Lodz University of Technology

Study programme

Faculty:	Faculty of Process and Environmental Engineering
Major:	Environmental Engineering
Level of study:	first-cycle programme (inżynier)
Form of study:	full-time studies
Academic year:	2026/27

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Basic information

Name of the field of study:	Environmental Engineering
Level of study:	first-cycle programme (inżynier)
Study profile:	general academic
Form of studies:	full-time studies
Duration of studies (number of semesters):	7
The number of ECTS points required to complete studies:	210
Total number of hours of classes:	2690
The number of ECTS points a student obtains as part of classes conducted with the direct participation of academic teachers or other persons conducting classes:	108
Professional title awarded to graduates:	inżynier
ISCED code:	0712
Language of study:	polish

Assigning the course to the disciplines to which the learning outcomes relate

Discipline	Percentage share
Chemical engineering	69%
Environmental engineering, mining and energy	20%
Civil engineering and transport	11%

Learning outcomes (in relation to the PQF)

No.	Learning outcome code	Learning Outcome Content	Reference to the universal characteristics of the first level of PRK	Reference to the second-level characteristics of the PRK, taking into account the second-level characteristics enabling the acquisition of engineering competences
1	**1IOS1**	Knows and understands, at an advanced level, the methods and tools from the fields of science, chemical engineering, environmental engineering and construction necessary for the analysis and synthesis of complex systems in the field of environmental engineering.	P6U_W	P6S_WG
2	**1IOS2**	Demonstrates advanced knowledge and understanding of engineering technologies used in chemical and environmental engineering, particularly processes used in air, water, and soil protection, wastewater treatment, waste processing, and energy generation, including renewable energy. Applies the principles of sustainable development, circular economy, and product life cycles to describe these processes.	P6U_W	P6S_WG
3	**1IOS3**	Knows and understands the fundamental dilemmas of modern civilization, procedures, legal and economic foundations, and various methods and tools used in the field of environmental engineering. Possesses knowledge of industrial property protection, copyright law, and entrepreneurship.	P6U_W	P6S_WK
4	**1IOS4**	Is able to use the acquired knowledge to identify, formulate and solve complex and unusual problems in the field of environmental engineering and select and apply appropriate methods and tools, taking into account legal, economic, social and ethical aspects.	P6U_U	P6S_UW
5	**1IOS5**	Is able to plan and conduct experimental research, including measurements and computer simulations, analyzing, interpreting and reporting data.	P6U_U	P6S_UW
6	**1IOS6**	Is able to select appropriate equipment and technologies, prepare technical designs for basic installation systems and prepare technical documentation.	P6U_U	P6S_UW
7	**1IOS7**	Can communicate effectively with diverse audiences using specialized terminology, including in a foreign language at B2 level (Common European Framework of Reference for Languages); formulate arguments supported by knowledge documented by credible sources. Present results, analyze them, and engage in discussion.	P6U_U	P6S_UW, P6S_UK
8	**1IOS8**	Is able to plan and organize individual and team work, including interdisciplinary work, taking on various roles, and understands the need for lifelong learning and self-improvement.	P6U_U	P6S_UW, P6S_UU
9	**1IOS9**	Is ready to critically evaluate the knowledge acquired and recognize its importance in solving cognitive and practical problems, independently develop competences through the use of appropriate learning strategies and the use of expert knowledge.	P6U_U, P6U_K	P6S_UO, P6S_UU, P6S_KK

No.	Learning outcome code	Learning Outcome Content	Reference to the universal characteristics of the first level of PRK	Reference to the second-level characteristics of the PRK, taking into account the second-level characteristics enabling the acquisition of engineering competences
10	**1IOS10**	Is ready to think and act in a creative and entrepreneurial manner, to pursue intended goals taking into account the public interest, while maintaining the principles of ethics and professional responsibility.	P6U_K	P6S_KO, P6S_KR

Matrix of course modules in relation to learning outcomes and curriculum content

No.	Course name	Program content	1IOS1	1IOS2	1IOS3	1IOS4	1IOS5	1IOS6	1IOS7	1IOS8	1IOS9	1IOS10
1	Physics	Physical quantities, kinetics and dynamics, the law of universal gravitation, rigid body motion, harmonic and wave motion, and the properties of waves and sound. Elements of thermodynamics, electric and magnetic fields.	x			x						
2	General Chemistry	Basic chemistry concepts include the structure of matter, the periodic table, chemical bonding, stoichiometry, states of matter, and properties of substances. Reactions in aqueous solutions, acids and bases, pH, buffers, redox, energetics of chemical processes, and chemical equilibrium.	x			x						
3	Mathematics I	Elementary functions, properties, complex numbers, number sequences, and limits. Number series and convergence criteria. Elements of differential calculus of real functions of one real variable with applications.	x			x						
4	Basics of Ecology and the Functioning of Ecosystems	The concept of ecology and ecosystems, including their biotic and abiotic components. The structure of ecosystems, the roles of producers, consumers, and decomposers, as well as energy flow and matter cycling. Feeding relationships in nature – food chains and food webs. Ecological balance and the impact of human activity on the functioning of ecosystems.	x		x						x	
5	Introduction to Environmental Engineering	University operating principles and study organization. Familiarization with potential career paths, job requirements, career development opportunities, and detailed descriptions of specific professions in the context of their competencies and responsibilities.			x				x		x	
6	Technical Documentation	Projection methods, drawing views, sections, and drawing and dimensioning principles in engineering practice. Technical and construction drawings, and architectural and construction drawings with symbols and notations.						x				
7	Mechanics and Strength of Materials	Principles of statics, forces and moments, constraints, friction, and analysis of internal and external forces in structures such as beams, frames, and trusses. Strength of materials, stress and strain calculations, bending, shear, torsion, buckling, and combined strength.		x		x						
8	Environmental Chemistry	The role of chemistry in the analysis of environmental processes, including atmosphere, water, and soil, toxicology, and bioaccumulation. Fundamentals of chemical analysis, including sample collection and preparation, and analytical techniques: gravimetric, titrimetric, and instrumental.	x				x					
9	Fluid Mechanics and Hydraulics	Properties of liquids and gases, fluid statics and dynamics, and the laws of equilibrium. Methods for describing fluid motion, laminar and turbulent flows, flow in pipes and through porous media, as well as unsteady phenomena, cavitation, and hydraulic shock.		x		x	x					
10	Computer Aided Design – AutoCAD	AutoCAD support, flowchart and process diagram creation, device symbol preparation, and technical installation drawings. Preparation of architectural and construction drawings and simple construction and installation documentation.						x				

No.	Course name	Program content	1OS1	1OS2	1OS3	1OS4	1OS5	1OS6	1OS7	1OS8	1OS9	1OS10
11	Mathematics II	The indefinite integral and its properties. The definite integral. Applications of the definite integral. Differential calculus of functions of two variables. Integral calculus of functions of two variables - the double integral, its properties and methods of calculation. Determinants, systems of linear equations. Ordinary differential equations of the first and second orders, with particular emphasis on linear equations.	x			x						
12	Information Technologies I	Working with the Microsoft Office 365 suite, with particular emphasis on Excel spreadsheets (including data analysis and statistical analysis) and the MS Word text editor. Basics of networking and internet security, including phishing and defense methods, and personal data protection.				x			x			
13	English B2 module I	Part I of the business language course with elements of industry-specific language; development of all language skills; development and improvement of soft skills focused on the graduate's future work environment.							x			
14	English B2+ module I	Part I of the business language course with elements of industry-specific language; development of all language skills; development and improvement of soft skills focused on the graduate's future work environment.							x			
15	English C1 module I	Part I of the business language course with elements of industry-specific language; development of all language skills; development and improvement of soft skills focused on the graduate's future work environment.							x			
16	German B2 module I	First part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.							x			
17	Solid Waste Management	Legal foundations and principles of waste management, characteristics, methods of collection, transportation, and processing of waste with an emphasis on compliance with the waste management hierarchy.		x	x	x						
18	Technical Thermodynamics	The laws of thermodynamics and their interpretation for closed and open systems. Ideal and real gases. Gas processes. Thermal cycles. Refrigerators and refrigerants. Heat pumps and application examples. Energy balance of thermal machines. Gas condensation and phase changes.	x			x	x					
19	Mechanical Processes in Environmental Engineering	Basic operations used in water, wastewater, and gas treatment, and waste management, such as sedimentation, filtration, flotation, and mechanical separation. Selection of appropriate mechanical processes for specific environmental problems.		x		x		x				
20	Meteorology, Hydrology and Geology	Fundamentals of atmospheric and weather processes, as well as energy and mass circulation. Water systems and the hydrological cycle. The structure of the Earth and processes shaping landforms, along with the relationships between the atmosphere, hydrosphere, and lithosphere.	x		x							
21	Environmental Process Engineering I	Basic mechanisms of heat transfer: conduction, radiation, natural and forced convection. Heat transfer and penetration. Heat transfer by boiling and condensation. Heat exchangers. Heat balances.		x		x		x				
22	English B2 module II	Part II of the business language course with elements of industry-specific language; development of all language skills; development and improvement of soft skills focused on the graduate's future work environment.							x			

No.	Course name	Program content	1OS1	1OS2	1OS3	1OS4	1OS5	1OS6	1OS7	1OS8	1OS9	1OS10
23	English B2+ module II	Part II of the business language course with elements of industry-specific language; development of all language skills; development and improvement of soft skills focused on the graduate's future work environment.							x			
24	English C1 module II	Part II of the business language course with elements of industry-specific language; development of all language skills; development and improvement of soft skills focused on the graduate's future work environment.							x			
25	German B2 module II	Second part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.							x			
26	Information Technologies II	Fundamentals of algorithms and programming in Python 3, including learning data types, structures, runtime environments, and the use of libraries such as NumPy, Sympy, SciPy, and Matplotlib. Leveraging programming tools and artificial intelligence to solve environmental engineering problems.	x			x						
27	Introduction to Environmental Biotechnology	Basics of biochemistry and microbiology. The most important metabolic pathways. Fundamentals of genetics in the context of microbial adaptation to changing environmental conditions.	x				x					
28	General Construction and Building Physics	Fundamentals of building law, structural and architectural design, materials and technologies used in construction, as well as issues of loads, static systems, and structural systems. Fundamentals of building thermal physics, mass and energy balance, thermal properties of building envelopes, and indoor environmental quality.		x				x				
29	Conventional and Renewable Energy Sources	Basic energy sources and their environmental impact, including conventional, low-emission, and renewable sources, as well as heat and electricity generation systems. Particular attention was paid to solar and geothermal energy, the technologies for their extraction, their operating principles, parameters, and the prospects for the development of future energy sources.			x	x				x		
30	Environmental Process Engineering II	Mass transport issues such as diffusion, convection, penetration, mass balances, and device calculations for absorption and adsorption processes, including their types, equilibrium, and resistance to mass transfer. Examples of applications of these processes in environmental engineering.		x		x				x		
31	Infrastructure in Environmental Engineering	Environmental infrastructure structures and components, including hydraulic engineering, waste management, and communications facilities, as well as gas, water, sewage, and heating networks. Legal and investment aspects, construction technologies, basic soil mechanics, and principles of design and operation of underground and above-ground infrastructure are discussed.		x		x		x				
32	Sustainability Management and the Basics of Life Cycle Analysis	Fundamentals of sustainability management, environmental assessment tools, and life cycle analysis (LCA) methodology in organizations and industry. Applications of LCA in decision-making, eco-design, and environmental strategies, as well as the current challenges of transitioning to a low-carbon and circular economy.			x	x			x			

No.	Course name	Program content	1OS1	1OS2	1OS3	1OS4	1OS5	1OS6	1OS7	1OS8	1OS9	1OS10
33	Fire Safety Engineering	Fire protection regulations and requirements, security system design, evacuation analysis, and building protection strategies. Interpretation of regulations, selection of security measures, design calculations, and the use of alternative solutions based on fire engineering.										
34	Emerging Technologies in Environmental Engineering	An overview of global environmental issues and innovative technologies in air protection, water purification, renewable energy sources, and energy recovery. During the seminar, students complete group assignments related to selected environmental topics and new technological solutions.		x					x			
35	Safety Rules	Safety regulations and principles for the storage, transport, operation, and maintenance of industrial installations and equipment such as pipes, tanks, pumps, and heat exchangers. Hazards associated with chemicals, static electricity, construction materials, and chemical reactions.			x				x			
36	English B2 module III	Part III of the business language course with elements of industry-specific language; development of all language skills; development and improvement of soft skills focused on the graduate's future work environment.							x			
37	English B2+ module III	Part III of the business language course with elements of industry-specific language; development of all language skills; development and improvement of soft skills focused on the graduate's future work environment.							x			
38	English C1 module III	Part III of the business language course with elements of industry-specific language; development of all language skills; development and improvement of soft skills focused on the graduate's future work environment.							x			
39	German B2 module III	Third part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.							x			
40	Geographic Information Systems	Theoretical foundations of Geographical Information Systems, including maps, databases, and the structure of information about the natural and anthropogenic environment. Using spatial and descriptive data to model environmental processes, report on them, and implement individual practical tasks.				x	x					
41	Environmental Conditions of Urbanized Areas	Air pollutant emissions, urban physics, thermal comfort, the heat island effect, and methods for protecting the urban environment, including green and blue infrastructure.Properties of acoustic waves, noise sources, monitoring of noise in the urban environment.	x		x	x						
42	Legal, Organizational and Financial Instruments in Environmental Engineering	Legal instruments for environmental protection in Poland and the EU, the structure and powers of administrative bodies. Principles of operation of the environmental fees and fines system, and sources of financing for environmental protection activities.			x					x		x
43	Air Protection Technologies	Basic concepts in the field of air protection and atmospheric pollution, as well as legal regulations concerning air protection and methods, technologies and devices for reducing dust and gas emissions. Calculations related to dust removal devices, emission calculations, fees and penalties for releasing gases and dust into the atmosphere.										

No.	Course name	Program content	1OS1	1OS2	1OS3	1OS4	1OS5	1OS6	1OS7	1OS8	1OS9	1OS10
44	Conceptual Design	Solving real-world environmental problems using the PBL method through group work, data analysis, and the formulation of interdisciplinary solutions. Students develop collaborative skills, critical information seeking, and assessment of ecological, social, and economic impacts. They also learn the principles of intellectual property protection and teamwork planning.							x	x	x	x
45	Water and Wastewater Management	The unit operations used in water and wastewater treatment systems. Legal regulations. Parameters and indicators that characterise water and wastewater. Technological solutions used in water and wastewater treatment plants.		x	x		x				x	
46	Ventilation and air Conditioning	Fundamentals of air hygiene, air conditioning, and the principles of thermal comfort, heat exchange in rooms, and indoor air quality. Natural, mechanical, and hybrid ventilation, ventilation and air conditioning systems, and methods for calculating air exchange and ventilation ducts.		x		x						
47	Occupational Health and Safety in an Industrial Environment	Basics of ergonomics, analysis of working conditions, physical, chemical, and biological factors, and principles of workplace design with employee safety and productivity in mind. Occupational diseases, accidents, risk assessment, and process hazards, along with regulations and methods for preventing accidents, fires, and explosions.			x	x				x		
48	English B2 module IV	Part IV of the business language course with elements of industry-specific language; development of all language skills; development and improvement of soft skills focused on the graduate's future work environment.							x			
49	English B2+ module IV	Part IV of the business language course with elements of industry-specific language; development of all language skills; development and improvement of soft skills focused on the graduate's future work environment.							x			
50	English C1 module IV	Part IV of the business language course with elements of industry-specific language; development of all language skills; development and improvement of soft skills focused on the graduate's future work environment.							x			
51	German B2 module IV	Fourth part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.							x			
52	Environmental Management System	ISO 14001 environmental management system, its components, implementation, and auditing. Project activities focus on identifying environmental aspects and developing criteria for their assessment in various enterprise processes.						x				
53	Energy Efficiency of Buildings	Energy performance of buildings, methods for determining energy demand, and ways to improve energy efficiency. Energy auditing and certification, legal support and efficiency improvement mechanisms, and computer-aided tools for energy assessment.						x		x		
54	Energy Efficiency of Industrial Processes	Energy efficiency audits, balancing energy consumption in production lines, and analyzing the energy performance of industrial installations and equipment. Heat recovery, methods for monitoring and estimating energy consumption, linking the audit to the ISO 50001 standard, and support systems, including white certificates.										

No.	Course name	Program content	1IOS1	1IOS2	1IOS3	1IOS4	1IOS5	1IOS6	1IOS7	1IOS8	1IOS9	1IOS10
55	Basics of Control and Automation	Building and industrial automation systems. Sensors and actuators. Energy monitoring and management in industrial facilities and processes. BMS systems. Smart buildings and smart homes basics. Programming tools for data collection and analysis. The impact of control on reducing energy consumption.		x			x					
56	Environmental Assessment of Buildings	Principles of sustainable development in construction, assessment of the environmental performance of buildings, and international certification systems and standard regulations. Methodologies for calculating environmental effects and environmental, social, and economic aspects of integrated building design.						x				
57	Economics and Management	Forms of conducting business in Poland, including company registration, taxation, accounting, and financial statement analysis. Business management, marketing, finance, human resources, and ESG and CSR standards that impact corporate social and environmental responsibility.			x					x		x
58	Engineering Project (Summative Module)	Solving an engineering problem in the field of environmental engineering, preparing technical and environmental documentation and presenting project results.				x		x	x	x	x	x
59	Energy Auditing and Certification	Energy audit methodology in accordance with the Act on Supporting Thermal Modernization and Renovation and the Regulation on the Scope and Form of Energy Audits. Energy certificate in accordance with the Regulation on the Methodology for Determining Building Energy Performance.				x						
60	Energy Efficiency Auditing	Energy efficiency audit methodology in accordance with the Energy Efficiency Act and the regulation on the detailed scope and method of preparing an energy efficiency audit and methods for calculating energy savings.										
61	Polymers and Biopolymers	Definition, history, properties, synthesis, and degradation of natural and synthetic polymers and their environmental impact, including biodegradation and the eco-balance of plastics. New trends in polymer technologies, analytical methods, industrial applications, additives, and toxicity.		x			x					
62	Environmental Effects of Heat and Energy Generation	Fuel types, combustion chemistry, pollutant generation, process balancing, and CO_2 emission regulations and standards for the combustion and co-combustion of biomass, waste, and alternative fuels. Calculation of calorific value, combustion balancing, recalculation of pollutant concentrations, and verification of compliance with emission standards.										
63	Computer Aided Process Design	Creating process flowcharts and process calculations in environmental engineering using ChemCad, including mass and energy balances of equipment and steady-state process simulations. Sensitivity analysis, interpretation of results, and prediction of physicochemical properties and simulation of gas purification and waste treatment processes.				x						
64	Photovoltaic Installations	Solar radiation, its impact on the Earth, and possible uses in a given area. The photovoltaic phenomenon, cell types and efficiency, and the basic elements of on-grid and off-grid photovoltaic installations.		x		x						
65	Diploma Seminar	Methodology for preparing a thesis, acquiring and analyzing literature sources, and the ability to present and discuss technical issues. Preparation for a competency exam assessing aggregate learning outcomes.	x	x	x	x			x	x		

No.	Course name	Program content	1IOS1	1IOS2	1IOS3	1IOS4	1IOS5	1IOS6	1IOS7	1IOS8	1IOS9	1IOS10
66	Internship with an Installation and Auditing Profile	The internship is of an installation-auditing or technological-administrative nature, the differentiation is aimed at the practical application of knowledge, skills and competences acquired during the implementation of the chosen diploma path.								x	x	x
67	Internship with a Technological and Administrative Profile	The internship is of an installation-auditing or technological-administrative nature, the differentiation is aimed at the practical application of knowledge, skills and competences acquired during the implementation of the chosen diploma path.								x	x	x
68	Final Project	Solving a given engineering task in the field of environmental engineering, developing the text of the work and presenting the assumptions and results of this work.			x	x			x	x		
69	Low-Emission Economy Strategies	The concept of the circular economy (CE) and its importance for sustainable development. Strategies and tools used to implement CE at the national, regional, and enterprise levels. Technologies and processes supporting closing material cycles and minimizing waste, and tools used to assess and modify processes.		x					x	x		
70	Air, Water, and Soil Pollution Monitoring System	Legal basis, structure, and tasks of the State Environmental Monitoring. Monitoring of air quality, water, land surfaces, waste management, integrated environmental monitoring.										
71	Air Protection Technologies II	Fundamentals of design. Methods of calculation and selection of devices used to reduce emissions of gaseous and particulate pollutants.										
72	Waste and Sewage Sludge Management	Thermal and biological methods of waste processing. Management of problematic waste, including hazardous waste and waste generated in wastewater treatment plants.			x	x						
73	Data Analysis, Environmental Modeling, and Reporting	Fundamentals of environmental data analysis, including descriptive statistics, measurement error calculations, probability distributions, and regression and prediction methods. Use of MS Excel for statistical analysis, graphing, calculations, and reporting.			x		x					
74	Wastewater Treatment Technologies	Theoretical and practical aspects of unit operations used in wastewater treatment systems. Modern technological solutions applied in wastewater treatment plants. Implementation of a wastewater treatment plant design and calculation exercises related to the selection of equipment for specific wastewater treatment processes.			x	x						
75	Environmental Impact Assessment of Projects	Environmental impact assessment of planned projects, including identifying, analyzing, and forecasting their effects. Development of environmental impact assessment documentation and practical application of environmental assessment procedures and tools.				x					x	
76	Operation of Buildings and Technical Maintenance Systems	Fundamentals of building management and operation include technical assessment of buildings, inspections of their technical condition, and monitoring of energy systems such as boilers, ventilation, and air conditioning. This scope also covers determining operational parameters, building energy management, and optimization and integration of HVAC systems for energy efficiency.		x					x	x		

No.	Course name	Program content	1IOS1	1IOS2	1IOS3	1IOS4	1IOS5	1IOS6	1IOS7	1IOS8	1IOS9	1IOS10
77	Networks and Connections	Power supply for environmental protection facilities and infrastructure. Electricity, gas, heating, and water and sewage networks. Parameters, equipment, selection, and design principles. Connecting facilities to the grid and connections. Modernization of existing networks. Legal issues related to industry-specific authorizations.						x				
78	Water Supply and Sewerage Systems	Water and sewage systems in buildings and facilities. Systems for supplying domestic water and disposing of sewage, including their local management. Computer-aided design methods. System dimensioning. Materials and equipment for water and sewage systems.				x	x					
79	Heating and Domestic Hot Water Systems	Heating and domestic hot water systems in buildings cover issues of thermal comfort and temperature, as well as the classification and characteristics of heating systems, including water, steam, air, central and local systems, and surface heating. The scope also includes installation systems adapted to various energy sources, solutions supporting energy efficiency and environmental protection, and computer-aided design methods.		x		x						
80	Ventilation and Air Conditioning Systems	Ventilation and air conditioning systems in buildings include comfort and industrial ventilation, heat recovery from ventilation air, and various air conditioning systems with central and zonal air treatment. The scope also covers the classification of single- and dual-duct systems with constant and variable airflows, air conditioners, and technical solutions for air handling units.					x	x				
81	Building Design with Elements of Technical Documentation	The basic technical and construction design of a facility within environmental engineering infrastructure includes standard requirements for technical documentation, selected discipline-specific aspects, and design in accordance with Eurocodes. It also covers permanent and variable loads in structures, examples of load assessment, structural element sizing, and detailing.						x				
82	Installation Design with Elements of Technical Documentation	Design of internal installations in environmental protection buildings. Selected sector-specific aspects in the design and implementation of construction projects. Basic standard requirements for technical documentation of installations. Fundamentals of design in accordance with Polish standards. Examples of system sizing and equipment selection.				x		x				

ECTS - subjects

No.	Course name	ECTS	Subjects in the field of humanities and social sciences	Elective subjects	Profile items	Classes in a foreign language
1	Physics	6				
2	General Chemistry	5			5	
3	Mathematics I	7				
4	Basics of Ecology and the Functioning of Ecosystems	3			3	
5	Introduction to Environmental Engineering	3				
6	Technical Documentation	3			3	
7	Mechanics and Strength of Materials	3			3	
8	Environmental Chemistry	7			7	
9	Fluid Mechanics and Hydraulics	8			8	
10	Computer Aided Design – AutoCAD	3			3	
11	Mathematics II	7				
12	Information Technologies I	3				
13	English B2 module I	2		2		
14	English B2+ module I	2		2		
15	English C1 module I	2		2		
16	German B2 module I	2		2		
17	Solid Waste Management	3			3	
18	Technical Thermodynamics	7			7	
19	Mechanical Processes in Environmental Engineering	5			5	
20	Meteorology, Hydrology and Geology	2				

No.	Course name	ECTS	Subjects in the field of humanities and social sciences	Elective subjects	Profile items	Classes in a foreign language
21	Environmental Process Engineering I	5			5	
22	English B2 module II	2		2		
23	English B2+ module II	2		2		
24	English C1 module II	2		2		
25	German B2 module II	2		2		
26	Information Technologies II	3			3	
27	Introduction to Environmental Biotechnology	3			3	
28	General Construction and Building Physics	6			6	
29	Conventional and Renewable Energy Sources	3				
30	Environmental Process Engineering II	7			7	
31	Infrastructure in Environmental Engineering	3				
32	Sustainability Management and the Basics of Life Cycle Analysis	4	4		4	
33	Fire Safety Engineering	2		2		2
34	Emerging Technologies in Environmental Engineering	2		2		2
35	Safety Rules	2		2		2
36	English B2 module III	2		2		
37	English B2+ module III	2		2		
38	English C1 module III	2		2		
39	German B2 module III	2		2		
40	Geographic Information Systems	3				
41	Environmental Conditions of Urbanized Areas	4				

No.	Course name	ECTS	Subjects in the field of humanities and social sciences	Elective subjects	Profile items	Classes in a foreign language
42	Legal, Organizational and Financial Instruments in Environmental Engineering	3	3			
43	Air Protection Technologies	3			3	
44	Conceptual Design	4		4		
45	Water and Wastewater Management	7			7	
46	Ventilation and air Conditioning	3			3	
47	Occupational Health and Safety in an Industrial Environment	3			3	
48	English B2 module IV	3		3		
49	English B2+ module IV	3		3		
50	English C1 module IV	3		3		
51	German B2 module IV	3		3		
52	Environmental Management System	4		4		
53	Energy Efficiency of Buildings	4		4		
54	Energy Efficiency of Industrial Processes	4		4		
55	Basics of Control and Automation	4		4		
56	Environmental Assessment of Buildings	3		3		
57	Economics and Management	4	4			
58	Engineering Project (Summative Module)	7		7	7	
59	Energy Auditing and Certification	3		3		
60	Energy Efficiency Auditing	2		2		
61	Polymers and Biopolymers	2		2		
62	Environmental Effects of Heat and Energy Generation	2		2		

No.	Course name	ECTS	Subjects in the field of humanities and social sciences	Elective subjects	Profile items	Classes in a foreign language
63	Computer Aided Process Design	2		2		
64	Photovoltaic Installations	2		2		
65	Diploma Seminar	2			2	
66	Internship with an Installation and Auditing Profile	6		6		
67	Internship with a Technological and Administrative Profile	6		6		
68	Final Project	15		15	15	
69	Low-Emission Economy Strategies	4		4		
70	Air, Water, and Soil Pollution Monitoring System	3		3		
71	Air Protection Technologies II	4		4		
72	Waste and Sewage Sludge Management	4		4		
73	Data Analysis, Environmental Modeling, and Reporting	4		4		
74	Wastewater Treatment Technologies	3		3		
75	Environmental Impact Assessment of Projects	2		2		
76	Operation of Buildings and Technical Maintenance Systems	4		4		
77	Networks and Connections	3		3		
78	Water Supply and Sewerage Systems	4		4		
79	Heating and Domestic Hot Water Systems	4		4		
80	Ventilation and Air Conditioning Systems	4		4		
81	Building Design with Elements of Technical Documentation	2		2		
82	Installation Design with Elements of Technical Documentation	3		3		

ECTS indicators

Name	brak	brak	brak
The total number of ECTS credits that a student must obtain through elective courses (amounting to no less than 30% of the total ECTS credits required to obtain the qualification corresponding to the given level of study)	69/210 (32.86%)	69/210 (32.86%)	69/210 (32.86%)
The total number of ECTS credits to be earned by a student through courses in the fields of humanities or social sciences	11	11	11
The total number of ECTS credits that a student must obtain from courses related to research conducted at the university, amounting to more than 50% of the total ECTS credits required to graduate from a given level of study	115/210 (54.76%)	115/210 (54.76%)	115/210 (54.76%)

Methods of verifying and assessing learning outcomes

Verification of achieved learning outcomes requires the use of diverse forms of student assessment, appropriate to the categories of knowledge, skills, and social competences to which these outcomes relate. The selection of appropriate tools also depends on the specifics of the subject and the form of instruction, and is described each time in the course syllabi. The achievement of required learning outcomes is assessed through:

1. written assignments (exams, tests, reports, essays, projects, posters, diploma theses, etc.);
2. oral statements (oral examinations of knowledge, public speaking such as delivering papers, presentations, etc.);
3. practical and/or project-based tasks (team and individual);
4. observation and evaluation of students' activity during classes;
5. self-assessment and peer assessment (especially in team projects);
6. competency examinations and the diploma examination.

Assessment may be formative (partial, conducted multiple times during the course) and/or summative (final grade). The final assessment result is provided according to the currently applicable grading scale.

The course coordinator or instructor is required, during the first class, to discuss the course syllabus and to define and formally communicate to students the methods of assessment and the conditions for verifying the achievement of learning outcomes.

Professional internships

As part of the study programme, students complete a 6-week professional internship, which provides an opportunity to apply the acquired knowledge and skills in practice and to become familiar with real tasks performed in selected workplaces. The internship is worth 6 ECTS credits.

Specializations/degree paths offered within the study program

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Characteristics of the course

Graduate profile

A graduate of the Environmental Engineering programme is a specialist with a solid technical background, capable of designing, analysing, and optimizing processes and installations affecting the environment. During the studies, the student acquires advanced knowledge in water treatment, wastewater treatment, waste management, emission reduction, and environmental infrastructure. The graduate has competences in the use of engineering tools such as CAD, GIS, numerical modelling, and process simulations, enabling precise analyses and the development of technical designs. They are able to carry out energy and environmental assessments, perform life cycle analysis (LCA) of products and buildings, calculate carbon footprint, and interpret results for environmental and technological optimization. They are familiar with environmental protection regulations and ESG and CSR principles and apply them in investment processes and documentation preparation. They analyse measurement data and prepare reports compliant with legal requirements and industry standards.

During the studies, students may choose one of three individual diploma paths, developing a specialization in technical systems, energy and environmental auditing, or environmental protection systems. They acquire competences enabling the design of solutions consistent with circular economy principles, energy transition, and sustainable construction. Graduates are prepared to work in industry, public administration, consulting companies, design offices, and the renewable energy sector. As engineers, they are capable of integrating technical efficiency with environmental safety, supporting the development of modern and environmentally friendly infrastructure.

The relationship between the field of study and the university's strategy

The implementation of a modern study programme and maintaining a high level of education for competent and highly qualified personnel for the needs of the economy and administration ensures a direct link with the mission and strategy of the University. Environmental Engineering as a field of study at Lodz University of Technology fully complies with the provisions of the Statute of the Lodz University of Technology (Senate Resolution No. 88/2019 of 10 July 2019) and implements the objectives defined in the University Development Strategy. According to the Annex to Resolution No. 39/2024 of the Senate of Lodz University of Technology of 26 June 2024 on adopting the Strategy of the Lodz University of Technology for 2025–2030 – “Development Strategy of Lodz University of Technology for 2025–2030,” the University’s mission is:
"Building a sustainable research university with a strong academic community, ensuring freedom of research and discussion as well as modern education, developing local and global cooperation, and fostering innovation for the benefit of society, the economy, and the world."

In line with the Development Strategy, the Environmental Engineering study programme uses modern teaching methods, offers a wide selection of specialisation and elective courses, and supports flexible learning paths, strengthening talent management through the individualisation of the graduate competency development process.

The proposed Environmental Engineering study programme responds to the need for the development of applied science and modern engineering solutions, strengthening the University’s research and teaching potential and enabling work focused on real industry expectations, especially in the area of sustainable development. The programme addresses challenges related to dynamically changing socio-economic needs, including water and wastewater management, emission reduction, and the development of a circular economy, thereby supporting the achievement of the University’s strategic goals and reinforcing the vision of Lodz University of Technology as a valued partner for the economy and a contributor to society.

Educational objectives and employment and continuing education opportunities

The aim of education is to prepare engineers capable of responsibly and effectively undertaking and implementing tasks in the broadly understood field of environmental protection in design, construction, and energy companies, including the renewable energy sector, as well as in enterprises and industrial plants as engineers or specialists in environmental protection and energy efficiency. Possible workplaces also include consulting and auditing firms conducting energy, industrial, and environmental audits, as well as entities involved in ESG compliance reporting and CSR activities. Employment prospects also include public administration (e.g., marshal offices, environmental funds, environmental inspectorates, regional environmental protection directorates, local government units—e.g., as municipal energy advisors), non-governmental organisations focused on environmental protection, research and development units, and design and engineering offices. Graduates obtain qualifications necessary to conduct independent business activities. Graduates of the 3.5-year engineering programme are awarded the title of engineer and may continue their education in second-cycle (Master’s)

studies.

Description of the process and outcome of consultations on the proposed study program with the socio-economic environment

The educational concept of the Environmental Engineering programme and the resulting graduate profile were consulted with the socio-economic environment and industrial enterprises such as Veolia Energia Łódź S.A., Veolia Energy Contracting Poland, Orifarm Manufacturing Poland Sp. z o.o., Chemat Sp. z o.o., RENA-POL Sp. z o.o. Sp. K., and Equipo Europe P.S.A.

Description of competencies expected from a candidate applying for admission to studies

In accordance with the legal regulations in force for a given academic year concerning the rules for admission to first-cycle studies at Lodz University of Technology.

The unit organizing education

Faculty of Process and Environmental Engineering

Education program

Semester 1

Course	Number of hours	ECTS points	Form of verification	Obligatory
Physics	Tutorials: 30 Lecture: 45	6	Exam	Obligatory
General Chemistry	Tutorials: 30 Lecture: 30	5	Graded assignment	Obligatory
Mathematics I	Tutorials: 45 Lecture: 45	7	Exam	Obligatory
Basics of Ecology and the Functioning of Ecosystems	Seminar: 15 Lecture: 30	3	Graded assignment	Obligatory
Introduction to Environmental Engineering	Seminar: 15 Lecture: 25	3	Graded assignment	Obligatory
Technical Documentation	Project work: 45	3	Graded assignment	Obligatory
Mechanics and Strength of Materials	Tutorials: 30 Lecture: 15	3	Graded assignment	Obligatory
Sum	**400**	**30**		

Semester 2

Course	Number of hours	ECTS points	Form of verification	Obligatory
Environmental Chemistry	Tutorials: 15 Laboratory classes: 45 Lecture: 30	7	Exam	Obligatory
Fluid Mechanics and Hydraulics	Tutorials: 30 Laboratory classes: 30 Lecture: 45	8	Exam	Obligatory

Course	Number of hours	ECTS points	Form of verification	Obligatory
Computer Aided Design – AutoCAD	Project work: 45	3	Graded assignment	Obligatory
Mathematics II	Tutorials: 45 Lecture: 45	7	Graded assignment	Obligatory
Physical Education 1	Tutorials: 30	0	Pass	Obligatory
Information Technologies I	Project work: 45	3	Graded assignment	Obligatory
Foreign Language Module 1		2	Graded assignment	Obligatory group
The student chooses one module from the group.				
English B2 module I	Tutorials: 30	2	Graded assignment	Optional
English B2+ module I	Tutorials: 30	2	Graded assignment	Optional
English C1 module I	Tutorials: 30	2	Graded assignment	Optional
German B2 module I	Tutorials: 30	2	Graded assignment	Optional
Sum	**435**	**30**		

Semester 3

Course	Number of hours	ECTS points	Form of verification	Obligatory
Solid Waste Management	Tutorials: 15 Lecture: 30	3	Exam	Obligatory
Technical Thermodynamics	Tutorials: 30 Laboratory classes: 30 Lecture: 30	7	Graded assignment	Obligatory
Mechanical Processes in Environmental Engineering	Tutorials: 15 Project work: 15 Lecture: 30	5	Exam	Obligatory
Meteorology, Hydrology and Geology	Lecture: 30	2	Graded assignment	Obligatory
Environmental Process Engineering I	Tutorials: 30 Lecture: 30	5	Exam	Obligatory

Course	Number of hours	ECTS points	Form of verification	Obligatory
Foreign Language Module 2		2	Graded assignment	Obligatory group
The student chooses one module from the group.				
English B2 module II	Tutorials: 30	2	Graded assignment	Optional
English B2+ module II	Tutorials: 30	2	Graded assignment	Optional
English C1 module II	Tutorials: 30	2	Graded assignment	Optional
German B2 module II	Tutorials: 30	2	Graded assignment	Optional
Physical Education 2	Tutorials: 30	0	Pass	Obligatory
Information Technologies II	Laboratory classes: 30 E-learning: 15	3	Graded assignment	Obligatory
Introduction to Environmental Biotechnology	Laboratory classes: 15 Lecture: 30	3	Graded assignment	Obligatory
Sum	**435**	**30**		

Semester 4

Course	Number of hours	ECTS points	Form of verification	Obligatory
General Construction and Building Physics	Project work: 45 Lecture: 30	6	Graded assignment	Obligatory
Conventional and Renewable Energy Sources	Project work: 30 Lecture: 15	3	Graded assignment	Obligatory
Environmental Process Engineering II	Tutorials: 30 Laboratory classes: 35 Lecture: 30	7	Exam	Obligatory
Infrastructure in Environmental Engineering	Project work: 15 Lecture: 30	3	Graded assignment	Obligatory

Course	Number of hours	ECTS points	Form of verification	Obligatory
Sustainability Management and the Basics of Life Cycle Analysis	Seminar: 15 Project work: 15 Lecture: 20	4	Exam	Obligatory
Elective Courses 1		2	Graded assignment	Obligatory group
The student chooses 1 course from the group.				
Fire Safety Engineering	E-learning: 30	2	Graded assignment	Optional
Emerging Technologies in Environmental Engineering	Tutorials: 15 Lecture: 15	2	Graded assignment	Optional
Safety Rules	Tutorials: 15 Lecture: 15	2	Graded assignment	Optional
Physical Education 3	Tutorials: 30	0	Pass	Obligatory
Foreign Language Module 3		2	Graded assignment	Obligatory group
The student chooses one module from the group.				
English B2 module III	Tutorials: 30	2	Graded assignment	Optional
English B2+ module III	Tutorials: 30	2	Graded assignment	Optional
English C1 module III	Tutorials: 30	2	Graded assignment	Optional
German B2 module III	Tutorials: 30	2	Graded assignment	Optional
Geographic Information Systems	Laboratory classes: 45	3	Graded assignment	Obligatory
Sum	**445**	**30**		

Semester 5

Course	Number of hours	ECTS points	Form of verification	Obligatory
Environmental Conditions of Urbanized Areas	Laboratory classes: 45 Lecture: 20	4	Graded assignment	Obligatory

Course	Number of hours	ECTS points	Form of verification	Obligatory
Legal, Organizational and Financial Instruments in Environmental Engineering	Tutorials: 15 Seminar: 15 Lecture: 15	3	Graded assignment	Obligatory
Air Protection Technologies	Tutorials: 15 Lecture: 30	3	Exam	Obligatory
Conceptual Design	Project work: 55	4	Graded assignment	Obligatory subjects to choose from
Water and Wastewater Management	Seminar: 15 Laboratory classes: 45 Lecture: 45	7	Exam	Obligatory
Ventilation and air Conditioning	Tutorials: 15 Lecture: 30	3	Graded assignment	Obligatory
Occupational Health and Safety in an Industrial Environment	Project work: 15 Lecture: 30	3	Graded assignment	Obligatory
Foreign Language Module 4		3	Exam	Obligatory group
The student chooses one module from the group.				
English B2 module IV	Tutorials: 30	3	Exam	Optional
English B2+ module IV	Tutorials: 30	3	Exam	Optional
English C1 module IV	Tutorials: 30	3	Exam	Optional
German B2 module IV	Tutorials: 30	3	Exam	Optional
Sum	**435**	**30**		

Semester 6

Course	Number of hours	ECTS points	Form of verification	Obligatory
Economics and Management	Tutorials: 15 Project work: 20 Lecture: 30	4	Graded assignment	Obligatory
Engineering Project (Summative Module)	Project work: 65	7	Graded assignment	Obligatory subjects to choose from
Sum	**130**	**11**		

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Course	Number of hours	ECTS points	Form of verification	Obligatory
Environmental Management System	Project work: 30 Lecture: 10	4	Graded assignment	Obligatory specialization courses
Energy Efficiency of Buildings	Project work: 45 Lecture: 15	4	Graded assignment	Obligatory specialization courses
Energy Efficiency of Industrial Processes	Tutorials: 15 Laboratory classes: 15 Lecture: 15	4	Graded assignment	Obligatory specialization courses
Basics of Control and Automation	Laboratory classes: 30 Lecture: 15	4	Graded assignment	Obligatory specialization courses
Environmental Assessment of Buildings	Project work: 30 Lecture: 10	3	Graded assignment	Obligatory specialization courses
Sum	**230**	**19**		

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Course	Number of hours	ECTS points	Form of verification	Obligatory
Low-Emission Economy Strategies	Seminar: 15 Project work: 15 Lecture: 15	4	Graded assignment	Obligatory specialization courses
Air, Water, and Soil Pollution Monitoring System	Laboratory classes: 30 Lecture: 10	3	Graded assignment	Obligatory specialization courses
Air Protection Technologies II	Project work: 30 Lecture: 15	4	Graded assignment	Obligatory specialization courses
Waste and Sewage Sludge Management	Laboratory classes: 15 Project work: 15 Lecture: 20	4	Graded assignment	Obligatory specialization courses
Data Analysis, Environmental Modeling, and Reporting	Laboratory classes: 30 Lecture: 20	4	Graded assignment	Obligatory specialization courses
Sum	**230**	**19**		

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Course	Number of hours	ECTS points	Form of verification	Obligatory
Operation of Buildings and Technical Maintenance Systems	Laboratory classes: 15 Project work: 15 Lecture: 10	4	Graded assignment	Obligatory specialization courses
Networks and Connections	Project work: 30 Lecture: 10	3	Graded assignment	Obligatory specialization courses
Water Supply and Sewerage Systems	Laboratory classes: 30 Lecture: 10	4	Graded assignment	Obligatory specialization courses
Heating and Domestic Hot Water Systems	Laboratory classes: 45 Lecture: 10	4	Graded assignment	Obligatory specialization courses

Course	Number of hours	ECTS points	Form of verification	Obligatory
Ventilation and Air Conditioning Systems	Laboratory classes: 25 Project work: 20 Lecture: 10	4	Graded assignment	Obligatory specialization courses
Sum	**230**	**19**		

Semester 7

Course	Number of hours	ECTS points	Form of verification	Obligatory
Elective Courses 2		2	Graded assignment	Obligatory group
Polymers and Biopolymers	Laboratory classes: 15 Lecture: 15	2	Graded assignment	Optional
Environmental Effects of Heat and Energy Generation	Tutorials: 15 Lecture: 15	2	Graded assignment	Optional
Computer Aided Process Design	Laboratory classes: 30	2	Graded assignment	Optional
Photovoltaic Installations	Project work: 15 Lecture: 15	2	Graded assignment	Optional
Diploma Seminar	Seminar: 30	2	Graded assignment	Obligatory
Elective Internship		6	Pass	Obligatory group
Internship with an Installation and Auditing Profile	Internship: 0	6	Pass	Optional
Internship with a Technological and Administrative Profile	Internship: 0	6	Pass	Optional
Final Project	Diploma Thesis: 0	15	Pass	Obligatory subjects to choose from
Sum	**60**	**25**		

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Course	Number of hours	ECTS points	Form of verification	Obligatory
Energy Auditing and Certification	Project work: 35	3	Graded assignment	Obligatory specialization courses
Energy Efficiency Auditing	Project work: 35	2	Graded assignment	Obligatory specialization courses
Sum	**70**	**5**		

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Course	Number of hours	ECTS points	Form of verification	Obligatory
Wastewater Treatment Technologies	Tutorials: 15 Project work: 15 Lecture: 10	3	Graded assignment	Obligatory specialization courses
Environmental Impact Assessment of Projects	Project work: 30	2	Graded assignment	Obligatory specialization courses
Sum	**70**	**5**		

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Course	Number of hours	ECTS points	Form of verification	Obligatory
Building Design with Elements of Technical Documentation	Project work: 35	2	Graded assignment	Obligatory specialization courses
Installation Design with Elements of Technical Documentation	Project work: 35	3	Graded assignment	Obligatory specialization courses
Sum	**70**	**5**		