Wrocław University of Science and Technology

Study programme

Organizational unit:	Faculty of Environmental Engineering
Field of study:	Environmental Quality Management
Level of study:	second degree 3 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 Environmental Engineering
Field of study:	Environmental Quality Management
Study level:	second degree 3 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:	3
Number of semesters in the English version of the programme:	3
Total number of hours of classes:	1085
Total number of ECTS points required to complete a given level of study:	90
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

A graduate of the Environmental Quality Management program has deepen knowledge in mathematics and natural sciences, as well as in technical and engineering sciences and the ability to use it in professional work and life in compliance with legal and ethical standards. They ought to get specialist knowledge in environmental engineering as well as in environment protection and is prepared for solving problems in sustainable development, circular economy, renewable energy resources, pollution of the environment and technologies, involving indoor and outdoor environment. Is able to play the role of the leader of the team and to organize and run research projects and scientific debates. The graduates should be able to deal with administrative and simple legal problems of companies. Has the experience necessary for professional career at research units, industry and at universities or colleges. Knows a foreign language at the B2+ level of proficiency of the Common European Framework of Reference for Languages of the Council of Europe, with a higher level of specialist terminology in the field of engineering and environmental protection. The graduate is prepared to undertake studies at a doctoral school or postgraduate studies.

Currentness of the study programme

Concept and goals of education

The Environmental Quality Management study program holistically addresses issues related to environmental engineering as well as to protection of the environment through initiatives necessary for the functioning of the natural ecosystems and built-up areas (water, soil and air protection systems, water and sewage treatment systems, water and sewage networks, resources recycling and waste management) to provide the sustainable development involving balance between economic development, environmental protection and social well-being. The study program involves major subjects divided into compulsory and elective. Compulsory subjects are taken by all students. Elective subjects allow for the individualization of the education path in accordance with students' interests. The most common way to check students' knowledge is a colloquium and a written exam. For practical subjects, the achievement of learning outcomes is verified, among others, through tests, control papers, projects, reports or oral presentations. Student's involvement in class work and the ability to work in a group as a participant or leader are also assessed. At the last stage of the studies, students prepare a master's thesis under the supervision of a supervisor, which is a study-analytical, design or experimental solution to a given problem in the area of environmental engineering and protection, carried out using the knowledge and skills acquired during the second-cycle studies. Studies in this field are intended for people who meet the detailed recruitment requirements contained in the Internal Regulations of the Wrocław University of Science and Technology "On the conditions and procedure of recruitment". The studies last 3 semesters. To complete them, student must obtain at least 90 ECTS. The second-cycle studies end with a diploma exam, which student can take after completing the study program and obtaining a positive assessment of the diploma thesis.

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

The assumed learning outcomes are consistent with the needs of the socio-economic and labour market. This compliance is constantly verified based on conclusions resulting from contacts with employers, the activities of the Careers Office, monitoring the professional activity of graduates and analysing strategic programs for the development of Poland and the European Union and related reports. An important source of information that allows monitoring the compliance of learning outcomes with the needs of the labour market are the surveys of the faculty graduates, completed at the time of graduation, when quite often students are already active on the labour market and perform professional functions related to the field of study. The learning outcomes provide for the acquisition of knowledge, skills and competencies required to undertake professional work in the areas of: planning, designing, and exploitation of the devices, processes, technologies and systems of water and wastewater treatment, water and sewage networks, indoor and outdoor air protection, circular economy, and renewable energy. Graduates of this field are prepared to water resources management, monitoring of the environment state, taking action with the aim of water protection, as well as to solve problems of water and wastewater management in industrial plants.

Other important factors determining the validity of the study programme

Second-cycle studies in Environmental Quality Management enable students to acquire knowledge, skills and competencies necessary to take action and behave in accordance with the rules of the sustainable development. The study program includes classes in the form of lectures, exercises, laboratories, projects and seminars. Tasks are carried out individually or in teams, and classes are conducted in a way that allows for discussion, presentation of the results of one's own work and learning how to solve problems, including research problems. Throughout the entire course of study, students are motivated and prepared to work independently and to constantly improve and develop themselves in accordance with the requirements of the labour market, the development of science and technology and legal solutions. During the studies, events supporting the field education are organized, e.g. lectures given by scientists, industry training, study trips, visits and lectures by representatives of companies from the environmental engineering industry, the topics and level of which are adapted to the stage of studies. Modern digital solutions are implemented in the teaching process, both as platforms for learning and self-development of students and as tools supporting the work of an engineer or a researcher. As part of the improvement of the teaching process, internal and external factors determining the currency of the knowledge, skills and competencies (involving researcher competencies) transferred to students are constantly monitored. The needs and expectations of young people regarding the education process are analysed and taken into account. Lecturers, who have extensive scientific and practical experience in the field of environmental engineering, ensure that the knowledge transferred is valuable and current, and the skills acquired are useful on the labour market.

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

The study program in the Environmental Quality Management field is consistent with the strategy of the Wrocław University of Science and Technology in terms of:

- ensuring high quality education – students are provided with up-to-date knowledge, skills and competences, and modern program content, appropriate forms of classes and dedicated study paths enable them to realize their life aspirations,
- shaping students' personalities – the study program assumes shaping creative, critical and tolerant personalities of students as well as ethical and professional attitudes during studies and future professional work,
- enabling students' scientific development – students are provided with space for discussion, identification and solving technical, scientific and civilization problems while respecting property rights and standards.

Equally important common goals for the study program in the field of Environmental Quality Management and the strategy of the Wrocław University of Science and Technology are:

- cultivating university values and traditions,
- partnership and cooperation with other universities and the economic environment in the country and abroad,
- preparing students to perform independent functions, independently expand their knowledge, skills and competences and acquire professional qualifications,
- preparing students to continue their education at the Doctoral School and to conduct their own research,
- increasing the didactic competences of lecturers through their scientific development, internships and training,
- the relevance and modernity of the knowledge and skills provided, taking into account technological development, legal requirements and the needs of the labour market.

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_EQM_W01	knows and understand, at a deepened level, selected fields of mathematics, physics, and chemistry including, e.g., statistics, technical physics and environmental chemistry, necessary to a description and analysis of measurements data	P7S_WG	
K2_EQM_W02	knows and understand, at a deepened level, selected fields of building law, technology, organization of works and spatial management	P7S_WK	
K2_EQM_W03	knows and understand social, economical and legal conditions of engineering activities and the resulting responsibility; understands and takes into account the consequences of these activities for the environment, community and economy and knows the objectives of the enterprise in various organizational and legal forms, recognizing the diversity of operational problems, also in the context of the company's environment	P7S_WK	P7S_WK_INŻ
K2_EQM_W04	knows and understands the concepts and principles necessary to manage intellectual property resources	P7S_WK	P7S_WK_INŻ
K2_EQM_W05	knows and understands issues related to management, including quality management and running a business	P7S_WK	P7S_WK_INŻ
K2_EQM_W06	knows the methods and means of assessing efficiency, reliability and safety and understands the risk factors in environmental engineering systems	P7S_WG	P7S_WG_INŻ
K2_EQM_W07	knows and understands, at a deepened level, the key issues and methods of obtaining energy from alternative sources. Is aware of development trends in the field of alternative energy and the life cycle of devices and objects related to it	P7S_WG	P7S_WG_INŻ
K2_EQM_W08	knows the development trends and the latest achievements in installation and construction technologies	P7S_WK	P7S_WK_INŻ
K2_EQM_W09	knows and understands, at a deepened level, the methods of assessing the quality of natural waters and advanced and modern technologies of water and sewage treatment	P7S_WG	P7S_WG_INŻ
K2_EQM_W10	knows at a deepened level mineral and organic raw materials, their processing and use, including waste generated in the process	P7S_WG	P7S_WG_INŻ
K2_EQM_W11	knows at a deepened level advanced, modern solid waste management technologies	P7S_WG	P7S_WG_INŻ
K2_EQM_W12	knows at a deepened level the environmental threats, especially those of microbiological origin and the characteristics of anthropogenic pollution	P7S_WG	
K2_EQM_W13	knows and understands, at a deepened level, the issues related to modern gas purification technologies	P7S_WG	P7S_WG_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_EQM_W14	knows, at a deepened level, selected issues related to water supply and sewage systems	P7S_WG	P7S_WG_INŻ
K2_EQM_W15	knows, at a deepened level, the methods and techniques for assessing air quality and understands its impact on humans and the environment	P7S_WG	P7S_WG_INŻ
Skills			
K2_EQM_U01	is able to describe collected statistic data, apply the methods of statistical inference in a reference to processes and phenomena in the field of study Environmental Quality Management	P7S_UW	P7S_UW_INŻ
K2_EQM_U02	is able to use information and communication techniques and analysis and simulation methods to solve a task; is able to rate the usefulness and the possibility to apply a device or a computer system in order to control the above processes	P7S_UW	P7S_UW_INŻ
K2_EQM_U03	is able to prepare and present an oral presentation independently or in a group (as a member or leader)	P7S_UW, P7S_UK, P7S_UO	
K2_EQM_U04	is able to obtain information from literature, data bases and other sources, on resources and waste management; is able to compile obtained information, interpret and critically evaluate it, draw conclusions, formulate and support opinions	P7S_UW	P7S_UW_INŻ
K2_EQM_U05	using standardized methods of analysis, is able to plan and conduct experiments and simple research in the field of Environmental Quality Management, i.e. in the field of water treatment and sewage treatment and waste management, taking into account biological aspects; is able to interpret results and draw conclusions	P7S_UW	P7S_UW_INŻ
K2_EQM_U06	is able to apply information and communication techniques, essential to prepare compilations and projects	P7S_UW	P7S_UW_INŻ
K2_EQM_U07	is able to perform mass balances of processes and devices used for gas treatment, with the use of proper methods, techniques and instruments	P7S_UW	P7S_UW_INŻ
K2_EQM_U08	is able to plan and conduct simple computer simulations on water supply and sewage systems, interpret the results and draw conclusions	P7S_UW	P7S_UW_INŻ
K2_EQM_U09	is able to present and comment on the results of their master’s thesis, reason about the ways of achieving the given results; is able to indicate alternative solutions to the issue analysed	P7S_UW, P7S_UK	
K2_EQM_U10	is able to compose a master’s thesis in the field of study Environmental Quality Management: is able to obtain information from native and foreign literature, data bases and other sources, compile, interpret and evaluate it, is able to use analytical, simulative and experimental methods to formulate and solve the problems, is capable of interdisciplinary compilation of knowledge, of adopting systematic approach considering also non- technological aspects, is able to assess the usefulness and possibilities of adopting modern technological achievements (techniques and technologies) in the presented discipline, is able to suggest procedures to upgrade/improve existing technological solutions, is able to interpret results of research, draw conclusions and formulate recommendations, is able to compose a master’s thesis in accordance to the proper formal register	P7S_UW, P7S_UU	P7S_UW_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
Social competence			
K2_EQM_K01	is ready to act and think in a creative and enterprising way, is able to set priorities in order to complete a given task	P7S_KK	
K2_EQM_K02	is aware of the social effects of engineering activities on the environment and the liability for the decisions made	P7S_KR	
K2_EQM_K03	understands the necessity of a lifetime learning process. Is able to perform critical analysis of own knowledge and receiving content	P7S_KO	
K2_EQM_K04	by participation in a group motion activity is ready to cooperate with a team under specific regulations and fair play rules; is aware of civilization hazards and prevents these threats by initiating the actions in favour of public interest	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

Environmental Quality Management

Name	Value
Total ECTS	90
Total number of hours of classes	1085
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)	59/90 (65.56%)
Number of ECTS points allocated to classes developing practical skills (including laboratory, project) (P)	39.4
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)	46
Percentage of ECTS for elective courses	29/90 (32.22%)
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	5
The number of ECTS points that a student will receive by completing classes in basic sciences (mathematics, physics/chemistry)	8

Organization of studies

Implementation of the study programme

Allowable ECTS deficit

Semester	Allowable deficit of ECTS points after a semester
Semester 1	6
Semester 2	6
Semester 3	0

Detailed requirements

Each course should be credited in a semester in which it is offered, taking into account the permissible ECTS credit deficit that allows enrolment in the subsequent semester.

Methods of verifying the intended learning outcomes

Activity form	Methods of verifying the intended learning outcomes
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, paper
Project	Project preparation, project implementation, project documentation, case study analysis
Diploma thesis	Evaluation of work in the preparation of a diploma thesis; diploma examination
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

Full-time second-cycle studies (level 7th of the Polish Qualifications Framework) in the Environmental Quality Management field of study last 3 semesters, and the required number of ECTS points to obtain a full qualification is 90. Organized classes (ZZU) cover 1085 hours. The study program includes blocks of subjects: basic, major and optional, which are carried out in the form of lectures, exercises, laboratories, projects, and seminars. Lectures provide the knowledge necessary for graduates to achieve the assumed learning outcomes. During classes, students are motivated to discuss and work on their own outside of classes. The most common way to check a student's knowledge is a colloquium or exam (written or oral). Practical subjects allow for the acquisition of skills and competences, involving research and analytical competencies, useful in researcher's work or in professional work on executive positions. Tasks are carried out individually or in teams, and classes are conducted in a way that allows for discussion, presentation of the results of own work, and learning how to solve problems, including research problems. The verification of the learning outcomes achieved by student for practical subjects takes place through tests, control papers, projects, reports, papers, oral presentations, and discussions. Student's involvement in the work during classes and the ability to cooperate in a group are also assessed. Second-cycle studies end with a diploma exam, which student can take after completing the study program and obtaining a positive assessment of the diploma thesis.

Internships

The studies do not include internships.

Diploma exam

The diploma exam consists of a presentation of the diploma thesis and answers to three questions from areas corresponding to the scope of studies, and includes issues from:

- water and wastewater treatment,
- water supply and sewerage systems,
- waste management,
- sanitary biology and environmental health hazards,
- air pollution and their sources.

A detailed list of issues for the diploma exam in a given academic year is consulted with academic teachers teaching individual courses and, after approval by the Program Committee of the field of study, is published on the faculty website no later than by the end of the second week of classes.

Study plan

Environmental Quality Management

Semester 1

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Water Quality Management	Lecture: 30	Exam	2	Obligatory
Water Treatment Technology	Lecture: 30 Laboratory: 15 Seminar: 15	Lecture: Exam Laboratory: Graded credit Seminar: Graded credit	Lecture: 2 Laboratory: 1 Seminar: 1	Obligatory
Water Supply Systems	Lecture: 15 Project: 15	Lecture: Graded credit Project: Graded credit	Lecture: 1 Project: 1	Obligatory
Raw Materials Management	Lecture: 15 Seminar: 15	Lecture: Graded credit Seminar: Graded credit	Lecture: 1 Seminar: 1	Obligatory
Sanitary Biology	Lecture: 15 Laboratory: 15	Lecture: Exam Laboratory: Graded credit	Lecture: 1 Laboratory: 1	Obligatory
Indoor Air Quality	Lecture: 15	Graded credit	1	Obligatory
AutoCAD	Laboratory: 15	Graded credit	1	Obligatory
Elective Courses - Block A	Lecture: 15	Graded credit	1	Obligatory group
The student chooses one subject				
Biomonitoring	Lecture: 15	Graded credit	1	Elective
Methods and Techniques of Air Pollutants Measurement	Lecture: 15	Graded credit	1	Elective
Environmental Chemistry	Lecture: 45 Laboratory: 15	Lecture: Graded credit Laboratory: Graded credit	Lecture: 3 Laboratory: 2	Obligatory
Engineering Applications of Mathematical Statistics	Lecture: 15 Classes: 15	Lecture: Graded credit Classes: Graded credit	Lecture: 2 Classes: 1	Obligatory

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Strategic Management	Lecture: 30	Graded credit	3	Obligatory
Ethics of New and Emerging Technologies	Lecture: 15	Graded credit	2	Obligatory
Foreign Language Course 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
Sum	**390**		**30**	

Semester 2

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Wastewater Treatment Technology	Lecture: 30 Laboratory: 15 Seminar: 15	Lecture: Graded credit Laboratory: Graded credit Seminar: Graded credit	Lecture: 2 Laboratory: 1 Seminar: 1	Obligatory
Waste Gases Purification	Lecture: 30 Classes: 15	Lecture: Exam Classes: Graded credit	Lecture: 2 Classes: 1	Obligatory
Environmental Toxicology	Lecture: 15 Laboratory: 15	Lecture: Graded credit Laboratory: Graded credit	Lecture: 1 Laboratory: 1	Obligatory
Environmental Health Hazards	Lecture: 30	Graded credit	2	Obligatory
Solid Waste Management	Lecture: 30 Laboratory: 15	Lecture: Exam Laboratory: Graded credit	Lecture: 2 Laboratory: 1	Obligatory
Biodegradable Materials	Lecture: 30	Graded credit	2	Obligatory
Reliability of Engineering Systems	Lecture: 30 Classes: 15	Lecture: Graded credit Classes: Graded credit	Lecture: 2 Classes: 1	Obligatory
Sewage Systems	Lecture: 15 Project: 15	Lecture: Graded credit Project: Graded credit	Lecture: 2 Project: 1	Obligatory
Membrane Separation Processes in Environmental Protection	Lecture: 15 Laboratory: 15	Lecture: Graded credit Laboratory: Graded credit	Lecture: 2 Laboratory: 1	Obligatory
Renewable Energy Systems	Lecture: 15	Graded credit	2	Obligatory

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Spatial Planning	Lecture: 15	Graded credit	2	Obligatory
Elective Courses - Block B	Laboratory: 15	Graded credit	1	Obligatory group
The student chooses one subject				
Automation in Environmental Engineering	Laboratory: 15	Graded credit	1	Elective
Thermal Comfort and Microclimate	Laboratory: 15	Graded credit	1	Elective
Sum	**390**		**30**	

Semester 3

Subject	Number of hours	Form of verification	ECTS points	Mandatoriness
Organization of Construction Works	Lecture: 15	Graded credit	1	Obligatory
Building Regulations	Lecture: 30	Graded credit	2	Obligatory
Diploma Seminar	Seminar: 30	Graded credit	2	Obligatory elective
Master Thesis	Diploma thesis: 110	Graded credit	16	Obligatory elective
Environmental Management	Lecture: 30	Graded credit	2	Obligatory
Elective Courses - Block C	Lecture: 15 Laboratory: 15	Graded credit	4	Obligatory group
The student chooses one subject				
Air Pollutants and Their Sources	Lecture: 15 Laboratory: 15	Lecture: Graded credit Laboratory: Graded credit	Lecture: 2 Laboratory: 2	Elective
Modeling of Water and Sewage Treatment Processes	Lecture: 15 Laboratory: 15	Lecture: Graded credit Laboratory: Graded credit	Lecture: 2 Laboratory: 2	Elective
Foreign Language Course 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	**305**		**30**	

Syllabuses

Wrocław University of Science and Technology

Water Quality Management

Educational subject description sheet

Basic information

Field of study Environmental Quality Management	**Education cycle** 2025/2026
Speciality -	**Subject code**
Organizational unit Faculty of Environmental Engineering	**Lecture languages** English
Study level second degree 3 semesters	**Mandatoriness** Obligatory
Study form full-time studies	**Block** Major-specific subjects
Education profile general academic profile	**Subject related to scientific research** Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 30 h, 2 ECTS, Exam

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student explains the key interactions within and between natural water cycle and urban water cycle.	K2_EQM_W09
PEU_W02	Student identifies water quality control tools within: wastewater, natural water and drinking water systems.	K2_EQM_W09
PEU_W03	Student describes the rules of forecasting changes in water quality.	K2_EQM_W09

Program content ensuring learning outcomes

As a part of the subject the water quality management systems involving natural water as urban water source and treated sewage receiver, wastewater collection and its treatment as well as drinking water systems will be presented. The central role of natural water sources (quantity and quality) within natural and urban water cycles will be analysed. Students will learn rules of natural water classification and methods of forecasting water quality changes as a result of natural and anthropogenic activity.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Credit/Exam	4
Preparation for an exam/credit	10
Self-study of class topics	6
Student workload	**Hours** 50

Wrocław University of Science and Technology

Water Treatment Technology

Educational subject description sheet

Basic information

Field of study Environmental Quality Management **Speciality** - **Organizational unit** Faculty of Environmental Engineering **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Lecture languages** English **Mandatoriness** Obligatory **Block** Major-specific subjects **Subject related to scientific research** Yes

Semester	**Activities, hours, ECTS and examination**
Semester 1	• Lecture: 30 h, 2 ECTS, Exam • Laboratory: 15 h, 1 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 characterizes raw and treated water quality.	K2_EQM_W09
PEU_W02	Student describes the course and efficiency of conventional and advanced water treatment processes.	K2_EQM_W09
PEU_W03	Student determines water treatment technology dependent on water composition and quality required.	K2_EQM_W09
PEU_W04	Student explains the operation principles of devices used for conventional and advanced systems of water treatment.	K2_EQM_W09
In terms of skills		
PEU_U01	Student carries out laboratory scale experiments and based on the result assesses usability of methods proposed.	K2_EQM_U05

PEU_U02	Student gathers and compares data from different sources preparing case study analysis.	K2_EQM_U03, K2_EQM_U04
PEU_U03	Student prepares and gives the presentation, enters into discussion, answers questions from the group and participates in discussions on other topics.	K2_EQM_U03, K2_EQM_U04
In terms of social competences		
PEU_K01	Student is able to cooperate with a group and perform various roles including the role of a leader or executor, as well as presenter, discussion member or opponent.	K2_EQM_K01

Program content ensuring learning outcomes

The course introduces students to the issues of construction and operation of water treatment systems as well as the safety of drinking water supply from source to tap. The main cognitive areas are focused on: water quality assessment, treatment processes description, construction of reactors and operating conditions. The practice of water treatment technology is verified by laboratory tests of selected water treatment processes. Seminar classes are focused on case study analyses of the real water treatment and supply systems operation.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	15
Seminar	15
Preparaton for classes	7
Conducting literature research	8
Preparation of a report/summary/presentation/paper	5
Preparation for an exam/credit	16
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Water Supply Systems

Educational subject description sheet

Basic information

Field of study Environmental Quality Management **Speciality** - **Organizational unit** Faculty of Environmental Engineering **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Lecture languages** English **Mandatoriness** Obligatory **Block** Major-specific subjects **Subject related to scientific research** Yes

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	Student describes the process of water distribution systems design and exploitation.	K2_EQM_W14
PEU_W02	Student classifies the types of water supply systems at an in-depth level.	K2_EQM_W14
In terms of skills		
PEU_U01	Student designs water supply system and analyzes hydraulics.	K2_EQM_U02, K2_EQM_U08
PEU_U02	Student develops flow calculation schemes for the water supply network.	K2_EQM_U02, K2_EQM_U08
In terms of social competences		

PEU_K01	Student identifies problems and dangers resulting from design mistakes and influencing society and environment.	K2_EQM_K02, K2_EQM_K04
PEU_K02	Student acts in accordance with the principles of work ethic.	K2_EQM_K04

Program content ensuring learning outcomes

The lecture will concern introduction to water supply systems with major information about the main elements of the water systems (from intakes to consumers). We will discuss the main types of water systems concerning different structures. Water demand and water losses calculations will be presented using different approaches. The methodology of designing and hydraulic calculations will be presented. The issue of proper exploitation of water supply systems will be discussed. Design classes concern transferring theoretical knowledge into practical applications. Students will develop the ability to see the relationship between design parameters and the hydraulics of operation and the impact on water recipients.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	15
Credit/Exam	2
Preparation for an exam/credit	6
Self-study of class topics	2
Preparation of a project	10
Student workload	**Hours** 50

Wrocław University of Science and Technology

Raw Materials Management

Educational subject description sheet

Basic information

Field of study Environmental Quality Management **Speciality** - **Organizational unit** Faculty of Environmental Engineering **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Lecture languages** English **Mandatoriness** Obligatory **Block** Major-specific subjects **Subject related to scientific research** Yes

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 15 h, 1 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 identifies the natural resources found in the world, their properties, extraction and application technologies, and the environmental impacts associated with them.	K2_EQM_W10, K2_EQM_W12
PEU_W02	Student explains the principles of natural resource management and discusses issues related to their classification, availability, reserves, and recycling.	K2_EQM_W10
In terms of skills		
PEU_U01	Student searches for, develops and presents information about the raw materials market in a selected country.	K2_EQM_U03, K2_EQM_U04
PEU_U02	Student analyzes literature and statistical data related to natural resource management and draws conclusions regarding their use in industry.	K2_EQM_U04

In terms of social competences		
PEU_K01	Student identifies environmental threats resulting from the exploitation of natural resources.	K2_EQM_K02, K2_EQM_K03

Program content ensuring learning outcomes

During the course, students will become familiar with issues related to the management of natural resources. Issues related to the classification of natural resources, their availability and the size of resources, as well as technologies for obtaining, processing, using and recycling natural resources will be discussed. In addition, issues related to the impact of mining and resource exploitation on the environment and methods of limiting them will be presented. Students will also acquire the skills of collecting and developing literature and statistical data, as well as presenting selected issues related to the exploitation of natural resources.

Calculation of ECTS points

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

Wrocław University of Science and Technology

Sanitary Biology

Educational subject description sheet

Basic information

Field of study
Environmental Quality Management

Speciality
-

Organizational unit
Faculty of Environmental Engineering

Study level
second degree 3 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code

Lecture languages
English

Mandatoriness
Obligatory

Block
Major-specific subjects

Subject related to scientific research
Yes

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

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student defines and characterizes techniques, methods of microbiological analysis used in environmental engineering.	K2_EQM_W12
PEU_W02	Student justifies the selection of methods for microbiological monitoring of the environment.	K2_EQM_W12
In terms of skills		
PEU_U01	Student examines environmental samples using biological methods and techniques, calculates and compiles results.	K2_EQM_U05
PEU_U02	Monitors and evaluates the role of microorganisms in technologies used in environmental engineering.	K2_EQM_U05
In terms of social competences		

PEU_K01	Student identifies the problems associated with microbial contamination of drinking water, indoor air, among others.	K2_EQM_K02

Program content ensuring learning outcomes

The program covers definitions and regulations related to monitoring and sanitary analysis of water, soil and air. It defines environmental microbiology, discussing biological methods for studying the positive and negative role of microorganisms in water, wastewater, soil and air treatment and environmental restoration technologies.
Laboratory classes include preparing materials for experiments, using biological and molecular biology techniques and methods to analyze samples from the environment.
Students will evaluate the effectiveness of disinfection and sterilization in environmental engineering, examine the presence of microorganisms.
The program provides the knowledge and skills needed to evaluate and use biological methods in environmental engineering.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	15
Preparation of a report/summary/presentation/paper	5
Preparaton for classes	5
Preparation for an exam/credit	6
Credit/Exam	4
Student workload	**Hours** 50

Wrocław University of Science and Technology

Indoor Air Quality

Educational subject description sheet

Basic information

Field of study
Environmental Quality Management

Speciality
-

Organizational unit
Faculty of Environmental Engineering

Study level
second degree 3 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code

Lecture languages
English

Mandatoriness
Obligatory

Block
Major-specific subjects

Subject related to scientific research
Yes

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

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student identifies the problem of indoor air quality and characterises methods of its assessment.	K2_EQM_W15
PEU_W02	Student recognises the causes and consequences of poor indoor air quality and lists indoor air quality pollutants.	K2_EQM_W15
PEU_W03	Student lists factors influencing indoor air quality.	K2_EQM_W15
PEU_W04	Student recognizes the importance of indoor air quality and its impact on people on a global scale.	K2_EQM_W15
In terms of social competences		
PEU_K01	Student takes care of maintaining high quality of indoor air in the spaces he or she occupies.	K2_EQM_K02
PEU_K02	Student is determined to learn about and apply modern technical and organizational solutions to maintain high indoor air quality.	K2_EQM_K02

PEU_K03	Student supports other people in their efforts to improve indoor air quality.	K2_EQM_K02

Program content ensuring learning outcomes

The objective of the course is to present the basics on indoor air quality (IAQ) and its impact on occupants. Humans are most heavily exposed to this component of the environment, due to the time spent indoors. Factors affecting IAQ will be listed. The causes and consequences of poor quality of indoor air will be indicated. Indoor air pollutants will be defined. Student will become familiar with the criteria and methods of IAQ assessment. The measurement methods, mathematical methods and sensory methods will be presented briefly. Attempts at introducing IAQ regulations will be mentioned. Student will gain an awareness of scale of the problem worldwide.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Self-study of class topics	6
Preparation for an exam/credit	3
Credit/Exam	1
Student workload	**Hours** 25

Wrocław University of Science and Technology

AutoCAD

Educational subject description sheet

Basic information

Field of study
Environmental Quality Management

Speciality
-

Organizational unit
Faculty of Environmental Engineering

Study level
second degree 3 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code

Lecture languages
English

Mandatoriness
Obligatory

Block
Major-specific subjects

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

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	Student creates and modifies technical drawings of intermediate complexity.	K2_EQM_U06
PEU_U02	Student creates their own library of files obtained from external sources.	K2_EQM_U06
PEU_U03	Student uses blocks from their self-created library to produce technical drawings.	K2_EQM_U06
PEU_U04	Student prepares a complete drawing in the form of digital documentation.	K2_EQM_U06
In terms of social competences		
PEU_K01	Student is able to obtain information from various sources.	K2_EQM_K03

Program content ensuring learning outcomes

Students become familiar with the possibilities of computer-aided design and improve their skills in using Autodesk AutoCAD. Through practical exercises, they enhance and expand their knowledge of tools used to prepare more advanced technical drawings. By working with block libraries and external sources, students learn how to gather information and solve design-related problems. The course is based on the practical use of the software and independent work, which helps consolidate knowledge and foster self-reliance.

Calculation of ECTS points

Activity form	**Activity hours**
Laboratory	15
Self-study of class topics	3
Self-development of practical skills	7
Student workload	**Hours** 25

Wrocław University of Science and Technology

Biomonitoring

Educational subject description sheet

Basic information

Field of study
Environmental Quality Management

Speciality
-

Organizational unit
Faculty of Environmental Engineering

Study level
second degree 3 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code

Lecture languages
English

Mandatoriness
Elective

Block
Major-specific subjects

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

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student identifies conditions influencing the occurrence of aquatic and terrestrial organisms.	K2_EQM_W12
PEU_W02	Student describes the diversity of flora and fauna, and therefore selects techniques commonly used in environmental biomonitoring.	K2_EQM_W12
In terms of social competences		
PEU_K01	Student identifies and understands the main threats to ecosystems and knows how to prevent them, therefore declares the protection of biodiversity.	K2_EQM_K01

Program content ensuring learning outcomes

During the lecture, students will learn about the factors that determine the presence of aquatic and terrestrial organisms. Biological processes and threats appearing in the natural environment as well as biological techniques for monitoring the

environment, will be discussed. Student will acquire knowledge sufficient to describe the diversity of flora and fauna as well as social competences.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Preparaton for classes	2
Self-study of class topics	2
Preparation for an exam/credit	4
Credit/Exam	2
Student workload	**Hours** 25

Wrocław University of Science and Technology

Methods and Techniques of Air Pollutants Measurement

Educational subject description sheet

Basic information

Field of study Environmental Quality Management **Speciality** - **Organizational unit** Faculty of Environmental Engineering **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Lecture languages** English **Mandatoriness** Elective **Block** Major-specific subjects **Subject related to scientific research** Yes

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

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student lists and characterizes methods and techniques for measuring major air pollutants.	K2_EQM_W15
PEU_W02	Student lists and explains methods and techniques for air sampling to determine its pollutants.	K2_EQM_W15
PEU_W03	Student identifies the problem of measuring devices calibration, as a critical one to attain the objective information about air pollution.	K2_EQM_W15
In terms of social competences		
PEU_K01	The student is in favour of using objective and reliable methods of assessing the state of the environment in order to identify environmental problems.	K2_EQM_K01

Program content ensuring learning outcomes

The objective of the course is to present selected methods and techniques for sampling air pollutants and to provide knowledge on the best, modern methods and techniques for measuring air pollutants, as well as their analysis. Sampling methods and techniques will be discussed which are appropriate for dust and for gaseous pollutants. The sampling principles and sampling procedures will be described, as well as the devices used for this purpose. Methods and techniques for measuring and analyzing air pollutants will be discussed which are appropriate for dust and individual gaseous pollutants. The main groups are gravimetric, optical, electrochemical and other methods, e.g. gas chromatography. Measuring and analytical devices will be presented. Issues related to the calibration of measuring devices will be emphasized.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Self-study of class topics	6
Preparation for an exam/credit	3
Credit/Exam	1
Student workload	**Hours** 25

Wrocław University of Science and Technology

Environmental Chemistry

Educational subject description sheet

Basic information

Field of study
Environmental Quality Management

Speciality
-

Organizational unit
Faculty of Environmental Engineering

Study level
second degree 3 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code

Lecture languages
English

Mandatoriness
Obligatory

Block
Subjects of basic education - chemistry

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 45 h, 3 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	Student describes the role of biological and physicochemical processes as factors influencing the quality of natural water resources.	K2_EQM_W01
PEU_W02	Student characterizes the physicochemical indicators of water quality.	K2_EQM_W01, K2_EQM_W09
PEU_W03	Student compares the analytical methods and indicates the best available analytical techniques to measure specific water quality parameters.	K2_EQM_W01, K2_EQM_W09
PEU_W04	Student identifies the basic notions: atmosphere, trace substance, air pollution, mass balance, basic photochemical cycle, gas-liquid phase equilibrium, dry and wet deposition.	K2_EQM_W01
PEU_W05	Student describes and explains the processes that take place in the troposphere in the gaseous phase.	K2_EQM_W01

PEU_W06	Student describes and explains the processes that take place in the troposphere in the liquid phase.	K2_EQM_W01
PEU_W07	Student indicates methods for determining the sieve, morphological, and chemical composition of waste.	K2_EQM_W01
PEU_W08	Student lists the parameters that determine the properties of waste.	K2_EQM_W01
PEU_W09	Student describes the methods of waste transformation and compares individual technologies.	K2_EQM_W01
In terms of skills		
PEU_U01	The student selects the best analytical techniques to assess the quality of the water resources.	K2_EQM_U05
PEU_U02	Student processes the measurement data and correctly interprets the results obtained.	K2_EQM_U05
PEU_U03	Student can apply the mathematical description of the mass balance of species in the troposphere.	K2_EQM_U07
PEU_U04	Student is able to analyse quantitatively selected processes that take place in the gas phase and liquid phase in the troposphere.	K2_EQM_U07
In terms of social competences		
PEU_K01	Student identifies problems related to the effects of pollution of water resources.	K2_EQM_K02
PEU_K02	Student understands the role of trace compounds in the troposphere and is able to support activities aimed at reducing their impact on the environment.	K2_EQM_K02
PEU_K03	Student supports activities aimed at proper waste management.	K2_EQM_K02

Program content ensuring learning outcomes

The course will cover issues related to the physicochemical properties of water, the problem of the presence of pollutants in the aquatic environment, and advanced analytical methods used in assessing water quality. Knowledge will be provided in the following areas: mass balance of substances in the atmosphere, selected models of changes in substance concentrations in the atmosphere, chemical changes in the troposphere in the gas phase, chemistry of the liquid phase in the troposphere, dry and wet deposition as processes of removing substances from the atmosphere. The following issues will be discussed: types of waste, quantitative and qualitative characteristics of waste, and their fertilization and calorific properties. Students will deepen their skills in the analysis of physicochemical indicators of water quality and the description and modelling of changes in the concentrations of trace substances in the troposphere.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	45
Laboratory	15
Credit/Exam	2
Preparation for an exam/credit	12
Self-study of class topics	16

Preparaton for classes	10
Self-development of practical skills	10
Preparation of a report/summary/presentation/paper	15
Student workload	**Hours** 125

Wrocław University of Science and Technology

Engineering Applications of Mathematical Statistics

Educational subject description sheet

Basic information

Field of study Environmental Quality Management **Speciality** - **Organizational unit** Faculty of Environmental Engineering **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Lecture languages** English **Mandatoriness** Obligatory **Block** Subjects of basic education - mathematics

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

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student recognizes selected methods and tools of descriptive statistics and characterizes them.	K2_EQM_W01
PEU_W02	Student recognizes selected methods and tools of inferential statistics and characterizes them.	K2_EQM_W01
PEU_W03	Student distinguishes statistical methods and tools according to their appropriateness for solving specific engineering problems.	K2_EQM_W01
In terms of skills		
PEU_U01	Student applies the descriptive and inferential statistics to solve problems in the domain of environmental engineering. In particular, student uses the relevant methods and tools to analyse the observation and measurement data.	K2_EQM_U01

PEU_U02	Student selects statistical methods and tools appropriate to the problems being analyzed and uses them appropriately.	K2_EQM_U01
PEU_U03	Student interprets the results of environmental data analysis using statistical methods and tools and formulates conclusions on this basis.	K2_EQM_U01
In terms of social competences		
PEU_K01	Student understands and accepts the need to use statistics due to functioning in the information society.	K2_EQM_K01

Program content ensuring learning outcomes

The aim of the subject is to present selected statistical methods and tools that are useful in analyzing and solving engineering problems, especially in the field of study. The first group of methods and tools belongs to the scope of descriptive statistics and includes: basic statistical measures, graphical methods of data presentation, basic distributions of discrete variables and basic distributions of continuous variables. The second group of methods and tools is used for statistical inference and includes statistical tests, analysis of variance and regression analysis. The schedules of the lecture and exercises are closely linked hence the methods and tools are learned in connection with their application to the analysis of real engineering problems.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Classes	15
Self-study of class topics	12
Self-development of practical skills	8
Preparation for an exam/credit	21
Credit/Exam	4
Student workload	**Hours** 75

Wrocław University of Science and Technology

Strategic Management

Educational subject description sheet

Basic information

Field of study Environmental Quality Management **Speciality** - **Organizational unit** Faculty of Environmental Engineering **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Lecture languages** English **Mandatoriness** Obligatory **Block** Subjects from the fields of humanities or social sciences

Semester	Activities, hours, ECTS and examination
Semester 1	• Lecture: 30 h, 3 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student explains the idea of strategic management.	K2_EQM_W03, K2_EQM_W05
PEU_W02	Student lists and describes a variety of management strategies.	K2_EQM_W05
PEU_W03	Student describes instruments (concepts, methods, models) used for the estimation of a strategy.	K2_EQM_W03, K2_EQM_W05

Program content ensuring learning outcomes

As part of the lecture, students will obtain knowledge about strategic management. They will be introduced to instruments (strategies, models and methods), that support strategic management. They will learn about enterprise and its market function, and the role of strategy at management of an enterprise. Selected concepts, environmental and resource analyses will be discussed. Students will gain knowledge about predicting trends, strategic position, strategic choice and implementation, and will be introduced to modern concepts of strategic management.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Credit/Exam	2
Self-study of class topics	23
Preparation for an exam/credit	20
Student workload	**Hours** 75

Wrocław University of Science and Technology

Ethics of New and Emerging Technologies

Educational subject description sheet

Basic information

Field of study Environmental Quality Management **Speciality** - **Organizational unit** Faculty of Environmental Engineering **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Lecture languages** English **Mandatoriness** Obligatory **Block** Subjects from the fields of humanities or social sciences

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	Student characterizes the principles of ethical, social and legal responsibility for the consequences of engineering activities and interprets these principles based on the ethics of new technologies.	K2_EQM_W03
PEU_W02	Student distinguishes between ethical principles and legal regulations, with particular emphasis on intellectual property principles.	K2_EQM_W04
In terms of social competences		
PEU_K01	Student appreciates the moral value of innovation and the importance of moral dilemmas related to new technologies in professional and social contexts.	K2_EQM_K02

Program content ensuring learning outcomes

The subject explains core ethical concepts and theories and explains the moral significance of innovation and new technologies.
The programme content includes: structure of the ethical dilemma, new ethical approaches to technology (roboethics, neuroethics), theoretical principles and practical aspects of technology assessment, ethical and social consequences of engineering and technical activities, the principle of responsibility. The subject explains the difference between ethical principles and legal regulations, including in the area of intellectual property. Structured assignments develop the ability to use sources, formulate critical judgements and communicate results to a wider audience.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Credit/Exam	2
Preparation for an exam/credit	10
Self-study of class topics	10
Preparation of a report/summary/presentation/paper	3
Preparaton for classes	10
Student workload	**Hours** 50

Wrocław University of Science and Technology

Foreign Language 2.1

Educational subject description sheet

Basic information

Field of study
lektoraty

Speciality
-

Organizational unit
Wrocław University of Science and Technology

Study level
second degree

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code
SJO000-25SM02684C

Lecture languages
English

Mandatoriness
Elective

Block
Foreign languages

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

Wastewater Treatment Technology

Educational subject description sheet

Basic information

Field of study Environmental Quality Management **Speciality** - **Organizational unit** Faculty of Environmental Engineering **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Lecture languages** English **Mandatoriness** Obligatory **Block** Major-specific subjects **Subject related to scientific research** Yes

Semester	**Activities, hours, ECTS and examination**
Semester 2	• Lecture: 30 h, 2 ECTS, Graded credit • Laboratory: 15 h, 1 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 lists, classifies and describes the processes of biological wastewater treatment.	K2_EQM_W09
PEU_W02	Student selects a technological system for municipal wastewater treatment in terms of the proper efficiency of removing organic compounds - nitrogen and phosphorus, as well as the recovery of nutrients.	K2_EQM_W09
PEU_W03	Student characterizes the observed efficiency of removing organic compounds, nitrogen and phosphorus, in connection with the parameters of biological treatment.	K2_EQM_W09
In terms of skills		

PEU_U01	Student performs laboratory tests of selected wastewater treatment and sludge processing processes and interprets the obtained results.	K2_EQM_U05
PEU_U02	Student assess the technological processes based on results of laboratory tests.	K2_EQM_U05
PEU_U03	Student finds in the literature information and data necessary to present the selected wastewater treatment technology.	K2_EQM_U04
PEU_U04	Student performs laboratory tests of selected wastewater treatment and sludge processing processes and interprets the obtained results.	K2_EQM_U03
In terms of social competences		
PEU_K01	Student is capable of appropriate conduct when striving to achieve a goal.	K2_EQM_K01

Program content ensuring learning outcomes

The lecture will cover topics related to mechanical and biological wastewater treatment, providing a foundation for understanding how treatment processes can be implemented to meet legally required effluent quality standards. Students will learn about biological processes for the removal of organic compounds, nitrogen (including nitrification and denitrification), and phosphorus (including enhanced biological phosphorus removal and chemical precipitation). The course will also cover key physical processes such as sedimentation and aeration. Students will use the acquired knowledge in practice by determining the impact of the applied unit processes on the parameters of wastewater samples and by preparing a presentation on wastewater treatment technologies.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	15
Seminar	15
Preparation of a report/summary/presentation/paper	20
Self-study of class topics	6
Preparation for an exam/credit	12
Credit/Exam	2
Student workload	**Hours** 100

Wrocław University of Science and Technology

Waste Gases Purification

Educational subject description sheet

Basic information

Field of study
Environmental Quality Management

Speciality
-

Organizational unit
Faculty of Environmental Engineering

Study level
second degree 3 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code

Lecture languages
English

Mandatoriness
Obligatory

Block
Major-specific subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 2	• Lecture: 30 h, 2 ECTS, Exam • Classes: 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 waste gases purification technologies.	K2_EQM_W13
PEU_W02	Student explains the physical and chemical phenomena on which waste gases purification technologies are based.	K2_EQM_W13
In terms of skills		
PEU_U01	Student calculates the mass balance of the absorption process and selects the absorber geometry.	K2_EQM_U07
In terms of social competences		
PEU_K01	The student accepts the need to purify waste gases from industrial and combustion processes.	K2_EQM_K01
PEU_K02	The student supports the development of new technologies that serve this purpose while accepting the costs associated with it.	K2_EQM_K01

Program content ensuring learning outcomes

The lectures will address the issue of ambient air quality. The lecture will discuss gaseous and dust pollutants resulting from industrial activity and fuel combustion. Students will be introduced to waste gases purification techniques. Particular attention will be paid to the removal of nitrogen and sulfur compounds. During the exercises, students will calculate the absorption and periodic adsorption process in the context of application to waste gases purification. They will learn to determine the geometry of process equipment.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Classes	15
Self-study of class topics	14
Preparation for an exam/credit	10
Credit/Exam	6
Student workload	**Hours** 75

Wrocław University of Science and Technology

Environmental Toxicology

Educational subject description sheet

Basic information

Field of study
Environmental Quality Management

Speciality
-

Organizational unit
Faculty of Environmental Engineering

Study level
second degree 3 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code

Lecture languages
English

Mandatoriness
Obligatory

Block
Major-specific subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 2	• 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	Student explains the basic concepts of environmental toxicology and describes the mechanisms of action of toxic substances and the factors influencing their toxicity.	K2_EQM_W12
PEU_W02	Student characterizes sources of environmental toxins, methods for assessing the toxicity of environmental components, and the impact of heavy metals and selected organic compounds on the environment.	K2_EQM_W12
In terms of skills		
PEU_U01	Student performs ecotoxicological analyses of environmental samples and uses indicator organisms to assess the quality of water, soil, and waste.	K2_EQM_U05

PEU_U02	Student evaluates the influence of biological and physicochemical factors on the toxicity of xenobiotics and prepares research results in the form of a report.	K2_EQM_U05
In terms of social competences		
PEU_K01	Student is sensitive to threats to people and the natural environment resulting from pollutant emissions.	K2_EQM_K02

Program content ensuring learning outcomes

During the lecture, students will be introduced to the principles and applications of environmental toxicology, including toxicity testing of water, air, soil, and sediment samples. Students will learn about the impact of heavy metals on the environment and the ecotoxicology of selected organic compounds. During laboratory classes, students will gain the ability to perform toxicological analyses of environmental samples obtained from the natural environment and to use indicator organisms to test water quality.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	15
Preparaton for classes	4
Preparation of a report/summary/presentation/paper	6
Preparation for an exam/credit	8
Credit/Exam	2
Student workload	**Hours** 50

Wrocław University of Science and Technology

Environmental Health Hazards

Educational subject description sheet

Basic information

Field of study
Environmental Quality Management

Speciality
-

Organizational unit
Faculty of Environmental Engineering

Study level
second degree 3 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code

Lecture languages
English

Mandatoriness
Obligatory

Block
Major-specific subjects

Subject related to scientific research
Yes

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

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student names the sources of environmental pollution and describes their impact on the human body.	K2_EQM_W12
PEU_W02	Student defines changes in the human body caused by environmental factors, both natural and anthropogenic.	K2_EQM_W12
PEU_W03	Student presents health hazards and sees the need to limit exposure to environmental risk factors.	K2_EQM_W12

Program content ensuring learning outcomes

During the lecture, students will learn about the influence of chemical, physical, and biological environmental factors on the human body. Extended knowledge of changes on a cellular level and basic physiological functions of the human body caused by environmental factors will be presented. Students will also be introduced to methods of forecast of the results and understanding the concept of limited exposure of the human body to hazardous environmental factors.

Calculation of ECTS points

Activity form	Activity hours
Lecture	30
Preparaton for classes	5
Preparation for an exam/credit	9
Self-study of class topics	4
Credit/Exam	2
Student workload	**Hours** 50

Wrocław University of Science and Technology

Solid Waste Management

Educational subject description sheet

Basic information

Field of study Environmental Quality Management **Speciality** - **Organizational unit** Faculty of Environmental Engineering **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Lecture languages** English **Mandatoriness** Obligatory **Block** Major-specific subjects **Subject related to scientific research** Yes

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

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student characterizes the objectives of waste management policy and law in the European Union.	K2_EQM_W11
PEU_W02	Student identifies the best available waste processing technologies, process conditions, basic parameters and final products.	K2_EQM_W11
In terms of skills		
PEU_U01	Student plans and conducts research on the technological properties of waste.	K2_EQM_U05
PEU_U02	Student analyzes the results of waste tests, interprets them and, on their basis, indicates the appropriate waste management technologies.	K2_EQM_U07
In terms of social competences		

PEU_K01	Student identifies problems related to waste generation.	K2_EQM_K02
PEU_K02	Student supports activities aimed at proper waste management.	K2_EQM_K02

Program content ensuring learning outcomes

The course will present issues related to waste management, physical and chemical properties of waste and technologies for their management. Knowledge will be provided on current problems and areas of development of European waste management policy. Sources of waste generation, methods of its collection and transport will be presented. Waste processing technologies such as: sorting, recycling, composting, fermentation, energy recovery in thermal processes and storage will be discussed in detail. During practical classes, students will be familiarized with selected analytical methods used in the assessment of technological properties of waste. Based on the conducted analyses, students will assess the technological properties of waste and choose methods for their management.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Laboratory	15
Credit/Exam	4
Preparation for an exam/credit	10
Self-study of class topics	6
Preparaton for classes	3
Preparation of a report/summary/presentation/paper	7
Student workload	**Hours** 75

Wrocław University of Science and Technology

Biodegradable Materials

Educational subject description sheet

Basic information

Field of study
Environmental Quality Management

Speciality
-

Organizational unit
Faculty of Environmental Engineering

Study level
second degree 3 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code

Lecture languages
English

Mandatoriness
Obligatory

Block
Major-specific subjects

Subject related to scientific research
Yes

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

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student classifies the types of applications of biodegradable materials on a global scale. Distinguishes their advantages and disadvantages in terms of application and environmental impact.	K2_EQM_W10
PEU_W02	Student recognizes the raw materials for the production of biodegradable materials, in relation to the region of the world. Identifies biodegradable materials used in construction, medicine, automotive and construction industries.	K2_EQM_W10
In terms of social competences		
PEU_K01	Student accepts the need for continuous expand of their knowledge.	K2_EQM_K03

Program content ensuring learning outcomes

During the lecture, students will learn about the division methods and types of biodegradable materials available on the market, with particular emphasis on polymeric materials. Methods of obtaining them, processing them and selected applications. Types of modifications to their properties will be discussed in order to meet the numerous requirements set by the current market of packaging materials used in construction or automotive.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Credit/Exam	2
Self-study of class topics	8
Preparation for an exam/credit	10
Student workload	**Hours** 50

Wrocław University of Science and Technology

Reliability of Engineering Systems

Educational subject description sheet

Basic information

Field of study
Environmental Quality Management

Speciality
-

Organizational unit
Faculty of Environmental Engineering

Study level
second degree 3 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code

Lecture languages
English

Mandatoriness
Obligatory

Block
Major-specific subjects

Subject related to scientific research
Yes

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

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student describes methods of analysis and assessment of the reliability of water supply and sewage systems, taking into account legal, economic and environmental protection conditions.	K2_EQM_W06
In terms of skills		
PEU_U01	Student analyzes the reliability of water supply and sewage systems based on data obtained from their operation and adapts modernization taking into account reliability requirements.	K2_EQM_U08
In terms of social competences		
PEU_K01	Student identifies problems related to the safety and risks of operating water and sewage networks and is able to act in an entrepreneurial manner.	K2_EQM_K02

Program content ensuring learning outcomes

The course will discuss the objectives and scope of reliability studies, taking into account the typical terminology used in this type of theoretical and practical research. The methodology for the analysis and assessment of the reliability of water supply and sewage systems will be presented, and practical examples of calculating reliability indicators using actual operating data will be provided. Basic reliability structures will be discussed, along with their distinction from technological structures. Practical examples of the effects of unreliable operation of water supply and sewage systems will be given, as well as the required level of reliability in relation to individual elements of these systems. The principles of design, construction and operation of water supply and sewage systems will be discussed, taking into account the requirements for the reliability of their operation. Modeling methods of reliability indicators will be presented, taking into account artificial intelligence and machine learning methods. The differences in modeling results between the stationary and dynamic approach will be shown. Methods for assessing the risk and safety of water and sewage systems will be discussed. Students will use the acquired knowledge in practice during the analysis of the reliability of water supply and sewage systems.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Classes	15
Credit/Exam	2
Preparation of a report/summary/presentation/paper	10
Preparaton for classes	4
Self-study of class topics	6
Preparation for an exam/credit	8
Student workload	**Hours** 75

Wrocław University of Science and Technology

Sewage Systems

Educational subject description sheet

Basic information

Field of study Environmental Quality Management **Speciality** - **Organizational unit** Faculty of Environmental Engineering **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Lecture languages** English **Mandatoriness** Obligatory **Block** Major-specific subjects **Subject related to scientific research** Yes

Semester	**Activities, hours, ECTS and examination**
Semester 2	• Lecture: 15 h, 2 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	The student explains the terminology of design and modeling of sewage systems.	K2_EQM_W14
PEU_W02	The student cites materials and describes techniques used to construct sewage systems.	K2_EQM_W14
In terms of skills		
PEU_U01	The student designs a gravity stormwater system.	K2_EQM_U02
PEU_U02	The student develops a hydrodynamic model of wastewater collection systems.	K2_EQM_U06
PEU_U03	The student develops simulations of sewerage systems.	K2_EQM_U08
In terms of social competences		

PEU_K01	The student identifies problems of environmental risks due to improper design and operation of sewage systems.	K2_EQM_K02, K2_EQM_K04

Program content ensuring learning outcomes

The course will discuss the characteristics of conventional and non-conventional sewage systems. Knowledge, skills and competencies will be imparted on the principle and methods of safe design of land drainage systems in the risk of urban flooding. There will be discussion of methods of hydrodynamic modeling of sewage systems with consideration of climate change and rainwater management methods.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Project	15
Preparaton for classes	9
Preparation of a project	10
Self-study of class topics	9
Preparation for an exam/credit	15
Credit/Exam	2
Student workload	**Hours** 75

Wrocław University of Science and Technology

Membrane Separation Processes in Environmental Protection

Educational subject description sheet

Basic information

Field of study
Environmental Quality Management

Speciality
-

Organizational unit
Faculty of Environmental Engineering

Study level
second degree 3 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code

Lecture languages
English

Mandatoriness
Obligatory

Block
Major-specific subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 2	• Lecture: 15 h, 2 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	Student explains the role of membrane in mass transport.	K2_EQM_W09
PEU_W02	Student knows the usefulness of hybrid and integrated membrane systems in water and wastewater treatment.	K2_EQM_W09
PEU_W03	Student indicates various methods to improve separation and transport features of membranes.	K2_EQM_W09
In terms of skills		
PEU_U01	Student is able to assess membrane separation and transport properties.	K2_EQM_U05
PEU_U02	Student makes use of research results to elaborate technologies of polluted streams cleaning or fractioning processes.	K2_EQM_U05
In terms of social competences		

PEU_K01	Student solves the problem to achieve required goal.	K2_EQM_K01

Program content ensuring learning outcomes

As a part of the lecture the membrane processes as well as the role of membrane in mass transport will be presented. The suitability of various membrane processes for removal of specific pollutants from water and wastewater will be discussed. The integrated and hybrid membrane systems involving water desalination and zero liquid discharge concept will be described. Membrane bioreactors and their application in circular economy as well as exploitations problems will be also discussed. During laboratory classes student acquire the ability to evaluate membrane transport and separation properties as well as to propose an appropriate technological system involving membrane processes.

Calculation of ECTS points

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

Wrocław University of Science and Technology

Renewable Energy Systems

Educational subject description sheet

Basic information

Field of study Environmental Quality Management	**Education cycle** 2025/2026
Speciality -	**Subject code**
Organizational unit Faculty of Environmental Engineering	**Lecture languages** English
Study level second degree 3 semesters	**Mandatoriness** Obligatory
Study form full-time studies	**Block** Major-specific subjects
Education profile general academic profile	**Subject related to scientific research** Yes

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

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	Student classifies, characterizes and compares renewable energy sources and defines the principles of operation of RES system elements.	K2_EQM_W07
PEU_W02	Student determines the scope of applicability and design criteria of renewable energy sources in various branches of technology.	K2_EQM_W07

Program content ensuring learning outcomes

During the lecture, the student gains knowledge of renewable energy systems (RES) and energy component elements. The student is introduced to the method of operating energy systems and components and obtains information on the basic principles of assembling and configuring technical RES systems. The student learns how to operate devices in renewable energy systems and the key principles of operation of infrastructure elements of RES systems. The student is aware of the challenges related to energy and the environment and communicates with experts working in the field of RES.

Calculation of ECTS points

Activity form	Activity hours
Lecture	15
Credit/Exam	2
Preparation for an exam/credit	10
Self-study of class topics	10
Preparaton for classes	13
Student workload	**Hours** 50

Wrocław University of Science and Technology

Spatial Planning

Educational subject description sheet

Basic information

Field of study Environmental Quality Management **Speciality** - **Organizational unit** Faculty of Environmental Engineering **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Lecture languages** English **Mandatoriness** Obligatory **Block** Major-specific subjects

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

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of knowledge		
PEU_W01	The student formulates the main principles of spatial planning on a local and regional scale.	K2_EQM_W02
PEU_W02	Student explains the role and significance of planning documents in the spatial development process.	K2_EQM_W02
PEU_W03	Student characterizes the basic functions and applications of Geographic Information Systems (GIS) in spatial planning.	K2_EQM_W02
In terms of social competences		
PEU_K01	The student shows initiative to participate in the spatial planning process.	K2_EQM_K01, K2_EQM_K02

Program content ensuring learning outcomes

The lecture discusses key issues related to spatial planning, including:
- planning models,
- basic principles of shaping spatial order,
- planning documents,
- social participation,
- functional areas,
- ecosystems,
- planning for public health,
- history of settlement and planning processes,
- use of GIS in spatial planning

The lecture topics allow for obtaining basic knowledge about spatial planning systems in Poland, Europe and the world.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Preparation for an exam/credit	23
Credit/Exam	2
Self-study of class topics	10
Student workload	**Hours** 50

Wrocław University of Science and Technology

Automation in Environmental Engineering

Educational subject description sheet

Basic information

Field of study Environmental Quality Management **Speciality** - **Organizational unit** Faculty of Environmental Engineering **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Lecture languages** English **Mandatoriness** Elective **Block** Major-specific subjects

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

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	Student applies and uses information and communication technologies to develop appropriate control algorithms and programmable controllers for typical environmental engineering applications.	K2_EQM_U02
PEU_U02	Student assesses the suitability and applicability of a device or computer system for process control in environmental engineering.	K2_EQM_U02
In terms of social competences		
PEU_K01	Student identifies and solves problems based on available sources of information and consultation with people with relevant knowledge and cooperation with the group.	K2_EQM_K01

Program content ensuring learning outcomes

The laboratory covers aspects of the subject of automatic control of installations in the field of environmental engineering. Students will acquire skills in the preparation of PLC (Programmable Logic Controller) control and regulation algorithms. During laboratory classes, students will be familiarized with software that allows the development of control schemes for devices in the field of environmental engineering. Students will create a control system diagram for devices in the field of environmental engineering based on defined input and output signals.

Calculation of ECTS points

Activity form	**Activity hours**
Laboratory	15
Preparaton for classes	1
Self-development of practical skills	7
Preparation of a report/summary/presentation/paper	2
Student workload	**Hours** 25

Wrocław University of Science and Technology

Thermal Comfort and Microclimate

Educational subject description sheet

Basic information

Field of study
Environmental Quality Management

Speciality
-

Organizational unit
Faculty of Environmental Engineering

Study level
second degree 3 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code

Lecture languages
English

Mandatoriness
Elective

Block
Major-specific subjects

Subject related to scientific research
Yes

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

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	Student uses measuring devices, calculates indicators of thermal comfort and interprets the obtained results of calculations and measurements.	K2_EQM_U02, K2_EQM_U05
PEU_U02	Student decides what microclimate parameters should be set for the room to improve human functioning in the indoor environment.	K2_EQM_U02, K2_EQM_U05
In terms of social competences		
PEU_K01	Student identifies and solves problems based on available sources of information and consultation with people with relevat knowledge and the group.	K2_EQM_K01

Program content ensuring learning outcomes

The course will discuss key aspects of thermal comfort. Participants of the classes will learn the factors affecting the

microclimate of rooms, the methods and assumptions of calculating indices of thermal comfort and the principles of assessing its level, as well as the principles of creating user-friendly microclimate in rooms. Students will acquire skills in performing measurements of thermal comfort and selected microclimate parameters.

Calculation of ECTS points

Activity form	**Activity hours**
Laboratory	15
Preparaton for classes	2
Preparation of a report/summary/presentation/paper	6
Self-development of practical skills	2
Student workload	**Hours** 25

Wrocław University of Science and Technology

Organization of Construction Works

Educational subject description sheet

Basic information

Field of study Environmental Quality Management **Speciality** - **Organizational unit** Faculty of Environmental Engineering **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Lecture languages** English **Mandatoriness** Obligatory **Block** Major-specific 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	Student lists the stages of the investment process.	K2_EQM_W02, K2_EQM_W08
PEU_W02	Student classifies the types of cost estimates.	K2_EQM_W08
PEU_W03	Student indicates the appropriate technology and organization of works for a given installation.	K2_EQM_W02, K2_EQM_W08

Program content ensuring learning outcomes

The lecture will discuss issues related to the technology and organization of construction works. Students will be provided with knowledge about the stages of the investment process. Topics related to the preparation of cost calculations for construction works, including the development of the construction site and the conditions for storing building materials, will be discussed. During the lecture, knowledge about the correct use of technology in the design and execution of installations will also be provided.

Calculation of ECTS points

Activity form	Activity hours
Lecture	15
Self-study of class topics	5
Preparation for an exam/credit	3
Credit/Exam	2
Student workload	**Hours** 25

Wrocław University of Science and Technology

Building Regulations

Educational subject description sheet

Basic information

Field of study Environmental Quality Management **Speciality** - **Organizational unit** Faculty of Environmental Engineering **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Lecture languages** English **Mandatoriness** Obligatory **Block** Major-specific subjects

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 quotes building regulations in EU and international standards related to the investment process.	K2_EQM_W02
PEU_W02	The student describes the stages of the investment process and explains the principles of preparing project documentation, organizing construction works, and complying with health and safety regulations.	K2_EQM_W02

Program content ensuring learning outcomes

The course will discuss building regulations in Poland, EU and international standards. During the course, students will become familiar with the procedures for conducting the investment process. Knowledge will be provided in the field of engineering design, execution and construction in accordance with applicable regulations and standards. During the lecture, the occupational health and safety conditions applicable during construction works will be discussed. Issues related to building permits and technical requirements that buildings must meet will also be presented.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Self-study of class topics	10
Preparation for an exam/credit	8
Credit/Exam	2
Student workload	**Hours** 50

Wrocław University of Science and Technology

Diploma Seminar

Educational subject description sheet

Basic information

Field of study
Environmental Quality Management

Speciality
-

Organizational unit
Faculty of Environmental Engineering

Study level
second degree 3 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code

Lecture languages
English

Mandatoriness
Obligatory elective

Block
Major-specific subjects

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 skills		
PEU_U01	Student prepares and presents a presentation on an area relevant to the master thesis being realized.	K2_EQM_U03
PEU_U02	Student searches and selects data and information necessary to present problems described within the master thesis.	K2_EQM_U04
PEU_U03	Student leads a discussion on the problems described in the master thesis and persuade about the correctness of the adopted solutions.	K2_EQM_U09

Program content ensuring learning outcomes

As a part of the seminar, student presents the results of her/his master thesis performed within the area appropriate for the studied field and speciality.

Calculation of ECTS points

Activity form	Activity hours
Seminar	30
Preparation of a report/summary/presentation/paper	20
Student workload	**Hours** 50

Wrocław University of Science and Technology

Master Thesis

Educational subject description sheet

Basic information

Field of study
Environmental Quality Management

Speciality
-

Organizational unit
Faculty of Environmental Engineering

Study level
second degree 3 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code

Lecture languages
English

Mandatoriness
Obligatory elective

Block
Major-specific subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Diploma thesis: 110 h, 16 ECTS, Graded credit

Subject's learning outcomes

Subject's outcome	Content	Learning outcome
In terms of skills		
PEU_U01	Student independently prepares the master thesis on a topic appropriate to the field of Environmental Quality Management.	K2_EQM_U10
PEU_U02	Student proposes solutions to the problem, selects and applies computational and analytical methods according to the topic of the master thesis.	K2_EQM_U10
PEU_U03	Student obtains data and information necessary to complete the master thesis topic.	K2_EQM_U04, K2_EQM_U10

Program content ensuring learning outcomes

As a part of the subject, student realizes the master thesis within the area appropriate for the studied field, using knowledge, skills and competences acquired during the study.

Calculation of ECTS points

Activity form	Activity hours
Preparation of the thesis	290
Diploma thesis	110
Student workload	**Hours** 400

Wrocław University of Science and Technology

Environmental Management

Educational subject description sheet

Basic information

Field of study
Environmental Quality Management

Speciality
-

Organizational unit
Faculty of Environmental Engineering

Study level
second degree 3 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code

Lecture languages
English

Mandatoriness
Obligatory

Block
Major-specific subjects

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 characterizes and explains the principles of creation and functioning of environmental management systems.	K2_EQM_W03
PEU_W02	Student describes and explains the certification process and the stages of implementation of environmental management systems.	K2_EQM_W03
In terms of social competences		
PEU_K01	Student identifies problems related to the impact of human activity on the environment and declares readiness to take action to protect it.	K2_EQM_K02

Program content ensuring learning outcomes

As part of the Environmental Management course, student will become familiar with the environmental management system from a process, management and environmental perspective. Basic parameters of environmental management will be

presented, in terms of climate change and IPPC reports. In addition, knowledge of the assessment of investments on the environment and its impact on individual parameters will be presented, environmental management systems such as ISO 14001 and EMAS will be discussed. Key parameters of the management system will be presented, including ESG reporting, and the implementation of selected environmental projects regarding green-blue infrastructure and solutions based on nature such as NBS - Nature Based Solutions and solutions in the field of air quality management and low-emission activities for selected cities will be discussed.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	30
Credit/Exam	2
Self-study of class topics	8
Preparation for an exam/credit	10
Student workload	**Hours** 50

Wrocław University of Science and Technology

Air Pollutants and Their Sources

Educational subject description sheet

Basic information

Field of study Environmental Quality Management **Speciality** - **Organizational unit** Faculty of Environmental Engineering **Study level** second degree 3 semesters **Study form** full-time studies **Education profile** general academic profile	**Education cycle** 2025/2026 **Subject code** **Lecture languages** English **Mandatoriness** Elective **Block** Major-specific subjects

Semester	**Activities, hours, ECTS and examination**
Semester 3	• Lecture: 15 h, 2 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	Student lists and categorizes air pollutants in terms of their origin, especially from natural and anthropogenic sources.	K2_EQM_W12, K2_EQM_W15
PEU_W02	Student characterizes the impact of air pollution on humans and the environment.	K2_EQM_W12, K2_EQM_W15
In terms of skills		
PEU_U01	Student describes and evaluates the impact of pollution sources on outdoor and indoor air.	K2_EQM_U02
PEU_U02	Student uses appropriate mathematical models and conducts simulations using computer programs.	K2_EQM_U02
In terms of social competences		

PEU_K01	Student identifies the impact of air pollution on society. Student is able to express the opinion on this topic publicly.	K2_EQM_K01
PEU_K02	Student supports actions to reduce air pollutants emissions.	K2_EQM_K01

Program content ensuring learning outcomes

The objective of the course is to provide knowledge about air pollutants and their sources. The main emphasis will be on the presentation of basic pollutants such as sulfur oxides, nitrogen oxides, oxidants (e.g. ozone, free radicals), carbon monoxide, carbon dioxide, methane and volatile organic compounds, particulate matter. The impact of these air pollutants on the environment and human health will be characterized. The subject also aims to present selected computational methods for assessing the impact of air pollution sources on outdoor air, as well as on indoor air. During laboratory classes, students, using appropriate mathematical models, determine the impact of point sources on atmospheric air as well as on indoor air. They perform simulations of selected impact scenarios and analyze their results.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	15
Self-study of class topics	21
Self-development of practical skills	25
Preparation for an exam/credit	20
Credit/Exam	4
Student workload	**Hours** 100

Wrocław University of Science and Technology

Modeling of Water and Sewage Treatment Processes

Educational subject description sheet

Basic information

Field of study
Environmental Quality Management

Speciality
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Organizational unit
Faculty of Environmental Engineering

Study level
second degree 3 semesters

Study form
full-time studies

Education profile
general academic profile

Education cycle
2025/2026

Subject code

Lecture languages
English

Mandatoriness
Elective

Block
Major-specific subjects

Subject related to scientific research
Yes

Semester	Activities, hours, ECTS and examination
Semester 3	• Lecture: 15 h, 2 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	Student describes physical, chemical, and biological phenomena occurring in the course of water and wastewater treatment.	K2_EQM_W09
PEU_W02	Student explains the rules of mathematical modeling of water and wastewater treatment unit processes.	K2_EQM_W09
In terms of skills		
PEU_U01	Student uses water treatment models for planning and forecasting the effects of water treatment system operation.	K2_EQM_U08
PEU_U02	Student evaluates and selects algorithms and devices for controlling the wastewater treatment plant operation.	K2_EQM_U08
In terms of social competences		

PEU_K01	Student is creative and enterprising, and solves the problem to achieve required goal.	K2_EQM_K01

Program content ensuring learning outcomes

As a part of the lecture the basic rules of creation and verification of simulation algorithms describing the course of the selected unit processes of water and wastewater treatment will be presented. In turn, during the computer laboratory classes students will acquire skills on mathematical models application for planning and forecasting of the efficiency of the water treatment systems. Computer simulations performed with the use of wastewater treatment plant model will let students to acquire skills on evaluation of the efficiency of wastewater treatment plant, as well as on selection of the appropriate algorithms for controlling of the wastewater treatment plant operation.

Calculation of ECTS points

Activity form	**Activity hours**
Lecture	15
Laboratory	15
Preparation for an exam/credit	10
Preparation of a report/summary/presentation/paper	30
Credit/Exam	2
Self-study of class topics	18
Self-development of practical skills	10
Student workload	**Hours** 100

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** SJO000-25SM02690C
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