. Product information modeling, change management, and configuration management through lifecycle (CLM). IoT-based data services. Systems of utilization. Future of PSS in various industries.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	30
Preparation of a project	12
Self-development of practical skills	4
Preparation of a report/summary/presentation/paper	2
Credit/Exam	2
Prepararation for an exam/credit	4
Self-study of class topics	6
Student workload	**Hours** 75

Wrocław University of Science and Technology

Inventive Product Design and Advanced TRIZ

Educational subject description sheet

Basic information

Field of study Mining and Geology **Speciality** Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST **Organizational unit** Faculty of Geoengineering, Mining and Geology **Study level** second degree 4 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** W6GIG/000ILWS.52PS.05036.25 **Group of classes** Yes **Lecture languages** English **Mandatoriness** Elective **Block** Specialty subjects

Semester	**Examination**	**Number of ECTS points**
Semester 2	Graded credit **Activities and hours** Lecture: 15 Laboratory: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	distinguishes and explains the conceptual design phase and its instruments.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W18
PEU_W02	identifies and explains the voice of the product and forecasts technology evolution.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W18
In terms of skills		

PEU_U01	searches for and analyzes the patent landscape.	K2_GIG_U01, K2_GIG_U03, K2_GIG_U04, K2_GIG_U13
PEU_U02	modulates and modifies ideation algorithms.	K2_GIG_U01, K2_GIG_U03, K2_GIG_U04, K2_GIG_U13
PEU_U03	designs a new product and concept of the service on demand.	K2_GIG_U01, K2_GIG_U03, K2_GIG_U04
PEU_U04	evaluates design concepts from managerial and production perspectives.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U13
In terms of social competences		
PEU_K01	is capable of thinking and acting in a creative and entrepreneurial manner.	K2_GIG_K01

Program content ensuring learning outcomes

The subject contains basic and modern TRIZ (Theory for Inventive Problem Solving) tools for idea generation and other analytical tools that have proven their efficiency in the industry. The methods to find an idea that can save the product. Analyses of the situations when an out-of-box solution is needed. The methods to systematically deliver the list of patentable concepts to improve a product or a service. The method to circumvent the patents of competitors and develop an IP strategy. The subject includes the following modules: Introduction, Basics of Patenting, Function Definition, Function-oriented Search and Biomimetics, Contradictions, Function Modelling and Ttrimming, Cause-Effect Chain Analysis, Trends of Engineering System Evolution, Axiomatic Design, Design for Manufacturing and Assembly, and Conclusion. There are about 20 case studies and 100+ examples of smart new product design, technology troubleshooting, and inventive solutions, many of which come from success and failure stories of technological giants. Most cases originate from the engineering domain, although basic knowledge like how car brakes work and what is inside a refrigerator (except food) plus curiosity is enough to follow most.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	30
Credit/Exam	2
Prepararation for an exam/credit	6
Preparation of a project	10
Self-study of class topics	5
Preparation of a report/summary/presentation/paper	5
Conducting literature research	2

Student workload	Hours 75

Wrocław University of Science and Technology

Knowledge Discovery and Process Data Analysis

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.52PS.05037.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Elective

Block
Specialty subjects

Semester	Examination	Number of ECTS points
Semester 2	Graded credit **Activities and hours** Lecture: 15 Laboratory: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	defines and explains basic information on the main concept of the knowledge discovery process concerning industrial data.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W18
In terms of skills		
PEU_U01	analyses and evaluates the effect of digitalization and automation on the amount, nature, and quality of data from the chemical engineering point of view.	K2_GIG_U01, K2_GIG_U03, K2_GIG_U04, K2_GIG_U13

PEU_U02	applies specified methods and methodology to data.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U13
PEU_U03	applies management and collaboration skills in the implementation of project work.	K2_GIG_U01, K2_GIG_U13
In terms of social competences		
PEU_K01	demonstrates the ability to think and act in a creative and entrepreneurial manner.	K2_GIG_K01

Program content ensuring learning outcomes

Knowledge discovery refers to the overall process of discovering useful knowledge from data. The knowledge discovery process is interactive and iterative and involves several steps, starting from studying the application domain and ending with the use of the information discovered. Process data analysis can be part of this process. Fundamental concepts - such as reliability of data, preprocessing (e.g., de-noising, handling missing data, and scaling strategy), data reduction, choosing a methodology, validation, modelling, etc - will be addressed in lectures, Moodle assignments, and discussions. Project work will be carried out in small groups that will define their working methodology. The course is suitable for distance learning.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	30
Prepararation for an exam/credit	8
Credit/Exam	2
Preparation of a report/summary/presentation/paper	6
Preparation of a project	10
Conducting literature research	4
Student workload	**Hours** 75

Wrocław University of Science and Technology

Development of New Sustainable Products and Solutions

Educational subject description sheet

Basic information

Field of study Mining and Geology **Speciality** Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST **Organizational unit** Faculty of Geoengineering, Mining and Geology **Study level** second degree 4 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** W6GIG/000ILWS.52PS.05038.25 **Group of classes** Yes **Lecture languages** English **Mandatoriness** Elective **Block** Specialty subjects

Semester	**Examination**	**Number of ECTS points**
Semester 2	Graded credit **Activities and hours** Lecture: 15 Laboratory: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	recognises and depicts various types of new sustainable product development and solutions.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W18
PEU_W02	distinguishes and explains the tailoring of functionalities of biobased polymers to meet the functionality needed for specific applications.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W18
PEU_W03	identifies and depicts various renewable resources (biomaterials, biochemicals, cellulose, lignin, starch, carbohydrates, etc) based on sustainable product development and their applications.	K2_GIG_W01, K2_GIG_W02

PEU_W04	recognises and describes material and molecular design and its role in product performance.	K2_GIG_W02, K2_GIG_W18
In terms of skills		
PEU_U01	analyses and demonstrates the use of forest resources and forest-derived biomaterials for food, pharmaceuticals, composites, industry, and other applications.	K2_GIG_U01, K2_GIG_U03, K2_GIG_U04, K2_GIG_U13
In terms of social competences		
PEU_K01	is capable of thinking and acting in a creative and entrepreneurial manner.	K2_GIG_K01

Program content ensuring learning outcomes

The subject contains an overview of sustainable biobased products, bio-based barrier technologies for packaging applications, Biobased hygienic products and Solutions, Biomaterials for Printing, Biobased tall oil products, and Biomaterials in food application. Fundamentals about biomaterial design, modification, synthesis, and use of fibers, cellulose (derivatives), and lignin in various products. Chemical and mechanical modification, separation methods, mixing and drying methods. Product specification requirements and characterization methods. In addition, the course contains an interesting topic of group and individual assignments related to modern trends of sustainable biobased products and solutions.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	30
Credit/Exam	2
Prepararation for an exam/credit	5
Preparation of a project	10
Preparation of a report/summary/presentation/paper	5
Preparaton for classes	4
Conducting literature research	4
Student workload	**Hours** 75

Wrocław University of Science and Technology

Construction Contracts

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.52HS.04957.25

Lecture languages
English

Mandatoriness
Elective

Block
Subjects from the fields of humanities or social sciences

Semester	Activities, hours, ECTS and examination
Semester 2	• Lecture: 45 h, 3 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student characterizes various methods and strategies for creating tenders and construction contracts, considering legal and practical aspects. They justify the choice of specific tender strategies in the context of economic evaluation of investment projects and risk assessment of investments.	K2_GIG_W03, K2_GIG_W11
In terms of social competences		
PEU_K01	The student accepts the diversity of opinions and approaches in managing construction contracts, which fosters creative thinking. At the same time, they defend their decisions regarding the choice of tender strategies, based on solid arguments and analyses.	K2_GIG_K01

Program content ensuring learning outcomes

This course provides a comprehensive understanding of the principles and practices related to the preparation of tenders

and construction contracts. Through case studies and practical exercises, students will learn to apply theoretical knowledge to real-world scenarios, enhancing their ability to effectively manage construction contracts.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	45
Preparaton for classes	18
Prepararation for an exam/credit	2
Self-study of class topics	8
Credit/Exam	2
Student workload	**Hours** 75

Wrocław University of Science and Technology

Machine Vision

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.52PS.04958.25

Lecture languages
English

Mandatoriness
Elective

Block
Specialty subjects

Semester	Activities, hours, ECTS and examination
Semester 2	• Lecture: 45 h, 3 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student characterizes machine vision systems used in raw material technologies and geotechnics, describing their main components and functions.	K2_GIG_W19
In terms of skills		
PEU_U01	The student analyzes various image processing techniques, such as segmentation, filtering, and edge detection, adapting them to specific applications in geotechnics and sharing the analysis results with the team.	K2_GIG_U08

Program content ensuring learning outcomes

Definition and significance of machine vision in raw material technologies and geotechnical engineering.
Overview of Applications: Overview of machine vision applications in the mining and geotechnical engineering industries.

Principles of Image Formation: Principles of image formation and the impact of various factors on image quality.
Image Acquisition Techniques: Image acquisition techniques and types of sensors used in machine vision.
Basic Image Processing Techniques: Basic image processing techniques such as segmentation, filtering, and edge detection.
Binary Image Analysis Methods: Methods of binary image analysis and their application in object identification.
Machine Learning and Deep Learning in Machine Vision:
Introduction to Algorithms: Introduction to machine learning and deep learning algorithms.
Neural Networks Applications: Application of neural networks for pattern recognition and object classification in images.
Applications of Machine Vision in Geotechnical Engineering:
Examples of Applications: Examples of machine vision applications in monitoring and analyzing mining processes.
Technical Condition Assessment: Use of machine vision to assess the technical condition of mining machinery and equipment.
Reliability and Lifecycle of Machine Systems:
Reliability Analysis: Analysis of the reliability of machine systems used in raw material technologies.
Lifecycle Optimization Methods: Methods for evaluating and optimizing the lifecycle of mining machinery and equipment.
Practical Projects: Practical projects related to the application of machine vision in geotechnical engineering.
Case Study Analysis: Analysis of case studies on the implementation of machine vision systems in the mining industry.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	45
Preparation of a report/summary/presentation/paper	15
Credit/Exam	2
Preparaton for classes	13
Student workload	**Hours** 75

Wrocław University of Science and Technology

Fundamentals of Soil and Rock Mechanics

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.52PS.04959.25

Lecture languages
English

Mandatoriness
Elective

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 2	• Lecture: 45 h, 3 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Characterizes phenomena underlying technologies used in mining and mineral engineering, and explains the principle of calculations for effective stresses, total stresses, and pore water pressure.	K2_GIG_W10
In terms of social competences		
PEU_K01	Is responsible for making decisions that minimize negative environmental impact, determining further soil and rock parameters based on given parameters, and respects the principles of professional ethics and social responsibility by calculating settlements caused by point, line, and distributed loads.	K2_GIG_K03

Program content ensuring learning outcomes

After successful completion of the course, students are able to • describe the soil and rock parameters presented, • explain the laboratory tests required to determine these parameters in soil and rock, • evaluate these laboratory tests in soil and

rock, • determine further soil and rock parameters from given parameters, • explain the principle of effective stress in the subsoil, • compute effective stresses, total stresses and pore water pressure in the subsoil with stationary and flowing groundwater, • explain the consolidation, the temporal reduction of excess pore water pressure in fine-grained soil, • apply the one-dimensional consolidation theory, • explain the principle of settlement calculations, • compute the straight-line limited contact pressure for retaining walls and shallow foundations, • compute the settlements due to point, line and distributed loads for rectangular, triangular and trapezoidal contact pressure distributions, • compute the water pressure distribution on a supporting structure with stationary and flowing groundwater, • explain the term earth pressure in detail, • compute the active earth pressure and earth resistance due to soil self-weight, cohesion and loads on ground surface, • describe bearing failure in the subsoil, • perform tipping, sliding and bearing failure verifications for retaining walls and shallow foundations in the ultimate limit state in accordance with the standard, • demonstrate safety against uplift in accordance with the standard, • explain subsoil failure in form of slope failure, • demonstrate safety against slope failure for homogeneous non-cohesive and cohesive soils, • compute the slope failure safety for flat sliding surfaces, • explain the Fenner-Pacher diagram, • compute the stresses around an elliptical cavity at the roof, invert and walls.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	45
Credit/Exam	2
Preparaton for classes	13
Self-study of class topics	10
Prepararation for an exam/credit	5
Student workload	**Hours** 75

Wrocław University of Science and Technology

Geophysical Exploration Methods II

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.52PS.04989.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Semester	Examination	Number of ECTS points
Semester 2	Exam **Activities and hours** Lecture: 30 Seminar: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Selects and combines the suitable geophysical methods for raw-material exploration and environmental investigations.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
In terms of skills		
PEU_U01	Student processes and interprets the results of geophysical measurements to solve explorations tasks. Develops professional decisions in geophysical prospecting.	K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
In terms of social competences		

PEU_K01	Open and receptive to the knowledge and acceptance of professional and technological methodological developments in the fields of technical earth sciences, tand to the participation in their development.	K2_GIG_K01, K2_GIG_K03

Program content ensuring learning outcomes

The subject familiarizes the students specialized in geophysical engineering with the details of different geophysical methods used in the fields of raw-material exploration and environmental investigations.
Physical basics of seismic methods. Reflexion seismic method. Refraction seismic method. Vertical seismic profile (VSP). Geophysical inversion of magnetic data. Magnetic forward problem of arbitrary shaped source. The problem of ambiguity. 3D underdetermined problems of magnetic data. Geological applications. Physical basics of geoelectrical methods. Self-potential method. Charged-body method. Direct current resistivity methods. Induced polarization method. Physical basics of electromagnetic (EM) methods. Magnetotelluric method. Frequency-domain (FD) electromagnetic methods. Transient electromagnetic method (TEM). Very-low-frequency electromagnetic method (VLF-EM). Main features and essentials of borehole geophysics. Classification of well logging methods. Formation density logging. Photoelectric factor logging. Neutron logging methods. Well log interpretation techniques. Quick-Look Interpretation. Crossplots and overlays. Formation evaluation in shaly sands.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Seminar	30
Preparaton for classes	11
Preparation of a report/summary/presentation/paper	10
Prepararation for an exam/credit	15
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Operations Research

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Zagreb - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EZWS.54HS.04927.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects from the fields of humanities or social sciences

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 15 h, 1 ECTS, Graded credit • Laboratory: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	presents the linear programming method, the types of variables in the model, constraints, and the solution approach, as well as the scope of applications, and distinguishes between linear and nonlinear optimization.	K2_GIG_W06
PEU_W02	explains project planning models (CPM and PERT), as well as resource and cost management models.	K2_GIG_W06
PEU_W03	presents the concept of mass service system models and describes simulation models of industrial processes.	K2_GIG_W06
In terms of skills		
PEU_U01	constructs optimization models for production systems and transportation issues.	K2_GIG_U02, K2_GIG_U10

PEU_U02	develops a project schedule based on the CPM and PERT methods.	K2_GIG_U02, K2_GIG_U10
PEU_U03	prepares a simulation model of a technological process using the specified software.	K2_GIG_U02, K2_GIG_U10
In terms of social competences		
PEU_K01	is open to various approaches in decision-making problem-solving and has the ability to work in a team.	K2_GIG_K01

Program content ensuring learning outcomes

Linear and nonlinear optimization models.
Network programming and project scheduling.
Simulations and models of stochastic processes.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	15
Preparaton for classes	5
Self-study of class topics	10
Preparation of a report/summary/presentation/paper	15
Prepararation for an exam/credit	13
Credit/Exam	2
Student workload	**Hours** 75

Wrocław University of Science and Technology

Project Management, Appraisal and Risk Evaluation

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Zagreb - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EZWS.54HS.04924.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects from the fields of humanities or social sciences

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 3	Exam **Activities and hours** Lecture: 15 Laboratory: 30 Project: 15	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	discusses the concepts of demand and supply and their impact on the market, characterizes the concepts of costs in economics and accounting and explains their differences.	K2_GIG_W03, K2_GIG_W05
PEU_W02	characterizes the contents of financial statements and presents the method of ratio analysis of financial statements	K2_GIG_W03, K2_GIG_W11
PEU_W03	understands the concepts of Future Value and Present Value of cash flows, characterizes the main methods of capital budgeting and project evaluation, as well as the main methods of investment project risk assessment.	K2_GIG_W03

In terms of skills		
PEU_U01	analyzes the causes and consequences of changes in demand and supply, interprets cost data presented in various cost classification systems, demonstrates the ability to make short-term decisions based on cost data.	K2_GIG_U04, K2_GIG_U08
PEU_U02	can read information presented in financial statements and analyse them using financial ratios.	K2_GIG_U04, K2_GIG_U06
PEU_U03	is able to calculate Present Value of cash flows, can perform capital budgeting procedure, assess the investment project as well as the risk involved.	K2_GIG_U03, K2_GIG_U06
PEU_U04	is able to create basic project documentation and initiate the project. Can utilise the basic methods of project management, monitoring and risk assessment.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U09
PEU_U05	is able to utilise the basic methods of group conflict management, basic methods of group management and leadership, can assess effectiveness of group management	K2_GIG_U08, K2_GIG_U09
In terms of social competences		
PEU_K01	demonstrates the ability to think and act in a systematic, creative and entrepreneurial manner, has an attitude of economic acting and decision making on the basis of financial data and forecasts.	K2_GIG_K01

Program content ensuring learning outcomes

The course combines two groups of topics: basics of mineral resources economics and financial management and introduction to project management.
Part A: Supply and demand mechanism, Concept of costs in microeconomics and accounting. Cost accounting for reporting and management purposes. Content of financial statements and their analysis. Concept of change in the value of money over time. Methods of investment project evaluation. Analysis of the profitability of investment projects in risk conditions.
Part B: Introduction to basic concepts, methods and tools of project management. Presentation of selected areas of project management: project scope management, project time management, project cost management, project risk management. Planning, scheduling and control of projects using Microsoft Project. Issues of effective communication in project teams, group behavior and leadership.

Calculation of ECTS points

Activity form	Activity hours
Lecture	15
Laboratory	30
Project	15
Preparation of a project	10
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	6
Prepararation for an exam/credit	10
Credit/Exam	4

Student workload	**Hours** 100

Wrocław University of Science and Technology

Environmental Management

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Zagreb - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EZWS.54PS.04928.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 30 h, 2 ECTS, Graded credit • Seminar: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student possesses systematic knowledge of the origins of environmental management systems, review and standardization of environmental management systems.	K2_GIG_W04, K2_GIG_W12
PEU_W02	The student determines the possibilities of practical applications of tools supporting the implementation of the environmental management system.	K2_GIG_W18
PEU_W03	The student presents the basic formal and legal principles regarding the use and application of management systems, tools and executive management.	K2_GIG_W13
PEU_W04	The student explains rational and sustainable management of environmental components.	K2_GIG_W13, K2_GIG_W18
In terms of skills		

PEU_U01	The student uses linguistic resources appropriate for a specialized language in the field of environmental management and is able to use them in linguistic activities in order to communicate in a professional environment related to the field of study; is able to obtain the necessary information and interpret and critically evaluate it, reads and understands professional literature, is able to formulate and comprehensively justify opinions, present problems related to the studied discipline, and participate in scientific and professional discussions.	K2_GIG_U05, K2_GIG_U10, K2_GIG_U12
PEU_U02	The student applies methods and appropriate IT tools in the systemic management of environmental elements.	K2_GIG_U11, K2_GIG_U12
In terms of social competences		
PEU_K01	The student is open to acting in a creative and entrepreneurial way.	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Getting to know systems of environmental management both in Poland and other EU countries.
Getting to know rational and sustainable management of environmental components.
Getting to know the genesis of environmental management systems, review and standardization of environmental management systems.
Getting to know benefits and obligations arising from the implementation of an environmental management system.
Presenting the relationship between an environmental management system and a quality management system.
Presenting an overview of informative methods of supporting the implementation of environmental management systems (possibilities and practical usage of computerised systems of environmental information management, decision support in the area of environmental protection and choice of methods and tools used to support the implementation of an environmental management system).

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Seminar	15
Self-study of class topics	6
Preparation of a report/summary/presentation/paper	14
Preparaton for classes	6
Credit/Exam	4
Student workload	**Hours** 75

Wrocław University of Science and Technology

Digital Mine

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Zagreb - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EZWS.54PS.04990.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 15 h, 1 ECTS, Graded credit • Laboratory: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	characterizes issues related to automation systems, control systems and measurement systems in various aspects of the mining industry.	K2_GIG_W07, K2_GIG_W12, K2_GIG_W18, K2_GIG_W19
PEU_W02	explains the importance of automation and robotics systems in modern mining.	K2_GIG_W07, K2_GIG_W12, K2_GIG_W18, K2_GIG_W19
In terms of skills		
PEU_U01	is able to select and integrate elements of a specialized measuring and control system including: control unit, executive system, measuring system as well as peripheral and communication modules	K2_GIG_U04, K2_GIG_U07

PEU_U02	designs improvements in the existing design solutions for automation and robotics components and systems	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08

Program content ensuring learning outcomes

Creation of utility applications in the C / C ++ and LabVIEW environment
Knowledge about embedded systems, their construction, selection of components, designing, programming and their exploitation.
Advances of technology & methods of future mining operations.
Building social competencies including emotional intelligence skills involving the cooperation in the group of students

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	15
Preparation of a project	10
Prepararation for an exam/credit	5
Self-study of class topics	5
Student workload	**Hours** 50

Wrocław University of Science and Technology

Computer Aided Geological Modelling & Geostatistics - Part Geostatistics

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Zagreb - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EZWS.54PM.04919.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects of basic education - mathematics

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Estimation methods, principles of geostatistics, kriging estimators	K2_GIG_W15
PEU_W02	Geostatistical modelling of the selected deposit parameters (domain analysis, variogram modelling)	K2_GIG_W06, K2_GIG_W08, K2_GIG_W15
In terms of skills		
PEU_U01	Application of relevant estimation methods for quality modelling of a deposit	K2_GIG_U02, K2_GIG_U04, K2_GIG_U08

Program content ensuring learning outcomes

Geology of the seam. Structural model of the stratified deposit. Methods of the prediction of the surface layer parameters. Spatial distribution of samples values. Regionalized variable. BLUE Estimator of the mean value: Kriging.

Domain analysis with the use of the statistical methods. Determination of the empirical variogram. Anisotropy analysis. Variogram modelling. Kriging Neighborhood Analysis - defining optimal parameters of the estimation procedure.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Preparaton for classes	15
Prepararation for an exam/credit	10
Self-study of class topics	10
Student workload	**Hours** 50

Computer Aided Geological Modelling & Geostatistics - Part Geological Modeling

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Zagreb - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EZWS.54PK.04920.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 3	• Laboratory: 45 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Creating and validating 3-D models of various geological structures in the comprehensive dedicated software environment	K2_GIG_W06, K2_GIG_W08, K2_GIG_W15
In terms of skills		
PEU_U01	Evaluating 3-D objects against structural and quality block models (volumes, tonnages, grades)	K2_GIG_U03, K2_GIG_U04, K2_GIG_U08
PEU_U02	Describing the interpretation and applied approach, creating models, evaluation results, recommendations for possible enhancements	K2_GIG_U03, K2_GIG_U04, K2_GIG_U08

Program content ensuring learning outcomes

Quality model of the deposit – block model of the parameter layers. Estimation and evaluation of the block model. Reserves modelling and evaluation. Mineral resources. International reporting. The JORC Code.

Calculation of ECTS points

Activity form	**Activity hours**
Laboratory	45
Preparation of a project	5
Student workload	**Hours** 50

Wrocław University of Science and Technology

Engineering Geophysics

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Zagreb - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EZWS.54PF.04921.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects of basic education - physics

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 15 h, 1 ECTS, Graded credit • Project: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	recognises, names and explains engineering problems in different fields.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
PEU_W02	identifies, describes, categorises and selects geophysical survey methods.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
PEU_W03	presents, explains, and evaluates case studies on engineering and environmental problems solved by geophysical methods.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
In terms of skills		

PEU_U01	analyses and solves complex practical problems (case studies) in engineering, environmental protection and geoengineering by applying geophysical knowledge and using modern geophysical data acquisition and interpretation.	K2_GIG_U04, K2_GIG_U13
PEU_U02	organizes teamwork, creates field research plans and monitors the work progress.	K2_GIG_U13
PEU_U03	analyses, evaluates, processes and interprets the results of geophysical investigations and makes recommendations related to engineering problems in mining, civil engineering, engineering geology, municipal and nuclear waste disposal sites, archaeology, with engineering properties of soils and rocks, hydrogeology, monitoring seepage in river embankments or dams.	K2_GIG_U04, K2_GIG_U13
PEU_U04	solves analytical geophysical problems/tasks and conducts auto-didactical education related to the detailed handling of typical software.	K2_GIG_U04, K2_GIG_U13

Program content ensuring learning outcomes

The essence and subject matter of descriptive and applied geophysics, geophysical methods used in deep and near-surface measurements. Geophysical methods to study engineering problems and elements and conditions of the environment. Techniques, geophysical survey methodologies and the construction and principles of operation of geophysical instruments used for engineering and environmental studies. Simple geophysical field surveys. Interpretation of the field data. Solving geophysical problems and tasks and critically evaluating the results. Analysing and critically evaluating examples of the application of geophysical methods in solving engineering and environmental problems and their results (case study analysis).

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	15
Preparation of a report/summary/presentation/paper	12
Preparaton for classes	8
Credit/Exam	4
Prepararation for an exam/credit	8
Self-study of class topics	7
Preparation of a project	6
Student workload	**Hours** 75

Wrocław University of Science and Technology

Principles and Application of InSAR and GIS in Mining

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Zagreb - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EZWS.54PK.04922.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 30 h, 2 ECTS, Exam • Laboratory: 45 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Defines expanded concepts in the use of geo-information systems to collect and process data used in modeling both natural and anthropogenic phenomena and processes.	K2_GIG_W15, K2_GIG_W16, K2_GIG_W18
PEU_W02	Describes the principles of construction and functioning of geoinformation systems in the mining industry and public administration.	K2_GIG_W15, K2_GIG_W16, K2_GIG_W18
In terms of skills		
PEU_U01	Uses advanced GIS tools in mining, studies of natural phenomena, the impact of mining on the environment and space development,	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08
PEU_U02	Formulates and solve spatial tasks in the GIS environment.	K2_GIG_U04, K2_GIG_U07

PEU_U03	Interprets the results obtained and draw conclusions.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08

Program content ensuring learning outcomes

1. Satellite radar interferometry, the possibility of using it in the ground deformation measurements.
   Determination of surface displacements based on satellite radar data.
   Use of GIS in advanced analysis of objects, phenomena and processes occurring in space.
   Formulation and solving tasks using GIS analytical functions.
   Use of spatial data and services in accordance with the INSPIRE Directive

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	45
Preparation of a report/summary/presentation/paper	10
Prepararation for an exam/credit	5
Credit/Exam	5
Self-study of class topics	5
Student workload	**Hours** 100

Wrocław University of Science and Technology

Occupational Health and Safety

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Zagreb - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EZWS.54PK.04923.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 15 h, 1 ECTS, Graded credit • Project: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Possesses general knowledge of rules of occupational risk assessment formulation	K2_GIG_W11, K2_GIG_W12, K2_GIG_W14
PEU_W02	Possesses knowledge of evaluating and determining the admissibility of occupational risk	K2_GIG_W17
PEU_W03	Possesses general knowledge of corrective and preventive actions regarding hazards of typical work posts in the mining industry	K2_GIG_W12, K2_GIG_W14
In terms of skills		
PEU_U01	Is able to identify hazards of harmful, dangerous and nuisance factors of typical work posts in the mining industry	K2_GIG_U11
PEU_U02	Is able to estimate and determine risk acceptability with methods according to STER software and the RISC SCORE method.	K2_GIG_U11

PEU_U03	Is able to plan corrective and preventive actions for hazards of typical work posts in the mining industry	K2_GIG_U11
In terms of social competences		
PEU_K01	Is able to work in a team and together complete occupational risk assessment and develop its results and the required documentation in the form of a team report	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Introduction to Mining Safety and Health Regulations. Overview of key regulations governing occupational safety and health in the mining industry. The importance of compliance with international safety standards.
Occupational hazards and risks. Safety management system for mining operations
Hazard Identification in Mining Operations. Analysis of common physical hazards in mining operations. Chemical, ergonomic, and psychological hazards.
Occupational Risk Assessment in Mining. Overview of the methods of identification, evaluation and management of risks
Health risk assessment in the mining industry. Methods for assessing occupational health risks, including exposure monitoring and health surveillance.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	15
Preparaton for classes	4
Preparation of a project	10
Preparation of a report/summary/presentation/paper	6
Student workload	**Hours** 50

Wrocław University of Science and Technology

Regional Hydrogeology

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.54PS.05012.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 3	Exam **Activities and hours** Lecture: 30 Project: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Defines the concept of scale in hydrogeology and explain its effect through permeability properties	K2_GIG_W01, K2_GIG_W02, K2_GIG_W10, K2_GIG_W15
In terms of skills		
PEU_U01	Apply hydrogeological maps in the description of hydrogeological features of the area Assess the significance of a particular hydrogeological system for a water supply	K2_GIG_U01, K2_GIG_U04, K2_GIG_U13
In terms of social competences		

PEU_K01	The student protects groundwater resources.	K2_GIG_K03

Program content ensuring learning outcomes

Hydrogeological interpretations on a regional scale and the acquisition of skills in presenting hydrogeological features and calculating groundwater reserves. The student will acquire basic knowledge about the aquifer systems of the Republic of Croatia and strategic groundwater reserves.
Students aquire specific skills in the area of hydrogeological interpretation on regional scale.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Preparaton for classes	10
Preparation of a project	10
Prepararation for an exam/credit	6
Preparation of a report/summary/presentation/paper	10
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Structural Geology

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Mineral Resources Exploration - Track WUST - University of Miskolc	**Subject code** W6GIG/000EWMS.54PS.04982.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 3	Exam **Activities and hours** Lecture: 30 Project: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student characterizes and identifies structural features, assigns and justifies structural data.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10, K2_GIG_W15
In terms of skills		
PEU_U01	The student interprets and analyzes the mechanics of structural processes and creates geological maps and profiles.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U10, K2_GIG_U13

In terms of social competences		
PEU_K01	The student appreciates the use of clear terminology and prioritizes observed data over theory with a critical approach. Additionally, the student is responsible for data analysis using graphical and computational tools.	K2_GIG_K03

Program content ensuring learning outcomes

The course provides a background in the fundamentals of structural geology. It introduces the methods of interpreting structural observations and determining the 3-D distribution of the lithological units, the physical properties controlling the development of fractures, folds and other structural features. The course also introduces the students to building up, constructing and analysing spatial models.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Preparation of a project	15
Preparaton for classes	10
Preparation of a report/summary/presentation/paper	5
Prepararation for an exam/credit	6
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Seismotectonics

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.54PS.05013.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 3	Exam **Activities and hours** Lecture: 30 Project: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student distinguishes types of stress and their distribution in the Earth's crust in relation to types of tectonic plate boundaries, regional and local geodynamic processes. They explain general terms in seismology (seismicity, seismic waves, earthquake magnitude, seismic hazard and risk, earthquake cycle, and elastic rebound theory).	K2_GIG_W02, K2_GIG_W10, K2_GIG_W14
In terms of skills		

PEU_U01	The student calculates the location of an earthquake's epicenter based on the analysis of seismograms from seismic stations, moment magnitude values, and assesses the earthquake's intensity. They use analytical methods and computer tools for the analysis of seismograms and earthquake-related calculations.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	Student demonstrates the ability to think and act creatively by creating seismotectonic profiles and presenting results related to seismicity, seismic hazards, and tectonic activity and their impact.	K2_GIG_K01

Program content ensuring learning outcomes

To describe the basics on seismotectonics in different geodynamic settings on Earth, in particular in Croatia, in circum Adriatic region and in the Eastern Mediterranean, and to provide students general knowledge on field and lab methods used in evaluation of seismicity and seismic hazard, assessment of recent tectonic movements on local and regional scale, active stress regimes in the Earth’s crust, and in identification and characterization of active, seismogenic faults and seismogenic sources.
The course cover all the important data and seismotectonic properties of certain areas.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Preparation of a project	10
Preparaton for classes	10
Prepararation for an exam/credit	6
Preparation of a report/summary/presentation/paper	10
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Mineral Deposits

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.54PS.04983.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 3	Exam **Activities and hours** Lecture: 30 Laboratory: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	It characterizes field campaigns related to the exploration of mineral resources, selecting appropriate methods and techniques, recognizing and distinguishing different types of resources, explaining their significance and application, and illustrating ore formation processes by categorizing different types of deposits.	K2_GIG_W08, K2_GIG_W09, K2_GIG_W10
In terms of skills		
PEU_U01	Demonstrates and distinguishes between different types of raw material deposits, recognizes and identifies field samples, and thus effectively contributes to exploration	K2_GIG_U01, K2_GIG_U10, K2_GIG_U13

In terms of social competences		
PEU_K01	Is capable of developing skills in synthesizing and integrating various geological and geophysical data, as well as creating a geological model based on field exploration data.	K2_GIG_K03

Program content ensuring learning outcomes

The course introduces the geology of raw material deposits, their spatial distribution, and their quantity and quality for different commodities. Students get familiar with the different groups of commodities – ores, industrial minerals, solid fossil energy minerals, construction materials, and their use and history. In the next period, the students will learn the ore-forming geological processes and their appearances, which create the different deposits. They will also learn the genetic classification of the deposits with national and international examples. This prepares the students to recognize the geological features of mineralizations, alterations, and tectonic deformations. The course covers all the important mines and ore districts in Europe and worldwide. During the laboratory classes, the students can learn the natural occurrences of ores, non-ores, and industrial minerals. They will learn the physical and chemical properties, and texture of the different raw material types, and how to identify and distinguish them. To properly use geological maps and sections in 3D, the students will do exercises to develop their capabilities. During the related field trips, the students will examine real deposits in the field.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	30
Preparaton for classes	10
Preparation of a report/summary/presentation/paper	10
Conducting empirical studies	10
Prepararation for an exam/credit	6
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Industrial Mineral Deposits and Applications

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.54PS.05014.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 3	Exam **Activities and hours** Lecture: 45 Seminar: 30	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Identifies and describes types of industrial mineral deposits. Formulates exploration plans for industrial mineral deposits to determine their potential for industrial applications.	K2_GIG_W01, K2_GIG_W07, K2_GIG_W12
In terms of skills		
PEU_U01	Classifies ore and industrial minerals and categorizes industrial minerals. Analyzes physicochemical conditions of the formation of clay, bauxite, quartz, evaporite, phosphate, barite, fluorite, pyrite, sulfur, zeolite, pigment, and graphite deposits and argues their impact on geological processes.	K2_GIG_U01, K2_GIG_U10, K2_GIG_U13

In terms of social competences		
PEU_K01	Accepts the impact of activities related to the extraction and processing of industrial minerals on the natural environment and proposes solutions to minimize negative effects. Respects the principles of sustainable management of natural resources, ensuring efficient use of deposits and minimizing waste.	K2_GIG_K01, K2_GIG_K02

Program content ensuring learning outcomes

The course introduces the physicochemical and geological conditions of the formation of major industrial mineral deposits and their applications in industry. The course covers all important data regarding industrial minerals and their applications. Course content includes: Definitions of terms: (1) ore mineral and (2) industrial mineral. Classifications of industrial minerals. Physicochemical conditions of clay deposit formation. Industrial clays: kaolins, bentonites, sepiolites, and palygorskites. Mineralogy and geology of kaolin deposits. Applications of kaolin in industry. Mineralogy and geology of bentonite, sepiolite, and palygorskite deposits. Industrial applications. Construction clays and their industrial applications. Physicochemical conditions of bauxite deposit formation. Lateritic and karst bauxites. Industrial applications of bauxites. Quartz mineral resources (quartz crystals, quartz sands and sandstones, SiO2 as a chemical and biogenic sediment, diatomaceous earth, flint). Feldspar deposits. Industrial applications of quartz mineral resources and feldspar. Physicochemical conditions of evaporite formation. Gypsum and anhydrite deposits. Halite, sylvite, soda, borate, Mg and Li salt deposits. Physicochemical conditions of phosphate formation. Apatite and phosphorite deposits. Industrial applications of phosphates. Barite, fluorite, and refractory material deposits. Industrial applications of barite, fluorite, and refractory materials. Pyrite and sulfur deposits. Industrial applications of pyrite and sulfur. Physicochemical conditions of zeolite formation. Zeolite deposits. Industrial applications of zeolites. Pigments and their industrial applications. Graphite deposits. Industrial applications of graphite.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	45
Seminar	30
Preparaton for classes	10
Preparation of a report/summary/presentation/paper	10
Preparation of a project	15
Prepararation for an exam/credit	11
Credit/Exam	4
Student workload	**Hours** 125

Wrocław University of Science and Technology

Human Resources Management & Organizational Behaviour

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMFS.54HS.04937.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects from the fields of humanities or social sciences

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 30 h, 3 ECTS, Exam

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Identifies key factors influencing the behavior of individuals and groups in organizations, formulates human resource management strategies, and demonstrates the importance of the human aspect of management as a complement to technical skills.	K2_GIG_W05, K2_GIG_W09
In terms of skills		
PEU_U01	Organizes HR processes within the organization.	K2_GIG_U08, K2_GIG_U09
In terms of social competences		
PEU_K01	Declares readiness to collaborate in interdisciplinary teams.	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Completion of the course aids in learning to diagnose managerial situations, enabling the transfer of this skill to the professional world. The specific objectives of the course include:
1. Understanding the relevance of human resources for organizations
and the key concepts of human behavior in organizations.
2. Appreciating how the human side of management is an essential
complement to the technical skills you are learning in other courses.
3. Learning concepts and approaches that will enable you to analyze HR and organizational problems and to develop appropriate solutions.
4. Developing the knowledge and skills you need to be a successful
manager of yourself and others.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	20
Self-study of class topics	11
Credit/Exam	4
Student workload	**Hours** 75

Wrocław University of Science and Technology

Engineering Geology and Hydrogeology

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.54PS.04984.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 3	Exam **Activities and hours** Lecture: 30 Laboratory: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	It characterizes the basic methods, theories, and approaches in hydrogeology, mechanics, and geotechnics, and analyzes groundwater flow systems, the fundamentals of shallow and deep groundwater, water quality and hydraulics, as well as soil mechanics issues.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10, K2_GIG_W14
In terms of skills		
PEU_U01	Utilizes analytical methods and computer tools for calculations and optimization of groundwater systems, and analyzes soil samples.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U10, K2_GIG_U13

In terms of social competences		
PEU_K01	Is ready to solve complex hydrogeological and geotechnical problems, the student will be able to deliver decisions, plans based on hydrogeological data. Can provide professional decisions in field in case of hydrogeological and geotechnical problems.	K2_GIG_K03

Program content ensuring learning outcomes

It introduces students to the key concepts of engineering geology, modern hydrogeology, and field hydrogeology, soil formation, soil classification methods, laboratory and field soil tests, water-to-rock underwater stress, and groundwater flow patterns.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	30
Preparaton for classes	10
Preparation of a project	10
Preparation of a report/summary/presentation/paper	12
Prepararation for an exam/credit	4
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Analytical Methods in Ore Deposits

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.54PS.05015.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 3	Exam **Activities and hours** Lecture: 30 Laboratory: 45	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student explains the application of various methods and principles of sample preparation and instrument characteristics.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W10
In terms of skills		
PEU_U01	The student prepares geological samples for selected methods (cutting, grinding, polishing, crushing, dissolving, diluting, etc.) and interprets the results of radiogenic isotope analysis to determine the age of the parent rock, mineralization, and subsequent events.	K2_GIG_U07, K2_GIG_U13
In terms of social competences		

PEU_K01	The student takes on the challenge and shows initiative in conveying geological information in a widely understandable manner, presenting various perspectives.	K2_GIG_K01

Program content ensuring learning outcomes

This course is an overview of the most important analytical methods and their applications in mineral deposit studies. Its aim is to determine mineralogical, geochemical, and isotopic compositions, as well as to reconstruct genetic processes. The course covers techniques such as transmitted and reflected light microscopy, electron microscopy and electron microprobe, fluid inclusion microthermometry, ion chromatography, vitrinite reflectance, crystallinity of chlorite, illite, and graphite, atomic absorption and emission spectroscopy, inductively coupled plasma mass spectrometry (ICP-MS), and stable and radiogenic isotopes.
This course provides students with knowledge about analytical methods used in mineral deposit studies, enabling them to thoroughly understand and apply these techniques in practice.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	45
Preparation of a report/summary/presentation/paper	15
Prepararation for an exam/credit	16
Preparaton for classes	15
Credit/Exam	4
Student workload	**Hours** 125

Wrocław University of Science and Technology

Fluid Dynamics in Chemical Engineering

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.54PS.05029.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 3	Graded credit **Activities and hours** Lecture: 30 Classes: 15 Project: 30	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	describes and explains the theoretical basics of CFD (Computational Fluid Dynamics) in chemical engineering.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W07, K2_GIG_W10
PEU_W02	depicts and explains design methods and scale-up of fluid mixers, rheology, and mixing effects in chemical reactors.	K2_GIG_W02, K2_GIG_W07, K2_GIG_W10

PEU_W03	recognises and explains the basics of fluid rheology.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W07, K2_GIG_W10
In terms of skills		
PEU_U01	selects, sizes and scales up different mixing devices (stirred tanks, in-line mixers) for blending and multiphase mixing (solid-liquid mixing, liquid and gas dispersions) based on short-cut design methods,	K2_GIG_U01, K2_GIG_U04, K2_GIG_U07, K2_GIG_U13
PEU_U02	adapts the basics of fluid rheology to the mixing design.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U07, K2_GIG_U13
PEU_U03	solves fundamental fluid mixing problems with CFD programs (COMSOL software).	K2_GIG_U04, K2_GIG_U13
PEU_U04	calculates heat transfer, chemical reactions, and laminar and turbulent flow in CFD.	K2_GIG_U01, K2_GIG_U04
PEU_U05	analyzes relevant cases in Power-to-X chemical production technologies.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U13
In terms of social competences		
PEU_K01	demonstrates the ability to think and act in a creative and entrepreneurial manner.	K2_GIG_K01

Program content ensuring learning outcomes

Design methods and scale-up of fluid mixers, rheology, and mixing effects in chemical reactors. Theoretical basics of CFD (Computational Fluid Dynamics) in chemical engineering aspects and ability to solve basic mixing problems with CFD. COMSOL software for Multiphysics Simulation (FEM). Heat transfer, chemical reactions, laminar and turbulent flow in CFD.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Classes	15
Project	30
Credit/Exam	2
Prepararation for an exam/credit	15
Preparation of a report/summary/presentation/paper	7
Preparation of a project	8
Preparaton for classes	10
Conducting literature research	8

Student workload	**Hours** 125

Wrocław University of Science and Technology

Special Topics Geokinematics

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg	**Subject code** W6GIG/000GMFS.54PS.04938.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects

Semester	**Examination**	**Number of ECTS points**
Semester 3	Exam **Activities and hours** Lecture: 30 Laboratory: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	It characterizes the current issues related to predicting and monitoring ground surface movements caused by mining activities and presents case studies on the application of machine learning in the context of modeling ground surface movements caused by mining.	K2_GIG_W07, K2_GIG_W10, K2_GIG_W16
In terms of skills		
PEU_U01	Analyzes data monitoring ground movements to assess the risk associated with land subsidence. Applies analytical methods to forecast future ground movements based on collected data.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08
In terms of social competences		

PEU_K01	Identifies problems related to the environmental impact of mining activities and is responsible for making decisions that minimize negative effects.	K2_GIG_K03

Program content ensuring learning outcomes

• review of methods for predicting mining induced ground movements on topical examples
• applied inverse modelling and geostatistics for parameter estimation in the context of ground movement prediction
• introduction to supervised and unsupervised learning (Machine Learning) in the context of resource extraction monitoring and prediction
• case studies of machine learning in the context of mining induced ground movement modelling and exploration
• case studies for ground movement prediction and parameter estimation

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	30
Self-study of class topics	12
Preparation of a report/summary/presentation/paper	14
Prepararation for an exam/credit	10
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Analytical Technics in Mineralogy and Petrology

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Mineral Resources Exploration - Track WUST - University of Miskolc	**Subject code** W6GIG/000EWMS.54PS.04985.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 3	Graded credit **Activities and hours** Lecture: 15 Laboratory: 15	2.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The students can select and apply different analytical techniques in the field of earth science, to analyse, describe and identify the possible rock-, soil samples related to raw materials exploration and extraction.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
In terms of skills		

PEU_U01	The students can design data acquisition and collection sets alone to fulfil the requirements of certain, different exploration tasks, and evaluate, integrate and assess the measured data. Students can apply the different analytical methods an innovative way to maximize the available geological information from the available samples, and/or in the view of available resources.	K2_GIG_U04, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	The students learn how to work in teams, how to distribute the work and evaluate the results of the different analyses., They develop respect and critical (analytical) attitude towards geological data, and learn how to handle them.	K2_GIG_K03

Program content ensuring learning outcomes

The k course introduces the different analytical methods used in mineralogy and geology for the students. There are laboratory classes with individual work about the learned methods nearby the theoretical classes. Thru these exercises the students learn what is the best available method to answer certain geological questions.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	15
Preparation of a report/summary/presentation/paper	10
Prepararation for an exam/credit	8
Credit/Exam	2
Student workload	**Hours** 50

Wrocław University of Science and Technology

Geophysical Exploration and Mineral Resources

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.54PS.05016.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 30 h, 3 ECTS, Exam

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Characterizes the principles of working with instruments for magnetometric exploration. Distinguishes the principles of working with instruments for electric and electromagnetic exploration.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
In terms of social competences		
PEU_K01	Interprets various geophysical data and draws conclusions about mineral deposits and their main characteristics.	K2_GIG_K01

Program content ensuring learning outcomes

Opanowanie specjalistycznych metod geofizycznych pomiaru i interpretacji stosowanych w poszukiwaniu złóż materiałów budowlanych i surowców mineralnych. Kurs obejmuje kluczowe aspekty metod geofizycznych stosowanych w prospekcji i eksploracji złóż mineralnych.

Calculation of ECTS points

Activity form	Activity hours
Lecture	30
Self-study of class topics	15
Prepararation for an exam/credit	26
Credit/Exam	4
Student workload	**Hours** 75

Wrocław University of Science and Technology

Process Intensification

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.54PS.05030.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 3	Exam **Activities and hours** Lecture: 30 Classes: 30 Seminar: 15	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	describes and explains intensified reactors and separation equipment, the combination of reaction and separation, hybrid separation, alternative energy sources, the transformation of batch processes to continuous ones, and principles and goals of process intensification.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W07, K2_GIG_W10
PEU_W02	recognizes and describes possibilities to intensify processes and apply novel technology to existing processes (the production of E-fuels, carbon-neutral products, energy storage, etc.).	K2_GIG_W01, K2_GIG_W02, K2_GIG_W07, K2_GIG_W10

PEU_W03	finds the relation between the product design and process design, and describes the advantages of process intensification and typical intensification methods.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W07, K2_GIG_W10
In terms of skills		
PEU_U01	applies intensified reactors and separation equipment, the combination of reaction and separation, hybrid separation, alternative energy sources, and the transformation of batch processes to continuous ones.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U13
PEU_U02	calculates, constructs and demonstrates the process design to intensify a process given by the teacher.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
PEU_U03	prepares a scientific report and presents the design results as part of teamwork.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	demonstrates the ability to think and act creatively and entrepreneurially.	K2_GIG_K01

Program content ensuring learning outcomes

Different process intensification methods and their theoretical background. Teaching involves lectures, assignments, meetings and seminars. The main work is carried out as a process design project assignment where students work in teams aiming to intensify a process given by the teacher. Each team writes a report and presents results in the seminar. The topics focus mainly on the intensification of different Power-to-X processes, such as the production of E-fuels, carbon-neutral products, energy storage, etc.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Classes	30
Seminar	15
Credit/Exam	4
Preparation of a project	16
Conducting literature research	5
Prepararation for an exam/credit	6
Preparation of a report/summary/presentation/paper	8
Self-study of class topics	9

Preparaton for classes	2
Student workload	**Hours** 125

Wrocław University of Science and Technology

Applied Spatial Data Analysis and Modelling - Case Study (GIS 2)

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMFS.54PS.04939.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Semester	Examination	Number of ECTS points
Semester 3	Exam **Activities and hours** Lecture: 30 Classes: 45	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Characterizes topical problems related to predicting and monitoring mining induced ground movements,	K2_GIG_W08, K2_GIG_W18
In terms of skills		
PEU_U01	Solves topical problems related to predicting and monitoring mining induced ground movements	K2_GIG_U04, K2_GIG_U10

Program content ensuring learning outcomes

• review of methods for predicting mining induced ground movements
on topical examples

• applied inverse modelling and geostatistics for parameter estimation in the context of ground movement prediction
• introduction to supervised and unsupervised learning (Machine Learning) in the context of resource extraction monitoring and prediction
• case studies of machine learning in the context of mining induced ground movement modelling and exploration
• case studies for ground movement prediction and parameter estimation

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Classes	45
Preparaton for classes	10
Self-study of class topics	10
Preparation of a report/summary/presentation/paper	16
Prepararation for an exam/credit	10
Credit/Exam	4
Student workload	**Hours** 125

Wrocław University of Science and Technology

Geochemical Prospecting Methods

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.54PS.05003.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 3	Graded credit **Activities and hours** Lecture: 30 Project: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Applies the techniques and practices best available for geochemical sampling. To apply the right selection of analytical technics and digestion solution for geochemical samples. To apply the hierarchical planning approach for geochemical sampling. Combines the applied and theoretical knowledge required for the complex interpretation of geochemical datasets and processes.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
In terms of skills		
PEU_U01	To design and compile a workable geochemical sampling plan for a mineral exploration campaign. To organize and manages complex geochemical and mineral exploration field works.	K2_GIG_U04, K2_GIG_U10, K2_GIG_U13

In terms of social competences		
PEU_K01	Student applies innovative and creativity skills in solving mineral exploration problems in the fields with a geochemical approach. Percieves the professional and technological methodological developments in the fields of applied earth sciences. ,Plans the work independently, and rules on to lead workgroups. Takes responsibility and is accountable for the work processes carried out under his / her control.	K2_GIG_K02

Program content ensuring learning outcomes

Introduction into a basic area of mineral exploration methods, including the theorethical background of geochemical sampling, the detailed discussion of different sampling and analytical methods, as well as the methods of data processing and interpretation. Completion of a geochemical exploration project, including field sampling, sample preparation, data processing and interpretation is an important part of the course.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Preparation of a project	15
Preparation of a report/summary/presentation/paper	15
Prepararation for an exam/credit	8
Credit/Exam	2
Student workload	**Hours** 100

Wrocław University of Science and Technology

Analyses of Mineral Paragenesis

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.54PS.05017.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Semester	Examination	Number of ECTS points
Semester 3	Exam **Activities and hours** Lecture: 15 Laboratory: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	It classifies igneous rocks based on microstructures, primary and secondary mineral parageneses, and reconstructs the sequence of processes in the evolution of specific igneous rocks, as well as distinguishes different mineral parageneses and the sequence of their formation in metamorphic rocks.	K2_GIG_W01, K2_GIG_W02
In terms of skills		

PEU_U01	To apply phase diagrams in the interpretation of genesis of different microtextures, intergrowths and exsolutions inside of minerals in magmatic rocks. To use evident signs of disequilibrium in minerals and rocks in the interpretation of their crystallisation and later evolution and petrogenesis, respectively. To apply different types of mineral recrystallization and their deformations to deduce the p-T evolution of the metamorphic rocks.	K2_GIG_U01, K2_GIG_U13
In terms of social competences		
PEU_K01	Student interprets mineral paragenesis and draws conclusions about the genesis of rocks.	K2_GIG_K01

Program content ensuring learning outcomes

The goal of the course is to train the students in microscopic analysis of different generations of mineral parageneses in magmatic and metamorphic rocks and their interpretation in the light of petrogenesis and later evolution of these rocks in the certain geotectonic environment.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	30
Preparaton for classes	11
Prepararation for an exam/credit	10
Self-study of class topics	5
Credit/Exam	4
Student workload	**Hours** 75

Wrocław University of Science and Technology

Current Issues in Enabling Technologies for Circular Economy

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.54PS.05031.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 3	Graded credit **Activities and hours** Lecture: 30 Classes: 15 Project: 30	5.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	depicts, differentiates, and explains the concepts of the circular economy (raw materials, processing, manufacturing, until end-of-life recycling and reuse) and the drivers for change from linear to circular economy.	K2_GIG_W01, K2_GIG_W07, K2_GIG_W10, K2_GIG_W12
PEU_W02	identifies, describes, and explains the processing technologies of materials in the context of the circular economy.	K2_GIG_W01, K2_GIG_W07, K2_GIG_W10, K2_GIG_W12
In terms of skills		

PEU_U01	analyses and evaluates the processing technologies of materials in the context of the circular economy.	K2_GIG_U01, K2_GIG_U10, K2_GIG_U12, K2_GIG_U13
PEU_U02	analyses, interprets and categorises the impact (environmental, economic, and social) of processing technologies, evaluating current (linear) materials processing practice compared to circular value chains.	K2_GIG_U01, K2_GIG_U10, K2_GIG_U12, K2_GIG_U13
PEU_U03	applies the transferable skills of life cycle thinking (eco-design) to evaluate processing technologies in circular value chains.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	is open to modern material processing technologies in the context of a circular economy and supports their use to protect the environment.	K2_GIG_K01, K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

The most important processing technologies that enable the implementation of circular economy, such as recycling and recovery as well as separation and purification technologies. The approach of the subject is mainly solution-based and thus aims to show practical examples of the utilization of different technologies in solving different challenges in the circular economy. A special emphasis is laid on topical themes, such as recycling and upgrading of plastic, electric, packaging and textile waste as well as on the production of biofuels. The subject also introduces the concept of ecodesign as a tool to manage the complex value chains in a circular economy.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Classes	15
Project	30
Preparaton for classes	12
Preparation of a report/summary/presentation/paper	14
Credit/Exam	2
Prepararation for an exam/credit	8
Conducting literature research	6
Self-study of class topics	8
Student workload	**Hours** 125

Wrocław University of Science and Technology

Geomatics for Mineral Resource and Reserve Management

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMFS.54PS.04940.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Semester	Examination	Number of ECTS points
Semester 3	Exam **Activities and hours** Lecture: 60 Project: 60	6.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Characterizes methods of mineral resource exploration and geomechanical aspects, including tectonics.	K2_GIG_W07
PEU_W02	Describes phenomena associated with mining operations.	K2_GIG_W10
PEU_W03	Defines the formal and legal conditions in the field of geology and mining.	K2_GIG_W07, K2_GIG_W10, K2_GIG_W11, K2_GIG_W12, K2_GIG_W13
In terms of skills		

PEU_U01	Utilizes IT tools to optimize extraction processes.Selects appropriate methods for assessing mineral resources in accordance with international standards.	K2_GIG_U04, K2_GIG_U05
PEU_U02	Analyzes methods of mineral resource exploration and geomechanical aspects, including tectonics. Assesses the impact of mining activities on the environment.	K2_GIG_U10, K2_GIG_U12

Program content ensuring learning outcomes

After successful completion of the course, students are able to create case specific work flows and apply methods that support a safe, economical end environmental responsible exploitation of mineral deposits. The particular focus of this module is on:
- exploration of the resource and geo-mechanical aspects including tectonics,
- evaluation of mineral resources and reserves according international standards,
- monitoring of operational accessible reserves (in-pit reserves),
- grade control and reconciliation,
- operational production and safety monitoring and
- aspects related to optimization of mine design.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	60
Project	60
Preparation of a project	15
Preparation of a report/summary/presentation/paper	5
Prepararation for an exam/credit	8
Credit/Exam	2
Student workload	**Hours** 150

Wrocław University of Science and Technology

Geological Mapping

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.54PS.04987.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 3	Exam **Activities and hours** Lecture: 30 Project: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Characterizes methods for exploring mineral deposits.	K2_GIG_W08, K2_GIG_W10, K2_GIG_W11
PEU_W02	Explains the processes described by general and specific theories required for practicing in the fields of Earth sciences engineering (geological engineering, geophysical engineering, geoinformatics engineering), distinguishes the internal connections between geological processes, and describes the planning and interpretation procedures based on these processes.	K2_GIG_W10, K2_GIG_W11
In terms of skills		

PEU_U01	Develops complex planning, construction, inspection, and administrative tasks (plans for geological and geophysical surveys of natural resources, acquisition of environmental geology) with innovative application of theories and terminology describing technical knowledge about the Earth.	K2_GIG_U04
PEU_U02	Analyzes the structure of the raw material extraction sector, the technologies used for extraction and processing of mineral resources, as well as the scope of geo-environmental tasks, their external socio-economic environment, and the regulatory system.	K2_GIG_U10
In terms of social competences		
PEU_K01	Respects and adheres to ethical principles and written rules of work and professional culture in his activities, and is able to uphold them even while managing small work groups.	K2_GIG_K03
PEU_K02	Is sensitive to the needs and concerns of local communities, considering them in the spatial planning process after the cessation of mining activities and discussing the relationships between mining, mining damages, and spatial planning.	K2_GIG_K03

Program content ensuring learning outcomes

The subject provides knowledge on representing geological phenomena on topographic maps, preparing geological maps and cross-sections, creating their legends, and drafting explanatory reports. The purpose of preparing geological maps. Geological map and its additional parts (geological cross-sections, stratigraphic columns, and legend). Geological phenomena represented on geological maps: lithostratigraphic units, structural features. Different types of geological boundaries and their recognition in the field. Orientation in the field using a topographic map and GPS. Documentation of field observations in a field notebook and on a topographic map. Preparation of geological cross-sections. Preparation of covered and uncovered geological maps (without Quaternary sediments) with a stratigraphic column and legend. Drafting explanatory reports.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Preparaton for classes	10
Preparation of a report/summary/presentation/paper	10
Prepararation for an exam/credit	6
Preparation of a project	10
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Field and Laboratory Practicum

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.54PS.05018.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Project: 120 h, 6 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	To sample various geological materials (minerals, rocks, sediment, soil, water) for the purpose of exploration of the mineral deposits. To conduct field measurements of selected parameters in geological materials (eg pH, EC, redox potential, radioactivity) for the purpose of geochemical prospecting.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U13
In terms of social competences		
PEU_K01	Follows various field and laboratory methods and works used in the exploration of mineral deposits, being aware of the necessity to develop skills. Can convey their knowledge and the methods they use. Chooses methods that minimize adverse environmental impact.	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Students will be introduced to various field and laboratory methods used in exploration of mineral deposits. Students will be trained to recognize mineralization, visualize 3D geological structures, and reconstruct geological history. Most of the activities will be related to proper geological fieldwork: observation, personal filed book, interpretation and sampling.

Calculation of ECTS points

Activity form	**Activity hours**
Project	120
Prepararation for an exam/credit	8
Preparation of a project	20
Credit/Exam	2
Student workload	**Hours** 150

Wrocław University of Science and Technology

Digital Mine

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.54PS.04990.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 15 h, 1 ECTS, Graded credit • Laboratory: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	characterizes issues related to automation systems, control systems and measurement systems in various aspects of the mining industry.	K2_GIG_W07, K2_GIG_W12, K2_GIG_W18, K2_GIG_W19
PEU_W02	explains the importance of automation and robotics systems in modern mining.	K2_GIG_W07, K2_GIG_W12, K2_GIG_W18, K2_GIG_W19
In terms of skills		
PEU_U01	is able to select and integrate elements of a specialized measuring and control system including: control unit, executive system, measuring system as well as peripheral and communication modules	K2_GIG_U04, K2_GIG_U07

PEU_U02	designs improvements in the existing design solutions for automation and robotics components and systems	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08

Program content ensuring learning outcomes

Creation of utility applications in the C / C ++ and LabVIEW environment
Knowledge about embedded systems, their construction, selection of components, designing, programming and their exploitation.
Advances of technology & methods of future mining operations.
Building social competencies including emotional intelligence skills involving the cooperation in the group of students

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	15
Preparation of a project	10
Prepararation for an exam/credit	5
Self-study of class topics	5
Student workload	**Hours** 50

Wrocław University of Science and Technology

Start-Ups and Venture Formation

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.54PS.05032.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 3	Exam **Activities and hours** Lecture: 30 Project: 30 Seminar: 30	6.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	identifies and explains business start-up theories and processes.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W10, K2_GIG_W18
In terms of skills		
PEU_U01	critically analyses different business ventures and is skilled in testing business ideas and models.	K2_GIG_U07, K2_GIG_U13

PEU_U02	analyses business cases, prepares a business plan with its calculations, and pitches the plan successfully.	K2_GIG_U07, K2_GIG_U13
PEU_U03	organizes work as a team member in a development project.	K2_GIG_U07, K2_GIG_U13
In terms of social competences		
PEU_K01	demonstrates the ability to think and act in a creative and entrepreneurial manner.	K2_GIG_K01

Program content ensuring learning outcomes

Entrepreneurship theory and process, business ideas and opportunities, business models, entrepreneurial teams, start-ups and spin-offs, start-up process and development stages, start-up strategies and sequencing activities, start-up financing, testing of business ideas, business plans, and cases.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Seminar	30
Preparation of a project	25
Preparaton for classes	16
Prepararation for an exam/credit	8
Preparation of a report/summary/presentation/paper	7
Credit/Exam	4
Student workload	**Hours** 150

Wrocław University of Science and Technology

Reclamation

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg	**Subject code** W6GIG/000GMFS.54PS.04941.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Obligatory in specialty
Education profile general academic profile	**Block** Specialty subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 3	Exam **Activities and hours** Lecture: 30 Laboratory: 45 Project: 45	6.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Cites legal regulations applicable to geology, mining, and environmental protection. Defines the formal and legal conditions for mining activities.	K2_GIG_W04, K2_GIG_W07, K2_GIG_W10, K2_GIG_W11, K2_GIG_W12, K2_GIG_W19
In terms of skills		

PEU_U01	Utilizes IT tools to optimize reclamation processes. Selects appropriate reclamation methods for different conditions.	K2_GIG_U04, K2_GIG_U05, K2_GIG_U07, K2_GIG_U10, K2_GIG_U12

Program content ensuring learning outcomes

The module provides the development of expertise and methodological skills in the field of mining engineering. The students learn the theory and practice of reclamation in mining as essential element of balance for mining impacts. They understand the parallelism of mine and reclamation planning and the fact, why reclamation can exceed the mine project phase. Additionally the students will be qualified to explain scientifically reclamation measures, plan technical measures and calculate the financial expenses.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	45
Project	45
Preparation of a project	10
Preparation of a report/summary/presentation/paper	10
Prepararation for an exam/credit	6
Credit/Exam	4
Student workload	**Hours** 150

Wrocław University of Science and Technology

Graduate Research Seminar

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.54PS.04981.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Seminar: 30 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Presents accurate scientific communications in written and oral form in the field of applied Earth sciences. Selects appropriate solutions for citation. Cites various sources of literature in the field of applied Earth sciences, choosing appropriate and reliable sources of information.	K2_GIG_W01, K2_GIG_W07, K2_GIG_W10
In terms of skills		
PEU_U01	Creates accurate field reports in accordance with their content and formal requirements. Creates and demonstrates oral presentations of varying lengths in the field of applied Earth sciences. Creates charts and graphics with appropriate visual aids and approach.	K2_GIG_U01, K2_GIG_U08, K2_GIG_U13
In terms of social competences		

PEU_K01	Is sensitive to the knowledge and adherence to professional and ethical values. Takes on the challenge of working independently, showing initiative for work processes carried out under his/her control.	K2_GIG_K02

Program content ensuring learning outcomes

Introduction to methods of collecting and evaluating information, formal and ethical requirements of scientific communication, principles of preparing oral and poster presentations. During the course, these general requirements are adapted to the field of Earth sciences and engineering. Examples and exercises will use English-language publications and textual materials. Editorial and formal requirements of scientific publications. Planning the concept and structure of a scientific publication, preparing an outline, developing a concept map. Use of sources, citation styles. Ethics of scientific writing: how to avoid plagiarism, use of quotations. Information sources provided by the Central Library: paper versions, catalog search, electronic resources. Use of electronic information resources: search options, simple and complex searches, electronic libraries. Data visualization: charts, drawings, tables. Art of presentation: preparation for oral presentation. Art of presentation: preparation of a poster.

Calculation of ECTS points

Activity form	**Activity hours**
Seminar	30
Preparaton for classes	8
Preparation of a report/summary/presentation/paper	10
Credit/Exam	2
Student workload	**Hours** 50

Wrocław University of Science and Technology

Geochemistry

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.54PC.04991.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects of basic education - chemistry

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 30 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student possesses knowledge relating to the thermodynamic and geochemical principles and processes which occur in the Earth's crust	K2_GIG_W02, K2_GIG_W10
PEU_W02	Student possesses basic knowledge in the area of rock formation and the determination of the age of rocks.	K2_GIG_W02, K2_GIG_W10
In terms of social competences		
PEU_K01	Student is able to formulate and impart knowledge regarding processes occurring in the Earth's crust and their impact on the environment.	K2_GIG_K03

Program content ensuring learning outcomes

Lec.1 Introduction. History, present time and future of the Universe. Construction of the Earth and the structure of outer

zones
Lec.2 The basics of thermodynamic geological processes (parameters and functions of state)
Lec.3 Geochemical calculations (solutions, reactions, pH, Eh, dissolution, phase diagrams, stability, rule of contradiction)
Lec.4 Geochemical calculations (chemical equilibria diagrams)
Lec.5 Global geochemical cycles
Lec.6 Geochemistry of elements
Lec.7 Geochemistry of organic compounds
Lec.8 Earth and life
Lec.9 Applied Geochemistry
Lec.10 Determination of the absolute age of rocks. Mineral thermometry and barometry
Lec.11 Mineral facies indicators
Lec.12 Natural non-isotope markers
Lec.13 Natural isotope markers
Lec.14 Artificial non-isotope markers
Lec.15 Paleomagnetism and dendrochronology

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Prepararation for an exam/credit	20
Student workload	**Hours** 50

Wrocław University of Science and Technology

Academic Entrepreneurship

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.54PS.05033.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 3	Exam **Activities and hours** Lecture: 30 Project: 30 Seminar: 30	6.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	defines and develops awareness of their entrepreneurial mindset.	K2_GIG_W01, K2_GIG_W03, K2_GIG_W06, K2_GIG_W10
PEU_W02	identifies and explains entrepreneurial opportunities and routes for grasping them.	K2_GIG_W01, K2_GIG_W03, K2_GIG_W06, K2_GIG_W10
In terms of skills		

PEU_U01	analyses, evaluates and demonstrates new ways to commercialize their knowledge, skills and research activities.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U05, K2_GIG_U06, K2_GIG_U12
In terms of social competences		
PEU_K01	demonstrates the ability to think and act in a creative and entrepreneurial manner.	K2_GIG_K01
PEU_K02	declares the need to formulate and convey to the public – including through the mass media – information and opinions regarding the achievements of the mining industry, geoengineering and mineral engineering, and other aspects of the engineer's activity, makes efforts to convey such information and opinions in a generally understandable manner, presenting different points of view, is aware of the value and need to shape a culture of occupational safety and responsibility for the health and lives of other employees.	K2_GIG_K02
PEU_K03	declares awareness of the importance of the non-technical effects of engineering activities, including their impact on the environment and the related responsibility for decisions made.	K2_GIG_K03

Program content ensuring learning outcomes

The central concepts of entrepreneurship. The entrepreneurial mindset, motivations, resources and opportunity recognition. The anatomy of the venturing process. Commercializing academic skills and research activities. Communicating entrepreneurial ventures.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Project	30
Seminar	30
Credit/Exam	4
Prepararation for an exam/credit	13
Conducting literature research	7
Preparation of a report/summary/presentation/paper	6
Preparaton for classes	11
Preparation of a project	9
Self-study of class topics	10
Student workload	**Hours** 150

Wrocław University of Science and Technology

Student Research Project

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.54PS.05004.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Project: 90 h, 6 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	A student accurately formulates a research problem for the chosen topic and characterizes the principles of proper scientific analysis of the research problem.	K2_GIG_W01
In terms of skills		
PEU_U01	A student analyzes data collected during field and laboratory research to draw scientific conclusions, argues their position based on collected evidence and scientific literature, and selects appropriate tools and methods for the implementation of the research project.	K2_GIG_U01, K2_GIG_U07, K2_GIG_U08, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	A student demonstrates initiative in seeking new research methods and techniques and ensures precise and comprehensible communication of research findings to the public.	K2_GIG_K01, K2_GIG_K02

Program content ensuring learning outcomes

Formulation of a research problem. Defining research goals. Analyzing the problem in a scientifically correct manner. Analyzing the literature. Theoretical foundations of conducting research.
Synthesizing knowledge and skills acquired throughout the period of study. Critical analysis of information, scientific summary and drawing conclusions.
Planning, organizing and conducting research and development projects.

Calculation of ECTS points

Activity form	**Activity hours**
Project	90
Preparation of a project	50
Preparation of a report/summary/presentation/paper	8
Credit/Exam	2
Student workload	**Hours** 150

Wrocław University of Science and Technology

Environmental Aspects of Mineral Extraction

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.54PS.04960.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 3	Exam **Activities and hours** Lecture: 30 Classes: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	It characterizes the principles of mining and sustainable development in the context of ethical responsibility. It explains the purpose and stages of the Environmental Impact Assessment (EIA) process. It identifies the main impacts of mining projects on the atmospheric, terrestrial, and aquatic environments.	K2_GIG_W04, K2_GIG_W11, K2_GIG_W12, K2_GIG_W13
In terms of skills		
PEU_U01	It uses tools to assess the environmental impact of mining projects.	K2_GIG_U03, K2_GIG_U05, K2_GIG_U10, K2_GIG_U12

In terms of social competences		
PEU_K01	Accepts the need to formulate and communicate information about the achievements of the mining industry to the public. Ensures that information is conveyed in a universally understandable manner, presenting various viewpoints. Declares commitment to fostering a culture of workplace safety. Appreciates the value of responsibility for the health and lives of other workers. Identifies issues related to the environmental impact of engineering activities. Is responsible for making decisions aimed at minimizing the negative effects of engineering activities. Is open to different viewpoints and opinions regarding the mining industry. Is sensitive to social and environmental needs related to mining projects. Takes on the challenge of communicating the achievements of the mining industry through mass media. Respects the principles of sustainable development and ethical responsibility in the context of engineering activities.	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

The course introduces environmental and social aspects related to mining projects, as well as the Environmental Impact Assessment (EIA) processes in Austria, Europe, and abroad. Students will learn to describe the principles of mining and sustainable development in the context of ethical responsibility. They will identify, analyze, and understand the main impacts of mining projects on atmospheric, land, and water environments. The course covers the main issues related to the impact of mining projects on the community, aspects of land reclamation, and mine closure in the context of preventing environmental impacts for decades after mining has ceased. Additionally, students will learn the purpose and stages of the EIA process.

Calculation of ECTS points

Activity form	Activity hours
Lecture	30
Classes	30
Credit/Exam	4
Preparaton for classes	6
Preparation of a report/summary/presentation/paper	5
Student workload	**Hours** 75

Wrocław University of Science and Technology

Mine Water I – Formation and Treatment

Educational subject description sheet

Basic information

Field of study Mining and Geology	**Education cycle** 2025/2026
Speciality Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg	**Subject code** W6GIG/000GMFS.54PS.04943.25
Organizational unit Faculty of Geoengineering, Mining and Geology	**Group of classes** Yes
Study level second degree 4 semesters	**Lecture languages** English
Study form full-time studies	**Mandatoriness** Elective
Education profile general academic profile	**Block** Specialty subjects
	Subject related to scientific research Yes

Semester	**Examination**	**Number of ECTS points**
Semester 3	Graded credit **Activities and hours** Lecture: 60 Laboratory: 60	6.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Characterizes the processes of acid mine drainage formation and identifies the risks associated with mining activities and their impact on the environment.	K2_GIG_W10
In terms of social competences		
PEU_K01	Accepts the importance of responsibility for engineering decisions affecting the environment and defends the principles of sustainable development in the context of mining activities.	K2_GIG_K03

Program content ensuring learning outcomes

The student will gain general knowledge about the formation of acidic mine waters and how to investigate the detailed behaviour. Furthermore he gets knowledge about treatment strategies. So in the end he is able to choose proper measures for partial avoiding of acidic mine water formation and he can choose suitable and site specific treatment strategies

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	60
Laboratory	60
Preparaton for classes	8
Preparation of a report/summary/presentation/paper	10
Preparation of a project	10
Credit/Exam	2
Student workload	**Hours** 150

Wrocław University of Science and Technology

Information Management

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMFS.54PS.04944.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Elective

Block
Specialty subjects

Semester	Examination	Number of ECTS points
Semester 3	Graded credit **Activities and hours** Lecture: 60 Laboratory: 60	6.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Defines the impact of information systems on the business environment and demonstrates the influence of information systems on business models and managerial decision-making.	K2_GIG_W10
In terms of social competences		
PEU_K01	Respects environmental protection principles in the context of information technology use and is responsible for the quality and security of data in information systems.	K2_GIG_K03

Program content ensuring learning outcomes

Completion of the course provides a general view of the integration of business and technology in enterprises. This course offers a comprehensive and integrative understanding of new technologies, information system applications, and their impact on business models and managerial decision-making. From a managerial perspective, the course covers the application of concepts related to hardware, software, and data organization. The subject enables understanding and application of the basics of information systems, focusing on economic issues and the significance of information systems for enterprises and practical information and communication technologies to increase the efficiency and effectiveness of information systems.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	60
Laboratory	60
Preparation of a project	15
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	3
Credit/Exam	2
Student workload	**Hours** 150

Wrocław University of Science and Technology

Business Communication

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMFS.54PS.04945.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Elective

Block
Specialty subjects

Semester	Examination	Number of ECTS points
Semester 3	Graded credit **Activities and hours** Lecture: 60 Classes: 60	6.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student presents the principles of effective communication to any situation, from writing to presenting and storytelling	K2_GIG_W05
PEU_W02	Characterizes communication techniques for influence and emotional impact	K2_GIG_W05
In terms of skills		
PEU_U01	The student applies the principles of effective communication to different situations. Develops his own unique voice to communicate with any audience.	K2_GIG_U01
In terms of social competences		

PEU_K01	The student declares awareness of the importance of effective communication in professional, business and social environments.	K2_GIG_K03

Program content ensuring learning outcomes

In this course, student will learn how to captivate an audience from the very first words they write or say, techniques for making a mark with memorable messages, and how to find and use the power of one's own unique style. Students will also explore the importance of being crystal clear on one's story, the effectiveness of simplicity, incisive writing and speaking techniques, using logic and emotion to influence and persuade, how to adopt positive body language to help them command an audience, and the remarkable but all too often underappreciated art of storytelling.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	60
Classes	60
Preparaton for classes	16
Credit/Exam	4
Prepararation for an exam/credit	10
Student workload	**Hours** 150

Wrocław University of Science and Technology

Design Thinking

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.54HS.02721.25

Lecture languages
English

Mandatoriness
Elective

Block
Subjects from the fields of humanities or social sciences

Semester	Activities, hours, ECTS and examination
Semester 3	• Project: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	The student is able to apply Design Thinking in the area of designing services and products for external partners.	K2_GIG_U08
In terms of social competences		
PEU_K01	The student is able to collaborate effectively in self-managing teams; can identify functions and roles that reflect their preferences and self-fulfillment needs; takes responsibility for assigned tasks and performs them diligently.	K2_GIG_K01

Program content ensuring learning outcomes

Understanding the method of Design Thinking.
Stimulating creativity and an innovative approach to analyzed issues and problem-solving.

Calculation of ECTS points

Activity form	Activity hours
Project	15
Preparation of a project	3
Preparaton for classes	3
Preparation of a report/summary/presentation/paper	4
Student workload	**Hours** 25

Wrocław University of Science and Technology

Electronic Sources of Information in Master Thesis Preparation

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.54PS.04993.25

Lecture languages
English

Mandatoriness
Elective

Block
Specialty subjects

Semester	Activities, hours, ECTS and examination
Semester 3	• Project: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student recognizes advanced MS Word functions used for professional thesis preparation, including formatting, document automation, and citation management.	K2_GIG_W01
PEU_W02	The student explains how to use electronic databases and scientific literature resources and differentiates methods of critically evaluating obtained scientific information.	K2_GIG_W01
PEU_W03	The student selects tools for managing scientific literature and presents the principles of their application for citation management.	K2_GIG_W01
PEU_W04	The student compares modern methods of disseminating mining knowledge, including the use of educational platforms, webinars, and social media.	K2_GIG_W01
In terms of skills		

PEU_U01	The student independently prepares a complete document in MS Word using advanced functions.	K2_GIG_U13
PEU_U02	The student searches for and filters scientific information using electronic databases and applies search techniques using keywords and logical operators.	K2_GIG_U01, K2_GIG_U13
PEU_U03	The student critically analyzes the quality and credibility of acquired sources and evaluates them in the context of the thesis being prepared.	K2_GIG_U01, K2_GIG_U08, K2_GIG_U13

Program content ensuring learning outcomes

1. Utilization of modern digital tools for efficient thesis preparation.
2. Use of advanced MS Word functions.
3. Discussion of literature resources, including databases and tools for managing literary sources.
4. Critical analysis and evaluation of the credibility and quality of scientific sources.
5. Overview of modern methods of disseminating mining and geological knowledge using the latest communication forms (webinars, podcasts, social media).

Calculation of ECTS points

Activity form	**Activity hours**
Project	15
Preparation of a report/summary/presentation/paper	8
Self-development of practical skills	2
Student workload	**Hours** 25

Wrocław University of Science and Technology

Intelligent Product-Service Systems

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.54PS.05035.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Elective

Block
Specialty subjects

Semester	Examination	Number of ECTS points
Semester 3	Graded credit **Activities and hours** Lecture: 15 Laboratory: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	recognizes and explains trends in product-service systems and digital transformation affecting manufacturing business.	K2_GIG_W18
PEU_W02	defines and explains the concepts related to product data management, product life cycle management, and IoT-based data services.	K2_GIG_W02, K2_GIG_W18
PEU_W03	recognizes the company's products and service processes and understands their interaction with the company's overall operations.	K2_GIG_W01, K2_GIG_W18
In terms of skills		

PEU_U01	categorises and evaluates PSS (Product Service System), PLM (Product Lifecycle Management) and ERP (Enterprise Risk Management) systems' characteristics, technical features, and managerial functions and verifies their role in product development and business management.	K2_GIG_U01, K2_GIG_U03, K2_GIG_U04, K2_GIG_U13
In terms of social competences		
PEU_K01	demonstrates the ability to think and act creatively and entrepreneurially.	K2_GIG_K01

Program content ensuring learning outcomes

Product-Service Systems (PSS) and Product Lifecycle Management (PLM) trends and digital transformation. Challenges with lifecycle management, requirements management, and systems engineering. Product information modeling, change management, and configuration management through lifecycle (CLM). IoT-based data services. Systems of utilization. Future of PSS in various industries.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	30
Preparation of a project	12
Self-development of practical skills	4
Preparation of a report/summary/presentation/paper	2
Credit/Exam	2
Prepararation for an exam/credit	4
Self-study of class topics	6
Student workload	**Hours** 75

Wrocław University of Science and Technology

Inventive Product Design and Advanced TRIZ

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.54PS.05036.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Elective

Block
Specialty subjects

Semester	Examination	Number of ECTS points
Semester 3	Graded credit **Activities and hours** Lecture: 15 Laboratory: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	distinguishes and explains the conceptual design phase and its instruments.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W18
PEU_W02	identifies and explains the voice of the product and forecasts technology evolution.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W18
In terms of skills		

PEU_U01	searches for and analyzes the patent landscape.	K2_GIG_U01, K2_GIG_U03, K2_GIG_U04, K2_GIG_U13
PEU_U02	modulates and modifies ideation algorithms.	K2_GIG_U01, K2_GIG_U03, K2_GIG_U04, K2_GIG_U13
PEU_U03	designs a new product and concept of the service on demand.	K2_GIG_U01, K2_GIG_U03, K2_GIG_U04
PEU_U04	evaluates design concepts from managerial and production perspectives.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U13
In terms of social competences		
PEU_K01	is capable of thinking and acting in a creative and entrepreneurial manner.	K2_GIG_K01

Program content ensuring learning outcomes

The subject contains basic and modern TRIZ (Theory for Inventive Problem Solving) tools for idea generation and other analytical tools that have proven their efficiency in the industry. The methods to find an idea that can save the product. Analyses of the situations when an out-of-box solution is needed. The methods to systematically deliver the list of patentable concepts to improve a product or a service. The method to circumvent the patents of competitors and develop an IP strategy. The subject includes the following modules: Introduction, Basics of Patenting, Function Definition, Function-oriented Search and Biomimetics, Contradictions, Function Modelling and Ttrimming, Cause-Effect Chain Analysis, Trends of Engineering System Evolution, Axiomatic Design, Design for Manufacturing and Assembly, and Conclusion. There are about 20 case studies and 100+ examples of smart new product design, technology troubleshooting, and inventive solutions, many of which come from success and failure stories of technological giants. Most cases originate from the engineering domain, although basic knowledge like how car brakes work and what is inside a refrigerator (except food) plus curiosity is enough to follow most.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	30
Credit/Exam	2
Prepararation for an exam/credit	6
Preparation of a project	10
Self-study of class topics	5
Preparation of a report/summary/presentation/paper	5
Conducting literature research	2

Student workload	Hours 75

Wrocław University of Science and Technology

Knowledge Discovery and Process Data Analysis

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.54PS.05037.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Elective

Block
Specialty subjects

Semester	Examination	Number of ECTS points
Semester 3	Graded credit **Activities and hours** Lecture: 15 Laboratory: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	defines and explains basic information on the main concept of the knowledge discovery process concerning industrial data.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W18
In terms of skills		
PEU_U01	analyses and evaluates the effect of digitalization and automation on the amount, nature, and quality of data from the chemical engineering point of view.	K2_GIG_U01, K2_GIG_U03, K2_GIG_U04, K2_GIG_U13

PEU_U02	]applies specified methods and methodology to data.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U13
PEU_U03	applies management and collaboration skills in the implementation of project work.	K2_GIG_U01, K2_GIG_U13
In terms of social competences		
PEU_K01	demonstrates the ability to think and act in a creative and entrepreneurial manner.	K2_GIG_K01

Program content ensuring learning outcomes

Knowledge discovery refers to the overall process of discovering useful knowledge from data. The knowledge discovery process is interactive and iterative and involves several steps, starting from studying the application domain and ending with the use of the information discovered. Process data analysis can be part of this process. Fundamental concepts - such as reliability of data, preprocessing (e.g., de-noising, handling missing data, and scaling strategy), data reduction, choosing a methodology, validation, modelling, etc - will be addressed in lectures, Moodle assignments, and discussions. Project work will be carried out in small groups that will define their working methodology. The course is suitable for distance learning.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	30
Prepararation for an exam/credit	8
Credit/Exam	2
Preparation of a report/summary/presentation/paper	6
Preparation of a project	10
Conducting literature research	4
Student workload	**Hours** 75

Wrocław University of Science and Technology

Development of New Sustainable Products and Solutions

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.54PS.05038.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Elective

Block
Specialty subjects

Semester	Examination	Number of ECTS points
Semester 3	Graded credit **Activities and hours** Lecture: 15 Laboratory: 30	3.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	recognises and depicts various types of new sustainable product development and solutions.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W18
PEU_W02	distinguishes and explains the tailoring of functionalities of biobased polymers to meet the functionality needed for specific applications.	K2_GIG_W01, K2_GIG_W02, K2_GIG_W18
PEU_W03	identifies and depicts various renewable resources (biomaterials, biochemicals, cellulose, lignin, starch, carbohydrates, etc) based on sustainable product development and their applications.	K2_GIG_W01, K2_GIG_W02

PEU_W04	recognises and describes material and molecular design and its role in product performance.	K2_GIG_W02, K2_GIG_W18
In terms of skills		
PEU_U01	analyses and demonstrates the use of forest resources and forest-derived biomaterials for food, pharmaceuticals, composites, industry, and other applications.	K2_GIG_U01, K2_GIG_U03, K2_GIG_U04, K2_GIG_U13
In terms of social competences		
PEU_K01	is capable of thinking and acting in a creative and entrepreneurial manner.	K2_GIG_K01

Program content ensuring learning outcomes

The subject contains an overview of sustainable biobased products, bio-based barrier technologies for packaging applications, Biobased hygienic products and Solutions, Biomaterials for Printing, Biobased tall oil products, and Biomaterials in food application. Fundamentals about biomaterial design, modification, synthesis, and use of fibers, cellulose (derivatives), and lignin in various products. Chemical and mechanical modification, separation methods, mixing and drying methods. Product specification requirements and characterization methods. In addition, the course contains an interesting topic of group and individual assignments related to modern trends of sustainable biobased products and solutions.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	30
Credit/Exam	2
Prepararation for an exam/credit	5
Preparation of a project	10
Preparation of a report/summary/presentation/paper	5
Preparaton for classes	4
Conducting literature research	4
Student workload	**Hours** 75

Wrocław University of Science and Technology

Project Management, Appraisal and Risk Evaluation

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.54HS.04924.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects from the fields of humanities or social sciences

Subject related to scientific research
Yes

Semester	Examination	Number of ECTS points
Semester 3	Exam **Activities and hours** Lecture: 15 Laboratory: 30 Project: 15	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	discusses the concepts of demand and supply and their impact on the market, characterizes the concepts of costs in economics and accounting and explains their differences.	K2_GIG_W03, K2_GIG_W05
PEU_W02	characterizes the contents of financial statements and presents the method of ratio analysis of financial statements	K2_GIG_W03, K2_GIG_W11
PEU_W03	understands the concepts of Future Value and Present Value of cash flows, characterizes the main methods of capital budgeting and project evaluation, as well as the main methods of investment project risk assessment.	K2_GIG_W03

In terms of skills		
PEU_U01	analyzes the causes and consequences of changes in demand and supply, interprets cost data presented in various cost classification systems, demonstrates the ability to make short-term decisions based on cost data.	K2_GIG_U04, K2_GIG_U08
PEU_U02	can read information presented in financial statements and analyse them using financial ratios.	K2_GIG_U04, K2_GIG_U06
PEU_U03	is able to calculate Present Value of cash flows, can perform capital budgeting procedure, assess the investment project as well as the risk involved.	K2_GIG_U03, K2_GIG_U06
PEU_U04	is able to create basic project documentation and initiate the project. Can utilise the basic methods of project management, monitoring and risk assessment.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U09
PEU_U05	is able to utilise the basic methods of group conflict management, basic methods of group management and leadership, can assess effectiveness of group management	K2_GIG_U08, K2_GIG_U09
In terms of social competences		
PEU_K01	demonstrates the ability to think and act in a systematic, creative and entrepreneurial manner, has an attitude of economic acting and decision making on the basis of financial data and forecasts.	K2_GIG_K01

Program content ensuring learning outcomes

The course combines two groups of topics: basics of mineral resources economics and financial management and introduction to project management.
Part A: Supply and demand mechanism, Concept of costs in microeconomics and accounting. Cost accounting for reporting and management purposes. Content of financial statements and their analysis. Concept of change in the value of money over time. Methods of investment project evaluation. Analysis of the profitability of investment projects in risk conditions.
Part B: Introduction to basic concepts, methods and tools of project management. Presentation of selected areas of project management: project scope management, project time management, project cost management, project risk management. Planning, scheduling and control of projects using Microsoft Project. Issues of effective communication in project teams, group behavior and leadership.

Calculation of ECTS points

Activity form	Activity hours
Lecture	15
Laboratory	30
Project	15
Preparation of a project	10
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	6
Prepararation for an exam/credit	10
Credit/Exam	4

Student workload	**Hours** 100

Wrocław University of Science and Technology

Rock Mechanics

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.54PS.04961.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 45 h, 3 ECTS, Exam • Laboratory: 30 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	A student defines concepts related to stresses in the Earth's crust and methods for their measurement, illustrates the principles governing rock fracturing around mining excavations, and explains the role of support systems in mines.	K2_GIG_W10, K2_GIG_W14, K2_GIG_W18
In terms of skills		
PEU_U01	A student analyzes stable mining systems, selects and implements effective mine support systems, constructs and modifies the full 3D orientation of the mine, and conducts control measurements of the excavation direction.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U10

Program content ensuring learning outcomes

On completion of this course the participants shall be able to:

-Plan stable mining layouts
-Select the most appropriate stoping method
-Design stable stoping excavations and pillar systems
-Select and implement the most effective and economic mine support systems to protect mine workers against the hazards of rock falls and rock bursts.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	45
Laboratory	30
Credit/Exam	4
Prepararation for an exam/credit	6
Preparaton for classes	5
Preparation of a report/summary/presentation/paper	15
Preparation of a project	20
Student workload	**Hours** 125

Wrocław University of Science and Technology

Operations Research

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.54HS.04927.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects from the fields of humanities or social sciences

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 15 h, 1 ECTS, Graded credit • Laboratory: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	presents the linear programming method, the types of variables in the model, constraints, and the solution approach, as well as the scope of applications, and distinguishes between linear and nonlinear optimization.	K2_GIG_W06
PEU_W02	explains project planning models (CPM and PERT), as well as resource and cost management models.	K2_GIG_W06
PEU_W03	presents the concept of mass service system models and describes simulation models of industrial processes.	K2_GIG_W06
In terms of skills		
PEU_U01	constructs optimization models for production systems and transportation issues.	K2_GIG_U02, K2_GIG_U10

PEU_U02	develops a project schedule based on the CPM and PERT methods.	K2_GIG_U02, K2_GIG_U10
PEU_U03	prepares a simulation model of a technological process using the specified software.	K2_GIG_U02, K2_GIG_U10
In terms of social competences		
PEU_K01	is open to various approaches in decision-making problem-solving and has the ability to work in a team.	K2_GIG_K01

Program content ensuring learning outcomes

Linear and nonlinear optimization models.
Network programming and project scheduling.
Simulations and models of stochastic processes.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	15
Preparaton for classes	5
Self-study of class topics	10
Preparation of a report/summary/presentation/paper	15
Prepararation for an exam/credit	13
Credit/Exam	2
Student workload	**Hours** 75

Wrocław University of Science and Technology

Applied Geodesy

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.54PS.04962.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 30 h, 2 ECTS, Exam • Laboratory: 30 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Characterizes the theory of errors in observations and adjustments, as well as the method of least squares. Classifies measurement errors and methods for their correction.	K2_GIG_W10
In terms of skills		
PEU_U01	Analyzes errors in observations and corrects them using the method of least squares. Selects appropriate techniques for detecting and correcting errors in geodetic measurements	K2_GIG_U03, K2_GIG_U04, K2_GIG_U07

Program content ensuring learning outcomes

Theory of errors in observations and adjustments; method of least squares
Reference and mapping systems
Methods of precise surveying

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	30
Credit/Exam	4
Preparation of a report/summary/presentation/paper	16
Preparation of a project	15
Prepararation for an exam/credit	5
Student workload	**Hours** 100

Wrocław University of Science and Technology

Research in Innovative Exploration

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.54PS.04994.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Project: 90 h, 7 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Formulates a research problem for a selected topic. Analyzes the problem scientifically and presents a detailed review of the required information.	K2_GIG_W01, K2_GIG_W04, K2_GIG_W08, K2_GIG_W10, K2_GIG_W12
In terms of skills		
PEU_U01	Combines knowledge and skills acquired during the learning period, searches for and critically evaluates information, and develops it in a scientific manner.	K2_GIG_U01, K2_GIG_U05, K2_GIG_U07, K2_GIG_U08, K2_GIG_U10, K2_GIG_U13
In terms of social competences		

PEU_K01	Declares the need to interpret obtained scientific results with a critical and analytical approach.	K2_GIG_K01, K2_GIG_K02

Program content ensuring learning outcomes

Upon completion of the course, the student will be able to formulate and analyze research problems in a scientifically correct manner and critically evaluate and synthesize information. They will be able to plan, structure, and carry out research projects, as well as interpret research results critically and analytically. The student will learn to work according to a schedule and express themselves in a scientifically correct manner. They will be able to critically evaluate the work of others and collaborate with a research team. Additionally, they will consider environmental aspects and principles of sustainable development in their research. As a result, the student will acquire the skills necessary to conduct scientific and developmental research in the field of mineral resource exploration.
The goal is to complete a research or development project related to a technique, method, or approach associated with mineral resource exploration, developed or justified under laboratory or field conditions.

Calculation of ECTS points

Activity form	**Activity hours**
Project	90
Preparaton for classes	15
Preparation of a project	38
Preparation of a report/summary/presentation/paper	25
Self-study of class topics	5
Credit/Exam	2
Student workload	**Hours** 175

Wrocław University of Science and Technology

Environmental Management

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.54PS.04928.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 30 h, 2 ECTS, Graded credit • Seminar: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student possesses systematic knowledge of the origins of environmental management systems, review and standardization of environmental management systems..	K2_GIG_W04, K2_GIG_W12
PEU_W02	The student determines the possibilities of practical applications of tools supporting the implementation of the environmental management system.	K2_GIG_W18
PEU_W03	The student presents the basic formal and legal principles regarding the use and application of management systems, tools and executive management.	K2_GIG_W13
PEU_W04	The student explains rational and sustainable management of environmental components.	K2_GIG_W13, K2_GIG_W18
In terms of skills		

PEU_U01	The student uses linguistic resources appropriate for a specialized language in the field of environmental management and is able to use them in linguistic activities in order to communicate in a professional environment related to the field of study; is able to obtain the necessary information and interpret and critically evaluate it, reads and understands professional literature, is able to formulate and comprehensively justify opinions, present problems related to the studied discipline, and participate in scientific and professional discussions.	K2_GIG_U05, K2_GIG_U10, K2_GIG_U12
PEU_U02	The student applies methods and appropriate IT tools in the systemic management of environmental elements.	K2_GIG_U11, K2_GIG_U12
In terms of social competences		
PEU_K01	The student is open to acting in a creative and entrepreneurial way.	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Getting to know systems of environmental management both in Poland and other EU countries.
Getting to know rational and sustainable management of environmental components.
Getting to know the genesis of environmental management systems, review and standardization of environmental management systems.
Getting to know benefits and obligations arising from the implementation of an environmental management system.
Presenting the relationship between an environmental management system and a quality management system.
Presenting an overview of informative methods of supporting the implementation of environmental management systems (possibilities and practical usage of computerised systems of environmental information management, decision support in the area of environmental protection and choice of methods and tools used to support the implementation of an environmental management system).

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Seminar	15
Self-study of class topics	6
Preparation of a report/summary/presentation/paper	14
Preparaton for classes	6
Credit/Exam	4
Student workload	**Hours** 75

Wrocław University of Science and Technology

Selected Aspects of Engineering Surveying in Mining and Tunnelling

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.54PS.04963.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 45 h, 3 ECTS, Exam • Laboratory: 60 h, 3 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student characterizes the methods and objectives of engineering surveying in mining and tunneling, describes monitoring and control processes in the construction of excavations, and analyzes deformation. They justify and demonstrate these practices in real-world applications.	K2_GIG_W07, K2_GIG_W09
In terms of skills		
PEU_U01	The student analyzes the objectives and methods of engineering surveying in the context of mining and tunneling. They construct and modify the full 3D orientation of the mine and conduct control measurements.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U07

Program content ensuring learning outcomes

On completion of this course the students will have developed skills for complex problem solutions in the field of engineering surveying for
mining and tunneling. They shall be able to:

- Plan and carry out of stake out in mining and tunneling
- Plan, implement and evaluate the complete orientation (3D) of a mine
- Plan and carry out surveying for heading control
- Plan, assemble, survey and analyze deformation profiles and networks
- Select the method and planning of hydrographic surveying.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	45
Laboratory	60
Credit/Exam	4
Preparation of a project	15
Prepararation for an exam/credit	10
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	6
Student workload	**Hours** 150

Wrocław University of Science and Technology

Computer Aided Geological Modelling & Geostatistics - Part Geostatistics

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.54PM.04919.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects of basic education - mathematics

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Estimation methods, principles of geostatistics, kriging estimators	K2_GIG_W15
PEU_W02	Geostatistical modelling of the selected deposit parameters (domain analysis, variogram modelling)	K2_GIG_W06, K2_GIG_W08, K2_GIG_W15
In terms of skills		
PEU_U01	Application of relevant estimation methods for quality modelling of a deposit	K2_GIG_U02, K2_GIG_U04, K2_GIG_U08

Program content ensuring learning outcomes

Geology of the seam. Structural model of the stratified deposit. Methods of the prediction of the surface layer parameters. Spatial distribution of samples values. Regionalized variable. BLUE Estimator of the mean value: Kriging.

Domain analysis with the use of the statistical methods. Determination of the empirical variogram. Anisotropy analysis. Variogram modelling. Kriging Neighborhood Analysis - defining optimal parameters of the estimation procedure.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Preparaton for classes	15
Prepararation for an exam/credit	10
Self-study of class topics	10
Student workload	**Hours** 50

Wrocław University of Science and Technology

Digital Mine

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.54PS.04990.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 15 h, 1 ECTS, Graded credit • Laboratory: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	characterizes issues related to automation systems, control systems and measurement systems in various aspects of the mining industry.	K2_GIG_W07, K2_GIG_W12, K2_GIG_W18, K2_GIG_W19
PEU_W02	explains the importance of automation and robotics systems in modern mining.	K2_GIG_W07, K2_GIG_W12, K2_GIG_W18, K2_GIG_W19
In terms of skills		
PEU_U01	is able to select and integrate elements of a specialized measuring and control system including: control unit, executive system, measuring system as well as peripheral and communication modules	K2_GIG_U04, K2_GIG_U07

PEU_U02	designs improvements in the existing design solutions for automation and robotics components and systems	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08

Program content ensuring learning outcomes

Creation of utility applications in the C / C ++ and LabVIEW environment
Knowledge about embedded systems, their construction, selection of components, designing, programming and their exploitation.
Advances of technology & methods of future mining operations.
Building social competencies including emotional intelligence skills involving the cooperation in the group of students

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	15
Preparation of a project	10
Prepararation for an exam/credit	5
Self-study of class topics	5
Student workload	**Hours** 50

Wrocław University of Science and Technology

Mine Mapping

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.54PS.04964.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 45 h, 3 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Characterizes basic mapping techniques used in mining, explains measurement methods and their application in mine mapping, and creates accurate mine maps using GIS software.	K2_GIG_W18
In terms of skills		
PEU_U01	Designs mine mapping processes using surveying techniques. Analyzes spatial data collected during measurements to optimize extraction systems.	K2_GIG_U07
PEU_U02	Organizes the learning process for oneself and others using modern cartographic tools. Applies acquired skills in practice by leading discussions on the latest trends in mining cartography.	K2_GIG_U08
In terms of social competences		

PEU_K01	Declares the need to formulate and communicate information about achievements in mine mapping to the public. Takes on the challenge of communicating opinions on geotechnical engineering achievements in a widely understandable manner.	K2_GIG_K02

Program content ensuring learning outcomes

Upon completing the course "Mine Mapping," the student will know how to apply surveying techniques to create accurate mine maps. They will be able to analyze spatial data collected during measurements and use it in mine planning and management. Additionally, they will be aware of safety principles and legal regulations related to mine mapping.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	45
Preparation of a report/summary/presentation/paper	15
Preparaton for classes	13
Credit/Exam	2
Student workload	**Hours** 75

Wrocław University of Science and Technology

Computer Aided Geological Modelling & Geostatistics - Part Geological Modeling

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.54PK.04920.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 3	• Laboratory: 45 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Creating and validating 3-D models of various geological structures in the comprehensive dedicated software environment	K2_GIG_W06, K2_GIG_W08, K2_GIG_W15
In terms of skills		
PEU_U01	Evaluating 3-D objects against structural and quality block models (volumes, tonnages, grades)	K2_GIG_U03, K2_GIG_U04, K2_GIG_U08
PEU_U02	Describing the interpretation and applied approach, creating models, evaluation results, recommendations for possible enhancements	K2_GIG_U03, K2_GIG_U04, K2_GIG_U08

Program content ensuring learning outcomes

Quality model of the deposit – block model of the parameter layers. Estimation and evaluation of the block model. Reserves modelling and evaluation. Mineral resources. International reporting. The JORC Code.

Calculation of ECTS points

Activity form	**Activity hours**
Laboratory	45
Preparation of a project	5
Student workload	**Hours** 50

Wrocław University of Science and Technology

Computer Aided Geological Modelling & Geostatistics - Part Geostatistics

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.54PM.04919.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects of basic education - mathematics

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Estimation methods, principles of geostatistics, kriging estimators	K2_GIG_W15
PEU_W02	Geostatistical modelling of the selected deposit parameters (domain analysis, variogram modelling)	K2_GIG_W06, K2_GIG_W08, K2_GIG_W15
In terms of skills		
PEU_U01	Application of relevant estimation methods for quality modelling of a deposit	K2_GIG_U02, K2_GIG_U04, K2_GIG_U08

Program content ensuring learning outcomes

Geology of the seam. Structural model of the stratified deposit. Methods of the prediction of the surface layer parameters.

Spatial distribution of samples values. Regionalized variable. BLUE Estimator of the mean value: Kriging.
Domain analysis with the use of the statistical methods. Determination of the empirical variogram. Anisotropy analysis.
Variogram modelling. Kriging Neighborhood Analysis - defining optimal parameters of the estimation procedure.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Preparaton for classes	15
Prepararation for an exam/credit	10
Self-study of class topics	10
Student workload	**Hours** 50

Wrocław University of Science and Technology

Compulsory Internship

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.54PS.04965.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Project: 75 h, 5 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student characterizes the technologies used in mining, ensuring the continuity of mining operations and the effective exploitation of mineral resources. Describes the hazards occurring in mines and cites elements of Geological and Mining Law.	K2_GIG_W09
In terms of skills		
PEU_U01	Organizes team activities to ensure efficient task completion. Collaborates with team members to integrate diverse skills and knowledge.	K2_GIG_U03, K2_GIG_U09
In terms of social competences		
PEU_K01	Initiates innovative technical and organizational solutions in mining and geotechnical processes. Identifies problems in existing systems and challenges them through creative thinking.	K2_GIG_K01

Program content ensuring learning outcomes

The "Compulsory Internship" course provides students with the opportunity to practically apply the knowledge and skills acquired during their master's studies in "Geomatics for Mineral Resource Management." Students are required to complete a mandatory internship at a relevant institution, preferably outside the university, to gain professional experience. They must prepare a written report presenting the experience gained and their observations and suggestions.

Calculation of ECTS points

Activity form	**Activity hours**
Project	75
Preparation of a project	48
Credit/Exam	2
Student workload	**Hours** 125

Wrocław University of Science and Technology

Engineering Geophysics

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.54PF.04921.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects of basic education - physics

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 15 h, 1 ECTS, Graded credit • Project: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	recognizes, names and explains engineering problems in different fields.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
PEU_W02	identifies, describes, categorises and selects geophysical survey methods.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
PEU_W03	presents, explains, and evaluates case studies on engineering and environmental problems solved by geophysical methods.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
In terms of skills		

PEU_U01	analyses and solves complex practical problems (case studies) in engineering, environmental protection and geoengineering by applying geophysical knowledge and using modern geophysical data acquisition and interpretation.	K2_GIG_U04, K2_GIG_U13
PEU_U02	organizes teamwork, creates field research plans and monitors the work progress.	K2_GIG_U13
PEU_U03	analyses, evaluates, processes and interprets the results of geophysical investigations and makes recommendations related to engineering problems in mining, civil engineering, engineering geology, municipal and nuclear waste disposal sites, archaeology, with engineering properties of soils and rocks, hydrogeology, monitoring seepage in river embankments or dams.	K2_GIG_U04, K2_GIG_U13
PEU_U04	solves analytical geophysical problems/tasks and conducts auto-didactical education related to the detailed handling of typical software.	K2_GIG_U04, K2_GIG_U13

Program content ensuring learning outcomes

The essence and subject matter of descriptive and applied geophysics, geophysical methods used in deep and near-surface measurements. Geophysical methods to study engineering problems and elements and conditions of the environment. Techniques, geophysical survey methodologies and the construction and principles of operation of geophysical instruments used for engineering and environmental studies. Simple geophysical field surveys. Interpretation of the field data. Solving geophysical problems and tasks and critically evaluating the results. Analysing and critically evaluating examples of the application of geophysical methods in solving engineering and environmental problems and their results (case study analysis).

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	15
Preparation of a report/summary/presentation/paper	12
Preparaton for classes	8
Credit/Exam	4
Prepararation for an exam/credit	8
Self-study of class topics	7
Preparation of a project	6
Student workload	**Hours** 75

Wrocław University of Science and Technology

Computer Aided Geological Modelling & Geostatistics - Part Geological Modeling

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.54PK.04920.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 3	• Laboratory: 45 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Creating and validating 3-D models of various geological structures in the comprehensive dedicated software environment	K2_GIG_W06, K2_GIG_W08, K2_GIG_W15
In terms of skills		
PEU_U01	Evaluating 3-D objects against structural and quality block models (volumes, tonnages, grades)	K2_GIG_U03, K2_GIG_U04, K2_GIG_U08
PEU_U02	Describing the interpretation and applied approach, creating models, evaluation results, recommendations for possible enhancements	K2_GIG_U03, K2_GIG_U04, K2_GIG_U08

Program content ensuring learning outcomes

Quality model of the deposit – block model of the parameter layers. Estimation and evaluation of the block model. Reserves modelling and evaluation. Mineral resources. International reporting. The JORC Code.

Calculation of ECTS points

Activity form	**Activity hours**
Laboratory	45
Preparation of a project	5
Student workload	**Hours** 50

Wrocław University of Science and Technology

Geoinformatics

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.54PS.04968.25

Lecture languages
English

Mandatoriness
Obligatory in module

Block
Specialty subjects

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 45 h, 2.5 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Explains the main principles of computer modeling of geological structures and computer-aided design and monitoring of mining objects, and provides examples of the application of geoinformatics tools in monitoring and designing geotechnical objects.	K2_GIG_W15
In terms of skills		

PEU_U01	Analyzes spatial data using software tools employed in the mineral resources industry, which develops critical thinking and continuous improvement skills. Argues the results of analyses, presenting logical and substantive justifications, which is crucial in the learning process and teaching others. Examines methods and concepts of spatial informatics and their applications in the mining industry, encouraging continuous search for new information and knowledge updates. Demonstrates the ability to visualize spatial data by creating clear and understandable maps and charts, which aids in knowledge transfer to others. Selects appropriate tools and techniques for conducting spatial analyses and resource estimation, which develops adaptability and flexibility in learning. Adapts analysis methods to the specific needs and conditions of projects in the mining industry, teaching effective organization of the learning process. Classifies spatial data, sorting it according to specified criteria, which develops the ability to systematize knowledge. Operates spatial analysis software, effectively utilizing its functions and capabilities, which teaches efficient use of available educational resources. Interprets the results of spatial analyses, drawing conclusions and formulating recommendations, which develops the ability to draw conclusions and make recommendations. Categorizes spatial data, organizing it in a way that facilitates further analyses and presentations, which helps in organizing information to facilitate teaching.	K2_GIG_U08
In terms of social competences		
PEU_K01	The student understands the impact of engineering activities on the environment and makes decisions considering sustainable development.	K2_GIG_K03

Program content ensuring learning outcomes

On completion of this course the participants shall be able to: • visualize spatial data, as used in the mineral resources industry with software tools • perform simple analyzes and calculations, such as resource estimations.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	45
Credit/Exam	2
Preparaton for classes	8
Preparation of a report/summary/presentation/paper	7
Student workload	**Hours** 62

Wrocław University of Science and Technology

Sensor and Measurement Technology in Automation

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.54PS.04969.25

Lecture languages
English

Mandatoriness
Obligatory in module

Block
Specialty subjects

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 45 h, 2.5 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	A student characterizes the fundamental elements of the measurement chain, both analog and digital, and selects appropriate measurement amplifiers and operational amplifiers for specific applications.	K2_GIG_W18
In terms of skills		
PEU_U01	A student analyzes various measurement configurations, both analog and digital, demonstrating the ability for continuous improvement and adaptation to new technologies.	K2_GIG_U08

Program content ensuring learning outcomes

With this lecture the students gain knowledge to understand and apply important elements of the measurement chain, relevant measurement methods and sensor principles. The students will be able to analyze, develop and realize sensor applications and measurement systems, and are able to assess and properly interpret the obtained measurement results.

Therewith real world measurement problems can be thoroughly analyzed and solved, even for complex application-specific problems.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	45
Credit/Exam	2
Preparaton for classes	10
Preparation of a report/summary/presentation/paper	5
Student workload	**Hours** 62

Wrocław University of Science and Technology

Production Data Analysis and Modelling

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.54PS.04971.25

Lecture languages
English

Mandatoriness
Obligatory in module

Block
Specialty subjects

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 75 h, 4 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Uses geographic information systems (GIS) to create geological maps, supporting the analysis of production data.	K2_GIG_W07
In terms of social competences		
PEU_K01	Accepts the importance of sustainable development in production data analysis, understanding how the choice of data and analysis methods impacts the environment.	K2_GIG_K03

Program content ensuring learning outcomes

Describe the properties of geoscientific data sets: Understand the characteristics and attributes of various geoscientific data sets used in production data analysis.
Organize geoscience data in a relational database: Efficiently structure and manage geoscience data within relational databases to facilitate analysis and modeling.

Understand and select remote sensing data specific to a problem: Identify and choose appropriate remote sensing data relevant to specific production-related issues.
Calculate and evaluate the distribution shape, average values, and scatter parameters of geoscience data collections: Perform statistical analysis to determine the distribution, central tendency, and variability of geoscientific data.
Use of Geographic Information Systems to create geologic maps: Utilize GIS tools to generate and interpret geologic maps that support production data analysis.
Analyze digital elevation models through the use of a Geographic Information System: Apply GIS techniques to analyze and interpret digital elevation models in the context of production data.
Analyze geoscience data sets using methods of multivariate statistics (regression, factor analysis): Employ multivariate statistical methods to analyze complex geoscientific data sets and derive meaningful insights.
Interpolate 3D geoscience data: Use interpolation techniques to create three-dimensional models of geoscientific data, enhancing the understanding of spatial relationships and trends.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	75
Preparation of a report/summary/presentation/paper	13
Preparaton for classes	10
Credit/Exam	2
Student workload	**Hours** 100

Wrocław University of Science and Technology

Geothermy

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.54PS.04972.25

Lecture languages
English

Mandatoriness
Obligatory in module

Block
Specialty subjects

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student characterizes various types of geothermal resources and explains the processes of their formation and heat flow in the Earth's crust. They analyze the impact of geothermal activities on the environment and develop strategies to minimize negative effects.	K2_GIG_W07
In terms of social competences		
PEU_K01	The student acknowledges the importance of non-technical impacts of engineering activities, appreciates diverse perspectives, and is open to collaboration with experts from various fields. They identify issues related to environmental impact and support decision-making that protects the environment.	K2_GIG_K03

Program content ensuring learning outcomes

Upon completing the course the student will:
Know the different types of geothermal resources and the principles of their formation and heat flow in the Earth's crust.
Understand how to select appropriate technologies for extracting geothermal energy and assess their reliability and life cycle.
Be able to model and simulate geothermal systems using tools and software for geothermal reservoir analysis.
Be capable of analyzing the environmental impact of geothermal activities and developing strategies to minimize negative effects.
Carry out practical projects related to geothermal energy and present the results of their research and analyses.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Credit/Exam	2
Preparaton for classes	8
Student workload	**Hours** 25

Wrocław University of Science and Technology

Principles and Application of InSAR and GIS in Mining

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.54PK.04922.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 30 h, 2 ECTS, Exam • Laboratory: 45 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Defines expanded concepts in the use of geo-information systems to collect and process data used in modeling both natural and anthropogenic phenomena and processes.	K2_GIG_W15, K2_GIG_W16, K2_GIG_W18
PEU_W02	Describes the principles of construction and functioning of geoinformation systems in the mining industry and public administration.	K2_GIG_W15, K2_GIG_W16, K2_GIG_W18
In terms of skills		
PEU_U01	Uses advanced GIS tools in mining, studies of natural phenomena, the impact of mining on the environment and space development,	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08
PEU_U02	Formulates and solve spatial tasks in the GIS environment.	K2_GIG_U04, K2_GIG_U07

PEU_U03	Interprets the results obtained and draw conclusions.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08

Program content ensuring learning outcomes

1. Satellite radar interferometry, the possibility of using it in the ground deformation measurements.
   Determination of surface displacements based on satellite radar data.
   Use of GIS in advanced analysis of objects, phenomena and processes occurring in space.
   Formulation and solving tasks using GIS analytical functions.
   Use of spatial data and services in accordance with the INSPIRE Directive

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	45
Preparation of a report/summary/presentation/paper	10
Prepararation for an exam/credit	5
Credit/Exam	5
Self-study of class topics	5
Student workload	**Hours** 100

Wrocław University of Science and Technology

Engineering Geophysics

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.54PF.04921.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects of basic education - physics

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 15 h, 1 ECTS, Graded credit • Project: 15 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	recognizes, names and explains engineering problems in different fields.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
PEU_W02	identifies, describes, categorises and selects geophysical survey methods.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
PEU_W03	presents, explains, and evaluates case studies on engineering and environmental problems solved by geophysical methods.	K2_GIG_W02, K2_GIG_W08, K2_GIG_W10
In terms of skills		

PEU_U01	analyses and solves complex practical problems (case studies) in engineering, environmental protection and geoengineering by applying geophysical knowledge and using modern geophysical data acquisition and interpretation.	K2_GIG_U04, K2_GIG_U13
PEU_U02	organizes teamwork, creates field research plans and monitors the work progress.	K2_GIG_U13
PEU_U03	analyses, evaluates, processes and interprets the results of geophysical investigations and makes recommendations related to engineering problems in mining, civil engineering, engineering geology, municipal and nuclear waste disposal sites, archaeology, with engineering properties of soils and rocks, hydrogeology, monitoring seepage in river embankments or dams.	K2_GIG_U04, K2_GIG_U13
PEU_U04	solves analytical geophysical problems/tasks and conducts auto-didactical education related to the detailed handling of typical software.	K2_GIG_U04, K2_GIG_U13

Program content ensuring learning outcomes

The essence and subject matter of descriptive and applied geophysics, geophysical methods used in deep and near-surface measurements. Geophysical methods to study engineering problems and elements and conditions of the environment. Techniques, geophysical survey methodologies and the construction and principles of operation of geophysical instruments used for engineering and environmental studies. Simple geophysical field surveys. Interpretation of the field data. Solving geophysical problems and tasks and critically evaluating the results. Analysing and critically evaluating examples of the application of geophysical methods in solving engineering and environmental problems and their results (case study analysis).

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	15
Preparation of a report/summary/presentation/paper	12
Preparaton for classes	8
Credit/Exam	4
Prepararation for an exam/credit	8
Self-study of class topics	7
Preparation of a project	6
Student workload	**Hours** 75

Wrocław University of Science and Technology

Occupational Health and Safety

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.54PK.04923.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 15 h, 1 ECTS, Graded credit • Project: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Possesses general knowledge of rules of occupational risk assessment formulation	K2_GIG_W11, K2_GIG_W12, K2_GIG_W14
PEU_W02	Possesses knowledge of evaluating and determining the admissibility of occupational risk	K2_GIG_W17
PEU_W03	Possesses general knowledge of corrective and preventive actions regarding hazards of typical work posts in the mining industry	K2_GIG_W12, K2_GIG_W14
In terms of skills		
PEU_U01	Is able to identify hazards of harmful, dangerous and nuisance factors of typical work posts in the mining industry	K2_GIG_U11
PEU_U02	Is able to estimate and determine risk acceptability with methods according to STER software and the RISC SCORE method.	K2_GIG_U11

PEU_U03	Is able to plan corrective and preventive actions for hazards of typical work posts in the mining industry	K2_GIG_U11
In terms of social competences		
PEU_K01	Is able to work in a team and together complete occupational risk assessment and develop its results and the required documentation in the form of a team report	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Introduction to Mining Safety and Health Regulations. Overview of key regulations governing occupational safety and health in the mining industry. The importance of compliance with international safety standards.
Occupational hazards and risks. Safety management system for mining operations
Hazard Identification in Mining Operations. Analysis of common physical hazards in mining operations. Chemical, ergonomic, and psychological hazards.
Occupational Risk Assessment in Mining. Overview of the methods of identification, evaluation and management of risks
Health risk assessment in the mining industry. Methods for assessing occupational health risks, including exposure monitoring and health surveillance.
Prevention and Control of Occupational Diseases in Mining.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	15
Preparaton for classes	4
Preparation of a project	10
Preparation of a report/summary/presentation/paper	6
Student workload	**Hours** 50

Wrocław University of Science and Technology

Principles and Application of InSAR and GIS in Mining

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.54PK.04922.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 30 h, 2 ECTS, Exam • Laboratory: 45 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Defines expanded concepts in the use of geo-information systems to collect and process data used in modeling both natural and anthropogenic phenomena and processes.	K2_GIG_W15, K2_GIG_W16, K2_GIG_W18
PEU_W02	Describes the principles of construction and functioning of geoinformation systems in the mining industry and public administration.	K2_GIG_W15, K2_GIG_W16, K2_GIG_W18
In terms of skills		
PEU_U01	Uses advanced GIS tools in mining, studies of natural phenomena, the impact of mining on the environment and space development,	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08
PEU_U02	Formulates and solve spatial tasks in the GIS environment.	K2_GIG_U04, K2_GIG_U07

PEU_U03	Interprets the results obtained and draw conclusions.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U08

Program content ensuring learning outcomes

1. Satellite radar interferometry, the possibility of using it in the ground deformation measurements.
   Determination of surface displacements based on satellite radar data.
   Use of GIS in advanced analysis of objects, phenomena and processes occurring in space.
   Formulation and solving tasks using GIS analytical functions.
   Use of spatial data and services in accordance with the INSPIRE Directive

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	45
Preparation of a report/summary/presentation/paper	10
Prepararation for an exam/credit	5
Credit/Exam	5
Self-study of class topics	5
Student workload	**Hours** 100

Wrocław University of Science and Technology

Occupational Health and Safety

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.54PK.04923.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 15 h, 1 ECTS, Graded credit • Project: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Possesses general knowledge of rules of occupational risk assessment formulation	K2_GIG_W11, K2_GIG_W12, K2_GIG_W14
PEU_W02	Possesses knowledge of evaluating and determining the admissibility of occupational risk	K2_GIG_W17
PEU_W03	Possesses general knowledge of corrective and preventive actions regarding hazards of typical work posts in the mining industry	K2_GIG_W12, K2_GIG_W14
In terms of skills		
PEU_U01	Is able to identify hazards of harmful, dangerous and nuisance factors of typical work posts in the mining industry	K2_GIG_U11

PEU_U02	Is able to estimate and determine risk acceptability with methods according to STER software and the RISC SCORE method.	K2_GIG_U11
PEU_U03	Is able to plan corrective and preventive actions for hazards of typical work posts in the mining industry	K2_GIG_U11
In terms of social competences		
PEU_K01	Is able to work in a team and together complete occupational risk assessment and develop its results and the required documentation in the form of a team report	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Introduction to Mining Safety and Health Regulations. Overview of key regulations governing occupational safety and health in the mining industry. The importance of compliance with international safety standards.
Occupational hazards and risks. Safety management system for mining operations
Hazard Identification in Mining Operations. Analysis of common physical hazards in mining operations. Chemical, ergonomic, and psychological hazards.
Occupational Risk Assessment in Mining. Overview of the methods of identification, evaluation and management of risks
Health risk assessment in the mining industry. Methods for assessing occupational health risks, including exposure monitoring and health surveillance.
Prevention and Control of Occupational Diseases in Mining.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	15
Preparaton for classes	4
Preparation of a project	10
Preparation of a report/summary/presentation/paper	6
Student workload	**Hours** 50

Wrocław University of Science and Technology

Diploma Seminar

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
-

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000S.58PK.00315.25

Lecture languages
English

Mandatoriness
Obligatory elective

Block
Major-specific subjects

Semester	Activities, hours, ECTS and examination
Semester 4	• Seminar: 15 h, 1 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student possesses in-depth knowledge of issues related to the mineral industry, particularly concerning the diploma specialization, which enables the identification of effective methods of scientific communication and presentation, as well as the presentation of principles and methods of conducting scientific research and presenting their results in a scientific publication.	K2_GIG_W01
In terms of skills		
PEU_U01	The student analyzes and critically evaluates information about the mineral industry from various sources, particularly concerning the diploma specialization, using appropriate linguistic means for specialized language to communicate effectively in a professional environment.	K2_GIG_U01, K2_GIG_U13
In terms of social competences		

PEU_K01	The student demonstrates initiative in preparing and delivering a complex presentation and participating in public forum discussions on topics related to mining and geology.	K2_GIG_K02
PEU_K02	The student declares readiness to work independently on the upcoming diploma thesis.	K2_GIG_K03

Program content ensuring learning outcomes

Synthesis of knowledge from the completed studies and practical experience.
Creation of education skills to assess the suitability and usability of various tools and sources of information to solve engineering problems.
Creation of education abilities of independent development and demonstration of technical issues in the mineral industry, using multimedia techniques.
Acquiring ability to develop a master thesis and a critical and comprehensive look at technological solutions.
Learn how to prepare basic studies of a scientific or technical knowledge.
Developing skills of preparation, critical evaluation and presentation of experimental results and evaluation studies.

Calculation of ECTS points

Activity form	**Activity hours**
Seminar	15
Preparation of a report/summary/presentation/paper	8
Credit/Exam	2
Student workload	**Hours** 25

Wrocław University of Science and Technology

Exploration Entrepreneurship

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Zagreb - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EZWS.58HS.04995.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects from the fields of humanities or social sciences

Semester	Examination	Number of ECTS points
Semester 4	Graded credit **Activities and hours** Lecture: 15 Project: 15 Seminar: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	It characterizes introductory training that supports the learning process. It lists broad professional issues. It reproduces business and entrepreneurial skills to develop awareness of business management and commercial practices in the field of mineral exploration and extraction.	K2_GIG_W03, K2_GIG_W05, K2_GIG_W09
In terms of skills		
PEU_U01	Develop relationships with other persons and maintain them. Can talk frankly about his ideas, fears and weaknesses.Identifying investment opportunities in the mineral resources sector.	K2_GIG_U08, K2_GIG_U09

In terms of social competences		
PEU_K01	To define professional targets, wants to succeed and is actively committed to implementing these targets. Not afraid of making mistakes and experimenting with new ideas. Willing to question himself critically, accept external advice, and implement it. The intellectual property rights (IPR) information will equip the students with knowledge on the competitive advantage of the market based on protection and information. It will provide efficient and strategic knowledge management, including safeguarding and protecting intangible assets. The security of IPR offer the protection to use, sell or license any outputs from the students future individual work.	K2_GIG_K01, K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

To equip students with the professional skills to increase their employability and entrepreneurship skills to meet the current market demands.The EFGeoMentoring scheme aims at improving international networking and supporting the life-long learning and CPD requirements of experienced geology professionals. In addition, it allows students to benefit from insider knowledge about international work perspectives in different sectors of geological profession and countries.
Mentoring within the course is a process during which an experienced professional with and EurGeol title (mentor) accompanies the student in a targeted way. Mentoring contributes to developing personal, entrepreneurial, networking,social and professional skills regarding the mineral prospecting and exploration activity. It allows learning from professional experiences that can only be acquired through practice and can't be found in any textbook. Mentoring improves the opportunities of career beginners by providing career-enhancing contacts and involvement in professional networks.
At the beginning of the mentoring cooperation, students formulate clear goals and communicate them to their mentor. In consultation with the mentor, concrete topics and the respective roles within the mentoring process will be defined. Since the student is at the centre of the process, it is their task to become aware of their own plans and their support needs.

Calculation of ECTS points

Activity form	Activity hours
Lecture	15
Project	15
Seminar	30
Preparation of a project	20
Self-study of class topics	8
Preparation of a report/summary/presentation/paper	10
Credit/Exam	2
Student workload	**Hours** 100

Wrocław University of Science and Technology

Exploration Entrepreneurship

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.58HS.04995.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects from the fields of humanities or social sciences

Semester	Examination	Number of ECTS points
Semester 4	Graded credit **Activities and hours** Lecture: 15 Project: 15 Seminar: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	haracterizes initial training supporting the learning process, identifies key professional issues, and explains business management processes.	K2_GIG_W03, K2_GIG_W05, K2_GIG_W09
In terms of skills		
PEU_U01	Collaborates with others, developing and maintaining relationships, engages in discussions, openly talking about ideas, concerns, and weaknesses, and analyzes investment opportunities in the mineral resources sector.	K2_GIG_U08, K2_GIG_U09
In terms of social competences		

PEU_K01	To define professional targets, wants to succeed and is actively committed to implementing these targets. Not afraid of making mistakes and experimenting with new ideas. Willing to question himself critically, accept external advice, and implement it. The intellectual property rights (IPR) information will equip the students with knowledge on the competitive advantage of the market based on protection and information. It will provide efficient and strategic knowledge management, including safeguarding and protecting intangible assets. The security of IPR offer the protection to use, sell or license any outputs from the students future individual work.	K2_GIG_K01, K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

To equip students with the professional skills to increase their employability and entrepreneurship skills to meet the current market demands.The EFGeoMentoring scheme aims at improving international networking and supporting the life-long learning and CPD requirements of experienced geology professionals. In addition, it allows students to benefit from insider knowledge about international work perspectives in different sectors of geological profession and countries.
Mentoring within the course is a process during which an experienced professional with and EurGeol title (mentor) accompanies the student in a targeted way. Mentoring contributes to developing personal, entrepreneurial, networking,social and professional skills regarding the mineral prospecting and exploration activity. It allows learning from professional experiences that can only be acquired through practice and can't be found in any textbook. Mentoring improves the opportunities of career beginners by providing career-enhancing contacts and involvement in professional networks.
At the beginning of the mentoring cooperation, students formulate clear goals and communicate them to their mentor. In consultation with the mentor, concrete topics and the respective roles within the mentoring process will be defined. Since the student is at the centre of the process, it is their task to become aware of their own plans and their support needs.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	15
Seminar	30
Preparation of a project	20
Self-study of class topics	8
Preparation of a report/summary/presentation/paper	10
Credit/Exam	2
Student workload	**Hours** 100

Wrocław University of Science and Technology

SOC Internship

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Zagreb - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EZWS.58PS.04996.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Semester	Activities, hours, ECTS and examination
Semester 4	• Project: 30 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student understands that social responsibility incorporates an ethical, social and environmentally-friendly perspective to our personal and professional activities	K2_GIG_W05, K2_GIG_W09, K2_GIG_W13
In terms of skills		
PEU_U01	Is able to engage in an informal professional discussion and business communication.	K2_GIG_U08, K2_GIG_U09, K2_GIG_U12
In terms of social competences		
PEU_K01	Copes with complexity, uncertainty and change in global contexts	K2_GIG_K01, K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

The aim of the course is to enable students to work in socially responsible workplaces, and apply their skills and knowledge to promote social good. While this develops them to become work-ready professionals, it also nurtures them to become advocates who help build a better world.
EDUCATIONAL GOALS:
1. To actively participate in the affairs of the community and in concrete actions on the ground that aim to promote the public interest, equality and solidarity.
2. To reflect on social license to operate issues
3. To work in direct contact with the beneficiaries of the civic activities undertaken e.g.: reception, facilitation, support, social assistance, etc.

Calculation of ECTS points

Activity form	**Activity hours**
Project	30
Preparation of a report/summary/presentation/paper	3
Preparation of a project	15
Credit/Exam	2
Student workload	**Hours** 50

Wrocław University of Science and Technology

SOC Internship

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.58PS.04996.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Semester	Activities, hours, ECTS and examination
Semester 4	• Project: 30 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student understands that social responsibility incorporates an ethical, social and environmentally-friendly perspective to our personal and professional activities	K2_GIG_W05, K2_GIG_W09, K2_GIG_W13
In terms of skills		
PEU_U01	Is able to engage in an informal professional discussion and business communication.	K2_GIG_U08, K2_GIG_U09, K2_GIG_U12
In terms of social competences		
PEU_K01	Copes with complexity, uncertainty and change in global contexts	K2_GIG_K01, K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Preparing students to work in socially responsible enterprises. Using skills and knowledge to promote social good. Professional development of employees. Educating committed social advocates for the common good, public interest, equality and solidarity.
Issues related to the social license to operate in the raw materials industry.
Working in direct contact with the beneficiaries of undertaken civic activities.

Calculation of ECTS points

Activity form	**Activity hours**
Project	30
Preparation of a report/summary/presentation/paper	5
Preparation of a project	13
Credit/Exam	2
Student workload	**Hours** 50

Wrocław University of Science and Technology

Exploration Entrepreneurship

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.58PS.04995.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Semester	Examination	Number of ECTS points
Semester 4	Graded credit **Activities and hours** Lecture: 15 Project: 15 Seminar: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student formulates the principles of financial management in the context of mineral exploration and extraction, highlighting their importance for effective enterprise management.	K2_GIG_W03, K2_GIG_W05, K2_GIG_W09
In terms of skills		
PEU_U01	The student organizes the learning process through participation in international networks, analyzing the benefits of exchanging professional experiences.	K2_GIG_U08, K2_GIG_U09
In terms of social competences		

PEU_K01	The student sets professional goals, ensures their achievement, and actively engages in reaching them.	K2_GIG_K01, K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

To equip students with the professional skills to increase their employability and entrepreneurship skills to meet the current market demands.The EFGeoMentoring scheme aims at improving international networking and supporting the life-long learning and CPD requirements of experienced geology professionals. In addition, it allows students to benefit from insider knowledge about international work perspectives in different sectors of geological profession and countries.
Mentoring within the course is a process during which an experienced professional with and EurGeol title (mentor) accompanies the student in a targeted way. Mentoring contributes to developing personal, entrepreneurial, networking,social and professional skills regarding the mineral prospecting and exploration activity. It allows learning from professional experiences that can only be acquired through practice and can't be found in any textbook. Mentoring improves the opportunities of career beginners by providing career-enhancing contacts and involvement in professional networks.
At the beginning of the mentoring cooperation, students formulate clear goals and communicate them to their mentor. In consultation with the mentor, concrete topics and the respective roles within the mentoring process will be defined. Since the student is at the centre of the process, it is their task to become aware of their own plans and their support needs.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	15
Seminar	30
Preparation of a project	20
Self-study of class topics	8
Preparation of a report/summary/presentation/paper	10
Credit/Exam	2
Student workload	**Hours** 100

Wrocław University of Science and Technology

Applied Field Exploration

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Zagreb - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EZWS.58PS.04997.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 4	• Project: 45 h, 3 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	A student characterizes various field methods and explains their application in the exploration of VMS deposits, identifying appropriate field techniques depending on geological conditions.	K2_GIG_W08, K2_GIG_W15
In terms of skills		
PEU_U01	A student analyzes and interprets structural, volcanological, and disturbance data from field outcrops. They construct and argue a model of the genesis of VMS deposits based on field observations.	K2_GIG_U04, K2_GIG_U09, K2_GIG_U10, K2_GIG_U13
In terms of social competences		

PEU_K01	The student acknowledges and appreciates the need to formulate and communicate information about the achievements of the mining, geoengineering, and mineral engineering industries to the public. The student takes on the challenge and shows initiative in conveying such information in a widely understandable manner, presenting various perspectives.	K2_GIG_K02

Program content ensuring learning outcomes

This course provides students with a practical understanding of various field exploration methodologies and their integration in the search for VMS (Volcanogenic Massive Sulfide) deposits. Additionally, it focuses on developing analytical and critical thinking skills, which are crucial for effective planning and execution of exploration projects.

Calculation of ECTS points

Activity form	**Activity hours**
Project	45
Preparation of a project	15
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	3
Credit/Exam	2
Student workload	**Hours** 75

Wrocław University of Science and Technology

Applied Field Exploration

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.58PS.04997.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 4	• Project: 45 h, 3 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student characterizes various field methods and explains their application in the exploration of VMS deposits. The student identifies appropriate field techniques depending on geological conditions.	K2_GIG_W08, K2_GIG_W15
In terms of skills		
PEU_U01	The student analyzes and interprets structural, volcanological, and alteration data from field outcrops. The student constructs and argues a genesis model for VMS deposits based on field observations.	K2_GIG_U04, K2_GIG_U09, K2_GIG_U10, K2_GIG_U13
In terms of social competences		

PEU_K01	The student acknowledges and appreciates the need to formulate and communicate information about the achievements of the mining, geoengineering, and mineral engineering industries to the public. The student takes on the challenge and shows initiative in conveying such information in a widely understandable manner, presenting various perspectives.	K2_GIG_K02

Program content ensuring learning outcomes

This course provides students with a practical understanding of various field exploration methodologies and their integration in the search for VMS (Volcanogenic Massive Sulfide) deposits. Additionally, it focuses on developing analytical and critical thinking skills, which are crucial for effective planning and execution of exploration projects.

Calculation of ECTS points

Activity form	**Activity hours**
Project	45
Preparation of a project	15
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	3
Credit/Exam	2
Student workload	**Hours** 75

Wrocław University of Science and Technology

SOC Internship

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.58PS.04996.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Semester	Activities, hours, ECTS and examination
Semester 4	• Project: 30 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Understands that social responsibility incorporates an ethical, social and environmentally-friendly perspective to our personal and professional activities	K2_GIG_W05, K2_GIG_W09, K2_GIG_W13
In terms of skills		
PEU_U01	Is able to engage in an informal professional discussion and business communication.	K2_GIG_U08, K2_GIG_U09, K2_GIG_U12
In terms of social competences		
PEU_K01	Copes with complexity, uncertainty and change in global contexts	K2_GIG_K01, K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

The aim of the course is to enable students to work in socially responsible workplaces, and apply their skills and knowledge to promote social good. While this develops them to become work-ready professionals, it also nurtures them to become advocates who help build a better world.
EDUCATIONAL GOALS:
1. To actively participate in the affairs of the community and in concrete actions on the ground that aim to promote the public interest, equality and solidarity.
2. To reflect on social license to operate issues
3. To work in direct contact with the beneficiaries of the civic activities undertaken e.g.: reception, facilitation, support, social assistance, etc.

Calculation of ECTS points

Activity form	**Activity hours**
Project	30
Preparation of a report/summary/presentation/paper	4
Preparation of a project	14
Credit/Exam	2
Student workload	**Hours** 50

Wrocław University of Science and Technology

Master Thesis

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Zagreb - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EZWS.58PD.04946.25

Lecture languages
English

Mandatoriness
Obligatory elective

Block
Diploma thesis

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 4	• Project: 30 h, 20 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student characterizes issues in the field of mining and geology, and in particular in the area of diploma specialization.	K2_GIG_W10
PEU_W02	Describes and applies methods of conducting scientific research, design work and presenting their results	K2_GIG_W01
PEU_W03	Characterizes issues related to social, psychological and environmental conditions of mining and geoengineering activities	K2_GIG_W05
In terms of skills		
PEU_U01	Solves detailed, complex issues in the field of mining and geology	K2_GIG_U03, K2_GIG_U04, K2_GIG_U10

PEU_U02	Obtains, collects and analyzes information from various sources in the field of mining and geology.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U08, K2_GIG_U13
PEU_U03	Selects and applies methods and tools to solve complex engineering and basic research tasks	K2_GIG_U03, K2_GIG_U04, K2_GIG_U10
In terms of social competences		
PEU_K01	Is able to think and act in a creative manner, is aware of the importance of non-technical effects of mining activities, including their impact on the environment and the related responsibility for decisions made.	K2_GIG_K01, K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Student planuje pracę, zgodnie z ustalonym wraz z opiekunem celem i zakresem pracy. Wyszukuje i pozyskuje niezbędne dane oraz źródła literaturowe. Pod kierunkiem opiekuna pracy, realizuje część badawczą/projektową pracy i formułuje wnioski. Sporządza pracę dyplomową zgodnie z wydziałowymi wytycznymi.

Calculation of ECTS points

Activity form	**Activity hours**
Project	30
Preparation of the thesis	470
Student workload	**Hours** 500

Wrocław University of Science and Technology

Master Thesis

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Zagreb

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWZS.58PD.04946.25

Lecture languages
English

Mandatoriness
Obligatory elective

Block
Diploma thesis

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 4	• Project: 30 h, 20 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student characterizes issues in the field of mining and geology, and in particular in the area of diploma specialization.	K2_GIG_W10
PEU_W02	Describes and applies methods of conducting scientific research, design work and presenting their results	K2_GIG_W01
PEU_W03	Characterizes issues related to social, psychological and environmental conditions of mining and geoengineering activities	K2_GIG_W05
In terms of skills		
PEU_U01	Solves detailed, complex issues in the field of mining and geology	K2_GIG_U03, K2_GIG_U04, K2_GIG_U10

PEU_U02	Obtains, collects and analyzes information from various sources in the field of mining and geology.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U08, K2_GIG_U13
PEU_U03	Selects and applies methods and tools to solve complex engineering and basic research tasks	K2_GIG_U03, K2_GIG_U04, K2_GIG_U10
In terms of social competences		
PEU_K01	Is able to think and act in a creative manner, is aware of the importance of non-technical effects of mining activities, including their impact on the environment and the related responsibility for decisions made.	K2_GIG_K01, K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Student planuje pracę, zgodnie z ustalonym wraz z opiekunem celem i zakresem pracy. Wyszukuje i pozyskuje niezbędne dane oraz źródła literaturowe. Pod kierunkiem opiekuna pracy, realizuje część badawczą/projektową pracy i formułuje wnioski. Sporządza pracę dyplomową zgodnie z wydziałowymi wytycznymi.

Calculation of ECTS points

Activity form	**Activity hours**
Project	30
Preparation of the thesis	470
Student workload	**Hours** 500

Wrocław University of Science and Technology

Applied Field Exploration

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.58PS.04997.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 4	• Project: 45 h, 3 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student characterizes various field methods and explains their application in the exploration of VMS deposits. They identify appropriate field techniques depending on geological conditions.	K2_GIG_W08, K2_GIG_W15
In terms of skills		
PEU_U01	The student integrates and synthesizes geological and geophysical data to identify VMS deposits. They select appropriate methods and acquire detailed structural, volcanological, and alteration data from rock outcrops in the field.	K2_GIG_U04, K2_GIG_U09, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	The student acknowledges and appreciates the need to formulate and communicate information about the achievements of the mining, geoengineering, and mineral engineering industries to the public.	K2_GIG_K02

Program content ensuring learning outcomes

This course provides students with a practical understanding of various field exploration methodologies and their integration in the search for VMS (Volcanogenic Massive Sulfide) deposits. Additionally, it focuses on developing analytical and critical thinking skills, which are crucial for effective planning and execution of exploration projects.

Calculation of ECTS points

Activity form	**Activity hours**
Project	45
Preparation of a project	15
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	3
Credit/Exam	2
Student workload	**Hours** 75

Wrocław University of Science and Technology

Master Thesis

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track TU Bergakademie Freiberg

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMFS.58PD.04946.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Diploma thesis

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 4	• Project: 90 h, 29 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student characterizes issues in the field of mining and geology, and in particular in the area of diploma specialization.	K2_GIG_W10
PEU_W02	Describes and applies methods of conducting scientific research, design work and presenting their results	K2_GIG_W01
PEU_W03	Characterizes issues related to social, psychological and environmental conditions of mining and geoengineering activities	K2_GIG_W05
In terms of skills		
PEU_U01	Solves detailed, complex issues in the field of mining and geology	K2_GIG_U03, K2_GIG_U04, K2_GIG_U10

PEU_U02	Obtains, collects and analyzes information from various sources in the field of mining and geology.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U08, K2_GIG_U13
PEU_U03	Selects and applies methods and tools to solve complex engineering and basic research tasks	K2_GIG_U03, K2_GIG_U04, K2_GIG_U10
In terms of social competences		
PEU_K01	Is able to think and act in a creative manner, is aware of the importance of non-technical effects of mining activities, including their impact on the environment and the related responsibility for decisions made.	K2_GIG_K01, K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Student planuje pracę, zgodnie z ustalonym wraz z opiekunem celem i zakresem pracy. Wyszukuje i pozyskuje niezbędne dane oraz źródła literaturowe. Pod kierunkiem opiekuna pracy, realizuje część badawczą/projektową pracy i formułuje wnioski. Sporządza pracę dyplomową zgodnie z wydziałowymi wytycznymi.

Calculation of ECTS points

Activity form	**Activity hours**
Project	90
Preparation of the thesis	635
Student workload	**Hours** 725

Wrocław University of Science and Technology

Exploration Entrepreneurship

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.58HS.04995.25

Group of classes
Yes

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Subjects from the fields of humanities or social sciences

Semester	Examination	Number of ECTS points
Semester 4	Graded credit **Activities and hours** Lecture: 15 Project: 15 Seminar: 30	4.0

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student broadly describes professional issues related to career planning and is capable of effective and strategic knowledge management, including the safeguarding and protection of intangible assets.	K2_GIG_W03, K2_GIG_W05, K2_GIG_W09
In terms of skills		
PEU_U01	The student demonstrates business and entrepreneurial skills necessary for business management and characterizes commercial practices in the field of mineral exploration and prospecting. Identifies investment opportunities in the mineral resources sector.	K2_GIG_U06, K2_GIG_U08, K2_GIG_U09

In terms of social competences		
PEU_K01	The student defines professional targets, wants to succeed and is actively committed to implementing these targets. Not afraid of making mistakes and experimenting with new ideas. Willing to question himself critically, accept external advice, and implement it.	K2_GIG_K01, K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

To equip students with the professional skills to increase their employability and entrepreneurship skills to meet the current market demands.The EFGeoMentoring scheme aims at improving international networking and supporting the life-long learning and CPD requirements of experienced geology professionals. In addition, it allows students to benefit from insider knowledge about international work perspectives in different sectors of geological profession and countries.
Mentoring within the course is a process during which an experienced professional with and EurGeol title (mentor) accompanies the student in a targeted way. Mentoring contributes to developing personal, entrepreneurial, networking,social and professional skills regarding the mineral prospecting and exploration activity. It allows learning from professional experiences that can only be acquired through practice and can't be found in any textbook. Mentoring improves the opportunities of career beginners by providing career-enhancing contacts and involvement in professional networks.
At the beginning of the mentoring cooperation, students formulate clear goals and communicate them to their mentor. In consultation with the mentor, concrete topics and the respective roles within the mentoring process will be defined. Since the student is at the centre of the process, it is their task to become aware of their own plans and their support needs.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	15
Seminar	30
Preparation of a project	20
Self-study of class topics	8
Preparation of a report/summary/presentation/paper	10
Credit/Exam	2
Student workload	**Hours** 100

Wrocław University of Science and Technology

Master Thesis

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track WUST - University of Miskolc

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EWMS.58PD.04946.25

Lecture languages
English

Mandatoriness
Obligatory elective

Block
Diploma thesis

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 4	• Project: 30 h, 20 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student characterizes issues in the field of mining and geology, and in particular in the area of diploma specialization.	K2_GIG_W10
PEU_W02	Describes and applies methods of conducting scientific research, design work and presenting their results	K2_GIG_W01
PEU_W03	Characterizes issues related to social, psychological and environmental conditions of mining and geoengineering activities	K2_GIG_W05
In terms of skills		
PEU_U01	Solves detailed, complex issues in the field of mining and geology	K2_GIG_U03, K2_GIG_U04, K2_GIG_U10

PEU_U02	Obtains, collects and analyzes information from various sources in the field of mining and geology.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U08, K2_GIG_U13
PEU_U03	Selects and applies methods and tools to solve complex engineering and basic research tasks	K2_GIG_U03, K2_GIG_U04, K2_GIG_U10
In terms of social competences		
PEU_K01	Is able to think and act in a creative manner, is aware of the importance of non-technical effects of mining activities, including their impact on the environment and the related responsibility for decisions made.	K2_GIG_K01, K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Student planuje pracę, zgodnie z ustalonym wraz z opiekunem celem i zakresem pracy. Wyszukuje i pozyskuje niezbędne dane oraz źródła literaturowe. Pod kierunkiem opiekuna pracy, realizuje część badawczą/projektową pracy i formułuje wnioski. Sporządza pracę dyplomową zgodnie z wydziałowymi wytycznymi.

Calculation of ECTS points

Activity form	**Activity hours**
Project	30
Preparation of the thesis	470
Student workload	**Hours** 500

Wrocław University of Science and Technology

Integrated Analysis of Deformations in Geomechanical Engineering

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.58PS.04925.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 4	• Lecture: 30 h, 2 ECTS, Graded credit • Laboratory: 30 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student distinguishes and describes the applications of deformation monitoring techniques in the spectrum of engineering disciplines such as mining and construction engineering	K2_GIG_W07, K2_GIG_W09, K2_GIG_W10, K2_GIG_W16, K2_GIG_W18
PEU_W02	Student characterizes the rock mass and mining methods. Describes empirical and deterministic analyses of rock mass deformations using FEM	K2_GIG_W10, K2_GIG_W16, K2_GIG_W18
In terms of skills		
PEU_U01	Student determines the main assumptions for geodetic measurement of deformations caused by mining exploitation	K2_GIG_U03, K2_GIG_U04, K2_GIG_U07, K2_GIG_U10

PEU_U02	Student creates a FEM model. Performs integrated analysis using deterministic modelling by means of the FEM method and using the results of geodetic and geotechnical measurements.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U07, K2_GIG_U10
In terms of social competences		
PEU_K01	Accepts different viewpoints and is open to constructive criticism, which allows for creative and entrepreneurial thinking and action	K2_GIG_K01, K2_GIG_K03
PEU_K02	Is responsible for the decisions taken taking into account their impact on the environment, which demonstrates awareness of the importance of non-technical effects of engineering activities: Appreciates the value of shaping a culture of work safety and cares for the health and lives of other employees.	K2_GIG_K02, K2_GIG_K03
PEU_K03	Formulates and conveys information on research and analysis results in a way that is understandable to a wide audience. Declares readiness to provide the public with information and opinions on the achievements of the mining, geoengineering and mineral engineering industries in a way that is understandable to all	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

1. Integrated analysis of deformations using the combination of monitoring and numerical modelling of deformations, processes occurring in engineering structures and in rock mass at the construction and post-construction stages.
2. Fully automated monitoring principles, data collection, and processing.
3. Analysis of deformations, processes occurring in engineering structures and in rock mass at the construction and post-construction stages.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	30
Preparation of a project	20
Preparation of a report/summary/presentation/paper	10
Credit/Exam	2
Prepararation for an exam/credit	8
Student workload	**Hours** 100

Wrocław University of Science and Technology

Integrated Analysis of Deformations in Geomechanical Engineering

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.58PS.04925.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 4	• Lecture: 30 h, 2 ECTS, Graded credit • Laboratory: 30 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student distinguishes and describes the applications of deformation monitoring techniques in the spectrum of engineering disciplines such as mining and construction engineering	K2_GIG_W07, K2_GIG_W09, K2_GIG_W10, K2_GIG_W16, K2_GIG_W18
PEU_W02	Student characterizes the rock mass and mining methods. Describes empirical and deterministic analyses of rock mass deformations using FEM	K2_GIG_W10, K2_GIG_W16, K2_GIG_W18
In terms of skills		
PEU_U01	Student determines the main assumptions for geodetic measurement of deformations caused by mining exploitation	K2_GIG_U03, K2_GIG_U04, K2_GIG_U07, K2_GIG_U10

PEU_U02	Student creates a FEM model. Performs integrated analysis using deterministic modelling by means of the FEM method and using the results of geodetic and geotechnical measurements.	K2_GIG_U03, K2_GIG_U04, K2_GIG_U07, K2_GIG_U10
In terms of social competences		
PEU_K01	Accepts different viewpoints and is open to constructive criticism, which allows for creative and entrepreneurial thinking and action:	K2_GIG_K01, K2_GIG_K03
PEU_K02	Is responsible for the decisions taken taking into account their impact on the environment, which demonstrates awareness of the importance of non-technical effects of engineering activities: Appreciates the value of shaping a culture of work safety and cares for the health and lives of other employees.	K2_GIG_K02, K2_GIG_K03
PEU_K03	Formulates and conveys information on research and analysis results in a way that is understandable to a wide audience. Declares readiness to provide the public with information and opinions on the achievements of the mining, geoengineering and mineral engineering industries in a way that is understandable to all	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

1. Integrated analysis of deformations using the combination of monitoring and numerical modelling of deformations, processes occurring in engineering structures and in rock mass at the construction and post-construction stages.
2. Fully automated monitoring principles, data collection, and processing.
3. Analysis of deformations, processes occurring in engineering structures and in rock mass at the construction and post-construction stages.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	30
Preparation of a project	20
Preparation of a report/summary/presentation/paper	10
Credit/Exam	2
Prepararation for an exam/credit	8
Student workload	**Hours** 100

Wrocław University of Science and Technology

SOC Internship

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.58PS.04996.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Semester	Activities, hours, ECTS and examination
Semester 4	• Project: 30 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student understands that social responsibility incorporates an ethical, social and environmentally-friendly perspective to our personal and professional activities	K2_GIG_W05, K2_GIG_W09, K2_GIG_W13
In terms of skills		
PEU_U01	Is able to engage in an informal professional discussion and business communication.	K2_GIG_U08, K2_GIG_U09, K2_GIG_U12
In terms of social competences		
PEU_K01	Copes with complexity, uncertainty and change in global contexts	K2_GIG_K01, K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Preparing students to work in socially responsible enterprises. Using skills and knowledge to promote social good. Professional development of employees. Educating committed social advocates for the common good, public interest, equality and solidarity.

Calculation of ECTS points

Activity form	**Activity hours**
Project	30
Preparation of a report/summary/presentation/paper	3
Preparation of a project	15
Credit/Exam	2
Student workload	**Hours** 50

Wrocław University of Science and Technology

Industrial Research Internship Project

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.58PS.05039.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 4	• Project: 30 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	identifies and explains trends in product-service systems and digital transformation which affect manufacturing business.	K2_GIG_W05, K2_GIG_W07, K2_GIG_W09, K2_GIG_W14
PEU_W02	defines and explains the concepts related to product data management and product life cycle management.	K2_GIG_W05, K2_GIG_W07, K2_GIG_W09, K2_GIG_W14
PEU_W03	recognizes the company's products and service processes and describes and explains their interaction with the company's overall operations.	K2_GIG_W07, K2_GIG_W09, K2_GIG_W14
PEU_W04	defines and explains the primary sector of the raw materials value chain (geology, mining, mineral processing, and the environment).	K2_GIG_W07, K2_GIG_W09

PEU_W05	identifies, defines, and explains innovative techniques, digitalization trends, and the concept of innovation and technology integration in the raw material sector.	K2_GIG_W07, K2_GIG_W09
In terms of skills		
PEU_U01	analyses and evaluates systems' characteristics, technical features, and managerial functions.	K2_GIG_U04, K2_GIG_U09, K2_GIG_U10, K2_GIG_U13
PEU_U02	reviews and prepares their role in product development and business management.	K2_GIG_U04, K2_GIG_U09, K2_GIG_U10, K2_GIG_U13
PEU_U03	creates new business models, fosters a digital culture, and implements innovative techniques in the raw materials chain.	K2_GIG_U04, K2_GIG_U09, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	engages in informal professional discussions and business communication and supports the need to communicate with the public.	K2_GIG_K01, K2_GIG_K02, K2_GIG_K03
PEU_K02	is responsible for the non-technical consequences of business and engineering activities, including their impact on the environment and the associated decision-making responsibilities.	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Students learn to work in responsible workplaces (companions, firms) and apply their skills and knowledge to promote entrepreneurship, innovation, and technology integration in the raw material sector. The students become work-ready professionals who can implement innovative technologies and efficient managerial issues. They learn to actively participate in the community and promote public interest, equality, and solidarity. The students will face environmental and technological problems such as land, water and air quality degradation by industrial activities. The necessity of transparency and accountability standards in the raw materials sector and the strategy are presented and experienced. The students will be exposed to the lack of effective information flow between the companies and society. In industrial or R&D companies, the students will develop and implement innovative solutions to the technological or managerial problems they encounter.

Calculation of ECTS points

Activity form	**Activity hours**
Project	30
Preparation of a project	7
Credit/Exam	2
Preparation of a report/summary/presentation/paper	4
Self-development of practical skills	4
Conducting literature research	3

Student workload	Hours 50

Wrocław University of Science and Technology

Industrial Research Internship Project

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.58PS.05039.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 4	• Project: 30 h, 2 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	identifies and explains trends in product-service systems and digital transformation which affect manufacturing business.	K2_GIG_W05, K2_GIG_W07, K2_GIG_W09, K2_GIG_W14
PEU_W02	defines and explains the concepts related to product data management and product life cycle management.	K2_GIG_W05, K2_GIG_W07, K2_GIG_W09, K2_GIG_W14
PEU_W03	recognizes the company's products and service processes and describes and explains their interaction with the company's overall operations.	K2_GIG_W07, K2_GIG_W09, K2_GIG_W14
PEU_W04	defines and explains the primary sector of the raw materials value chain (geology, mining, mineral processing, and the environment).	K2_GIG_W07, K2_GIG_W09

PEU_W05	identifies, defines, and explains innovative techniques, digitalization trends, and the concept of innovation and technology integration in the raw material sector.	K2_GIG_W07, K2_GIG_W09
In terms of skills		
PEU_U01	analyses and evaluates systems' characteristics, technical features, and managerial functions.	K2_GIG_U04, K2_GIG_U09, K2_GIG_U10, K2_GIG_U13
PEU_U02	reviews and prepares their role in product development and business management.	K2_GIG_U04, K2_GIG_U09, K2_GIG_U10, K2_GIG_U13
PEU_U03	creates new business models, fosters a digital culture, and implements innovative techniques in the raw materials chain.	K2_GIG_U04, K2_GIG_U09, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	engages in informal professional discussions and business communication and supports the need to communicate with the public.	K2_GIG_K01, K2_GIG_K02, K2_GIG_K03
PEU_K02	is responsible for the non-technical consequences of business and engineering activities, including their impact on the environment and the associated decision-making responsibilities.	K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Students learn to work in responsible workplaces (companions, firms) and apply their skills and knowledge to promote entrepreneurship, innovation, and technology integration in the raw material sector. The students become work-ready professionals who can implement innovative technologies and efficient managerial issues. They learn to actively participate in the community and promote public interest, equality, and solidarity. The students will face environmental and technological problems such as land, water and air quality degradation by industrial activities. The necessity of transparency and accountability standards in the raw materials sector and the strategy are presented and experienced. The students will be exposed to the lack of effective information flow between the companies and society. In industrial or R&D companies, the students will develop and implement innovative solutions to the technological or managerial problems they encounter.

Calculation of ECTS points

Activity form	**Activity hours**
Project	30
Preparation of a project	7
Credit/Exam	2
Preparation of a report/summary/presentation/paper	4
Self-development of practical skills	4
Conducting literature research	3

Student workload	Hours 50

Wrocław University of Science and Technology

Applied Field Exploration

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.58PS.04997.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 4	• Project: 45 h, 3 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student characterizes various field methods and explains their application in the exploration of VMS deposits. The student identifies appropriate field techniques depending on geological conditions.	K2_GIG_W08, K2_GIG_W15
In terms of skills		
PEU_U01	It integrates and synthesizes geological and geophysical data to identify VMS deposits, selects appropriate methods, and acquires detailed structural, volcanological, and alteration data from rock outcrops in the field.	K2_GIG_U04, K2_GIG_U09, K2_GIG_U10, K2_GIG_U13
In terms of social competences		

PEU_K01	The student acknowledges and appreciates the need to formulate and communicate information about the achievements of the mining, geoengineering, and mineral engineering industries to the public. The student takes on the challenge and shows initiative in conveying such information in a widely understandable manner, presenting various perspectives.	K2_GIG_K02

Program content ensuring learning outcomes

This course provides students with a practical understanding of various field exploration methodologies and their integration in the search for VMS (Volcanogenic Massive Sulfide) deposits. Additionally, it focuses on developing analytical and critical thinking skills, which are crucial for effective planning and execution of exploration projects.

Calculation of ECTS points

Activity form	**Activity hours**
Project	45
Preparation of a project	15
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	3
Credit/Exam	2
Student workload	**Hours** 75

Wrocław University of Science and Technology

Field Academy Student Project

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.58PS.05040.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 4	• Project: 45 h, 3 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	identifies and explains trends of product-service systems and digital transformation affecting manufacturing business.	K2_GIG_W08, K2_GIG_W09, K2_GIG_W14
PEU_W02	defines and explains the concepts related to product data and product life cycle management.	K2_GIG_W09, K2_GIG_W15
PEU_W03	recognises the company's products and service processes and understands their interaction with the company's overall operations.	K2_GIG_W09, K2_GIG_W15
PEU_W04	describes and explains the primary sector of the raw materials value chain (geology, mining, mineral processing, and the environment).	K2_GIG_W08, K2_GIG_W09

PEU_W05	distinguishes and explains innovative techniques, digitalization trends, and the concept of innovation and technology integration in the raw material sector.	K2_GIG_W09, K2_GIG_W15
In terms of skills		
PEU_U01	analyses and depicts systems' characteristics, technical features, and managerial functions.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U09, K2_GIG_U10
PEU_U02	creates and evaluates their role in product development and business management.	K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
PEU_U03	creates new business models and fosters a digital culture.	K2_GIG_U04, K2_GIG_U10, K2_GIG_U13
PEU_U04	implements and assesses innovative techniques in the raw materials chain.	K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	declares the use of formulating and applying – among others through the mass media – information and opinions regarding the hazards associated with mining, geoengineering and infrastructure engineering, and other information concerning engineers, in addition to efforts to convey such information and information understandably, presenting different points of view, having values and applications for shaping the work culture and responsibility for the health and other employees.	K2_GIG_K02

Program content ensuring learning outcomes

Students should acquire a hands-on understanding of different field research methodologies and how they can be integrated with innovation and technology in mining. Innovative techniques such as UAV (drones), UGV (robots), VR, GIS based data analysis, lidar imaging, hyperspectral method, as well as InSAR methods and digitalization trends will be explored by students. Students will conduct research in companies (commodity, geological, surveying, mining, processing plants, municipal facilities, IT companies) for innovative management and implementation of innovative techniques.

Calculation of ECTS points

Activity form	**Activity hours**
Project	45
Preparation of a project	15
Conducting empirical studies	10
Conducting literature research	5
Student workload	**Hours** 75

Wrocław University of Science and Technology

Field Academy Student Project

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.58PS.05040.25

Lecture languages
English

Mandatoriness
Obligatory in specialty

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 4	• Project: 45 h, 3 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	identifies and explains trends of product-service systems and digital transformation affecting manufacturing business.	K2_GIG_W08, K2_GIG_W09, K2_GIG_W14
PEU_W02	defines and explains the concepts related to product data and product life cycle management.	K2_GIG_W09, K2_GIG_W15
PEU_W03	recognises the company's products and service processes and understands their interaction with the company's overall operations.	K2_GIG_W09, K2_GIG_W15
PEU_W04	describes and explains the primary sector of the raw materials value chain (geology, mining, mineral processing, and the environment).	K2_GIG_W08, K2_GIG_W09

PEU_W05	distinguishes and explains innovative techniques, digitalization trends, and the concept of innovation and technology integration in the raw material sector.	K2_GIG_W09, K2_GIG_W15
In terms of skills		
PEU_U01	analyses and depicts systems' characteristics, technical features, and managerial functions.	K2_GIG_U04, K2_GIG_U07, K2_GIG_U09, K2_GIG_U10
PEU_U02	creates and evaluates their role in product development and business management.	K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
PEU_U03	creates new business models and fosters a digital culture.	K2_GIG_U04, K2_GIG_U10, K2_GIG_U13
PEU_U04	implements and assesses innovative techniques in the raw materials chain.	K2_GIG_U07, K2_GIG_U10, K2_GIG_U13
In terms of social competences		
PEU_K01	declares the use of formulating and applying – among others through the mass media – information and opinions regarding the hazards associated with mining, geoengineering and infrastructure engineering, and other information concerning engineers, in addition to efforts to convey such information and information understandably, presenting different points of view, having values and applications for shaping the work culture and responsibility for the health and other employees.	K2_GIG_K02

Program content ensuring learning outcomes

Students should acquire a hands-on understanding of different field research methodologies and how they can be integrated with innovation and technology in mining. Innovative techniques such as UAV (drones), UGV (robots), VR, GIS based data analysis, lidar imaging, hyperspectral method, as well as InSAR methods and digitalization trends will be explored by students. Students will conduct research in companies (commodity, geological, surveying, mining, processing plants, municipal facilities, IT companies) for innovative management and implementation of innovative techniques.

Calculation of ECTS points

Activity form	**Activity hours**
Project	45
Preparation of a project	15
Conducting empirical studies	10
Conducting literature research	5
Student workload	**Hours** 75

Wrocław University of Science and Technology

Master Thesis

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Mineral Resources Exploration - Track University of Miskolc - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000EMWS.58PS.04946.25

Lecture languages
English

Mandatoriness
Obligatory elective

Block
Specialty subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 4	• Project: 30 h, 20 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student characterizes issues in the field of mining and geology, and in particular in the area of diploma specialization.	K2_GIG_W10
PEU_W02	Describes and applies methods of conducting scientific research, design work and presenting their results	K2_GIG_W01
PEU_W03	Characterizes issues related to social, psychological and environmental conditions of mining and geoengineering activities	K2_GIG_W05
In terms of skills		
PEU_U01	Solves detailed, complex issues in the field of mining and geology	K2_GIG_U03, K2_GIG_U04, K2_GIG_U10

PEU_U02	Obtains, collects and analyzes information from various sources in the field of mining and geology.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U08, K2_GIG_U13
PEU_U03	Selects and applies methods and tools to solve complex engineering and basic research tasks	K2_GIG_U03, K2_GIG_U04, K2_GIG_U10
In terms of social competences		
PEU_K01	Is able to think and act in a creative manner, is aware of the importance of non-technical effects of mining activities, including their impact on the environment and the related responsibility for decisions made.	K2_GIG_K01, K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Student planuje pracę, zgodnie z ustalonym wraz z opiekunem celem i zakresem pracy. Wyszukuje i pozyskuje niezbędne dane oraz źródła literaturowe. Pod kierunkiem opiekuna pracy, realizuje część badawczą/projektową pracy i formułuje wnioski. Sporządza pracę dyplomową zgodnie z wydziałowymi wytycznymi.

Calculation of ECTS points

Activity form	**Activity hours**
Project	30
Preparation of the thesis	470
Student workload	**Hours** 500

Wrocław University of Science and Technology

Master Thesis

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track WUST - Lappeenranta-Lahti University of Technology

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000IWLS.58PD.04946.25

Lecture languages
English

Mandatoriness
Obligatory elective

Block
Diploma thesis

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 4	• Project: 30 h, 20 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student characterizes issues in the field of mining and geology, and in particular in the area of diploma specialization.	K2_GIG_W10
PEU_W02	Describes and applies methods of conducting scientific research, design work and presenting their results	K2_GIG_W01
PEU_W03	Characterizes issues related to social, psychological and environmental conditions of mining and geoengineering activities	K2_GIG_W05
In terms of skills		
PEU_U01	Solves detailed, complex issues in the field of mining and geology	K2_GIG_U03, K2_GIG_U04, K2_GIG_U10

PEU_U02	Obtains, collects and analyzes information from various sources in the field of mining and geology.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U08, K2_GIG_U13
PEU_U03	Selects and applies methods and tools to solve complex engineering and basic research tasks	K2_GIG_U03, K2_GIG_U04, K2_GIG_U10
In terms of social competences		
PEU_K01	Is able to think and act in a creative manner, is aware of the importance of non-technical effects of mining activities, including their impact on the environment and the related responsibility for decisions made.	K2_GIG_K01, K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Student planuje pracę, zgodnie z ustalonym wraz z opiekunem celem i zakresem pracy. Wyszukuje i pozyskuje niezbędne dane oraz źródła literaturowe. Pod kierunkiem opiekuna pracy, realizuje część badawczą/projektową pracy i formułuje wnioski. Sporządza pracę dyplomową zgodnie z wydziałowymi wytycznymi.

Calculation of ECTS points

Activity form	**Activity hours**
Project	30
Preparation of the thesis	470
Student workload	**Hours** 500

Wrocław University of Science and Technology

Master Thesis

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Master in Entrepreneurship, Innovation and Technology Integration in Mining - Track Lappeenranta-Lahti University of Technology - WUST

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000ILWS.58PD.04946.25

Lecture languages
English

Mandatoriness
Obligatory elective

Block
Diploma thesis

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 4	• Project: 30 h, 20 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student characterizes issues in the field of mining and geology, and in particular in the area of diploma specialization.	K2_GIG_W10
PEU_W02	Describes and applies methods of conducting scientific research, design work and presenting their results	K2_GIG_W01
PEU_W03	Characterizes issues related to social, psychological and environmental conditions of mining and geoengineering activities	K2_GIG_W05
In terms of skills		
PEU_U01	Solves detailed, complex issues in the field of mining and geology	K2_GIG_U03, K2_GIG_U04, K2_GIG_U10

PEU_U02	Obtains, collects and analyzes information from various sources in the field of mining and geology.	K2_GIG_U01, K2_GIG_U04, K2_GIG_U08, K2_GIG_U13
PEU_U03	Selects and applies methods and tools to solve complex engineering and basic research tasks	K2_GIG_U03, K2_GIG_U04, K2_GIG_U10
In terms of social competences		
PEU_K01	Is able to think and act in a creative manner, is aware of the importance of non-technical effects of mining activities, including their impact on the environment and the related responsibility for decisions made.	K2_GIG_K01, K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

Student planuje pracę, zgodnie z ustalonym wraz z opiekunem celem i zakresem pracy. Wyszukuje i pozyskuje niezbędne dane oraz źródła literaturowe. Pod kierunkiem opiekuna pracy, realizuje część badawczą/projektową pracy i formułuje wnioski. Sporządza pracę dyplomową zgodnie z wydziałowymi wytycznymi.

Calculation of ECTS points

Activity form	**Activity hours**
Project	30
Preparation of the thesis	470
Student workload	**Hours** 500

Wrocław University of Science and Technology

Master Thesis

Educational subject description sheet

Basic information

Field of study
Mining and Geology

Speciality
Geomatics for Mineral Resource Management - Track Montanuniversitaet Leoben

Organizational unit
Faculty of Geoengineering, Mining and Geology

Study level
second degree 4 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
W6GIG/000GMLS.58PD.04946.25

Lecture languages
English

Mandatoriness
Obligatory elective

Block
Diploma thesis

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 4	• Project: 90 h, 29 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student conducts research projects, starting from formulating the research question, through data collection and analysis, to drawing conclusions and presenting results, formulating research questions, collecting and analyzing data, drawing conclusions, and presenting results.	K2_GIG_W01, K2_GIG_W05, K2_GIG_W10
In terms of skills		
PEU_U01	The student analyzes the writing of a scientific paper, including structuring and composing the individual parts of the paper, such as the introduction, literature review, methodology, results, and discussion.	K2_GIG_U01, K2_GIG_U03, K2_GIG_U04, K2_GIG_U08, K2_GIG_U10, K2_GIG_U13
In terms of social competences		

PEU_K01	The student identifies specific aspects related to the research topic in the master's thesis and learns how to effectively present their scientific work, both in written and oral form.	K2_GIG_K01, K2_GIG_K02, K2_GIG_K03

Program content ensuring learning outcomes

The course prepares students for writing a thesis through:
Scientific Research
Learning to conduct scientific research, starting from formulating the research question, through data collection and analysis, to drawing conclusions.
Exploring various research methods, such as qualitative and quantitative research, and data collection techniques, such as surveys, interviews, observations, and experiments.
Critically evaluating scientific literature and identifying gaps in existing research that can form the basis for one's own research projects.
Structure and Composition of a Scientific Paper
Acquiring skills in writing a scientific paper, including structuring and composing the individual parts of the paper, such as the introduction, literature review, methodology, results, and discussion.
Creating coherent and logical arguments and clearly and understandably presenting results.
Learning the principles of formatting and writing style required in scientific papers, including citing sources and avoiding plagiarism.
Specific Aspects Related to the Research Topic in the Master's Thesis
Delving into specific aspects related to the research topic in the master's thesis, such as detailed data analysis methods, research tools, and experimental techniques.
Adapting the research approach to the specifics of the chosen topic, considering both theoretical and practical aspects.
Learning about the latest achievements and trends in the field, which allows for conducting research at the highest level.
Presentation of Scientific Work
Effectively presenting scientific work, both in written and oral form.
Learning techniques for creating multimedia presentations that support conveying research results in an attractive and understandable way.
Conducting scientific discussions, answering questions, and defending one's conclusions before an audience.

Calculation of ECTS points

Activity form	**Activity hours**
Project	90
Preparation of a project	600
Preparation of a report/summary/presentation/paper	33
Credit/Exam	2
Student workload	**Hours** 725