Zarządzenie nr 121

Rektora Zachodniopomorskiego Uniwersytetu Technologicznego w Szczecinie

z dnia 30 października 2023 r.

w sprawie opisów efektów uczenia się w tłumaczeniu na język angielski dla kierunków studiów prowadzonych na Wydziale Budownictwa i Inżynierii Środowiska

Na podstawie art. 23 ustawy z dnia 20 lipca 2018 r. Prawo o szkolnictwie wyższym i nauce (tekst jedn. Dz. U. z 2023 r. poz. 742, z późn. zm.) w związku z § 3 ust. 7 zarządzenia nr 64 Rektora ZUT z dnia 1 października 2019 r. w sprawie zasad sporządzania i wydawania dyplomów ukończenia studiów i suplementów do dyplomu (z późn. zm.) zarządza się, co następuje:

§ 1.

1. W celu wydania na wniosek absolwenta odpisu suplementu do dyplomu w tłumaczeniu na język angielski wprowadza się – uchwalone przez Senat – opisy efektów uczenia się w tłumaczeniu na język angielski dla kierunków studiów prowadzonych na Wydziale Budownictwa i Inżynierii Środowiska.
2. Opis efektów uczenia się w tłumaczeniu na język angielski dla poszczególnych kierunków studiów stanowi integralną cześć odpisu suplementu do dyplomu.

§ 2.

Opisy efektów w tłumaczeniu na język angielski w wydawanych odpisach suplementów do dyplomu dla kierunków studiów rozpoczynających się:

1) od roku akademickiego 2019/2020:
   a) budownictwo, studia pierwszego stopnia – stanowi załącznik nr 1,
   b) budownictwo, studia drugiego stopnia – stanowi załącznik nr 2,
   c) inżynieria środowiska, studia pierwszego stopnia – stanowi załącznik nr 3,
   d) inżynieria środowiska, studia drugiego stopnia – stanowi załącznik nr 4;
2) od roku akademickiego 2021/2022:
   a) budownictwo, studia pierwszego stopnia – stanowi załącznik nr 5,
   b) budownictwo, studia drugiego stopnia – stanowi załącznik nr 6,
   c) inżynieria środowiska, studia pierwszego stopnia – stanowi załącznik nr 7,
   d) inżynieria środowiska, studia drugiego stopnia – stanowi załącznik nr 8.

§ 3.

W zarządzeniu nr 94 Rektora Zachodniopomorskiego Uniwersytetu Technologicznego w Szczecinie z dnia 6 listopada 2019 r. w sprawie opisu efektów uczenia się w tłumaczeniu na język angielski dla poszczególnych kierunków studiów prowadzonych w ZUT (z późn. zm.) uchyla się w § 1 pkt 2a oraz załącznik nr 2a – Kierunki Wydziału Budownictwa i Inżynierii Środowiska.

§ 4.

Zarządzenie wchodzi w życie z dniem podpisania.

W zastępstwie Rektora

prof. dr hab. inż. Jacek Przepiórski
prorektor ds. nauki

Załącznik nr 1

do zarządzenia nr 121 Rektora ZUT z dnia 30 października 2023 r.

Budownictwo, studia pierwszego stopnia (na podstawie uchwały nr 88 Senatu ZUT z dnia 28 czerwca 2019 r.)

Programme of studies: *civil engineering*

Level of qualification: first cycle studies

Educational profile: general academic

Fields of science: Engineering and technology

Discipline of science: civil engineering and transport (100%)

Name of qualification (Title conferred): inżynier

Description of the planned educational effects

Code	Learning outcomes for programme of studies
Knowledge	
B_1A_W01	Has knowledge from selected areas of mathematics, physics, chemistry and other areas appropriate for Civil Engineering, necessary to formulate and solve simple tasks within the scope of civil engineering;
B_1A_W02	Knows the principles of descriptive geometry concerning the recording and reading of architectural and construction drawings, geodetic and geological maps with the use of CAD;
B_1A_W03	Knows how to define a map projection and what are the basic geodetic works in civil engineering;
B_1A_W04	Has knowledge of general mechanics and material strength;
B_1A_W05	Has basic knowledge of fluid mechanics and hydrology;
B_1A_W06	Knows the principles of structure mechanics and analysis of rod constructions within the scope of statistics;
B_1A_W07	Knows the standards and technical requirements used in civil engineering;
B_1A_W08	Knows the principles of constructing and dimensioning of building construction elements;
B_1A_W09	Knows the principles of foundation laying of building structures;
B_1A_W10	Knows the principles of analysis and construction of selected structures in general, industrial, transport civil engineering and hydro engineering;
B_1A_W11	Has basic knowledge of designing road transport infrastructure objects;
B_1A_W12	Has basic knowledge within the scope of building installations;
B_1A_W13	Has knowledge related to basic issues within the scope of the programme of study;
B_1A_W14	Knows selected analytical methods and computer programmes aiding construction design as well as organisation of construction works;
B_1A_W15	Knows the most frequently used construction materials and products as well as the basics of their manufacturing technology;
B_1A_W16	Knows the basics of construction physics;

Code	Learning outcomes for programme of studies
B_1A_W17	Knows typical engineering technologies used in civil engineering;
B_1A_W18	Has knowledge on the subject of creating quality management procedures for construction works. Knows the standards and norms of work in civil engineering as well as the organisation and the principles of construction site management;
B_1A_W19	Has basic knowledge on the subject of organisation and management of an investment process as well as conducting business activity in construction industry;
B_1A_W20	Has knowledge on the subject of the influence of carrying out construction investment s on the environment;
B_1A_W21	Has elementary knowledge within the scope of intellectual property and the sources of patent information;
B_1A_W22	Has basic knowledge on the life cycle of devices, building structures as well as technical systems used in civil engineering;
B_1A_W23	Has basic knowledge of developmental trends in civil engineering;
B_1A_W24	Has basic knowledge on the subject of the necessity to include micro- and macroeconomic conditions in the decision process;
B_1A_W25	Knows basic terms concerning ethics, philosophy, sociology, art, design and culture;
B_1A_W26	Knows the system of education at a university, the principles of its functioning and the academic traditions;
Skills	
B_1A_U01	Is able to classify building structures;
B_1A_U02	Is able to prepare a summary of loads acting on building structures;
B_1A_U03	Is able to define properly the computer analysis calculation models of constructions;
B_1A_U04	Is able to conduct a statistical analysis of statically determinate and indeterminate rod constructions, specify the stress and deformation states in construction elements as well as dimension them;
B_1A_U05	Is able to select (analytic or numerical) tools for solving problems of analysis, design, execution of construction elements as well as building structures;
B_1A_U06	Is able to use selected computer programmes aiding design decisions in civil engineering as well as critically evaluate the obtained results;
B_1A_U07	Is able to design selected elements and simple engineering constructions as well as evaluate the existing solutions;
B_1A_U08	Is able to solve basic engineering issues within the scope of the programme of study;
B_1A_U09	Is able to design simple foundations for building structures;
B_1A_U10	Is able to plan and conduct experiments, including computer measurements and simulations, interpret the obtained results and draw conclusions;
B_1A_U11	Is able to read architectural and construction drawings as well as geodetic and geological maps. Is able to prepare graphic documentation in the environment of selected CAD programmes;
B_1A_U12	Is able to prepare a simple cost estimation and schedule for construction works;
B_1A_U13	Is able to assess risks while carrying out construction works and implement appropriate safety rules;
B_1A_U14	Is able to use information technology, the Internet resources and other sources for finding general information, communicating and finding software aiding the work of a designer and construction works organiser;

Code	Learning outcomes for programme of studies
B_1A_U15	Has mastered the ability to communicate in a foreign language on B2 level including the knowledge of technical language elements within the scope of civil engineering;
B_1A_U16	Is able to apply regulations of building law and water law;
B_1A_U17	Is able to select building material and products;
B_1A_U18	Is able to organise work on the construction site in accordance with the principles of construction technology and organisation;
B_1A_U19	Is able to prepare documentation concerning the accomplishment of an engineering task;
B_1A_U20	Is able to prepare documentation concerning preparation and accomplishment of a construction investment;
B_1A_U21	Is able to prepare and deliver a presentation concerning the results of carrying out an engineering task;
B_1A_U22	Has the ability to learn alone;
B_1A_U23	Is able to use knowledge within the scope of economics to take rational decisions in business activity;
B_1A_U24	Is able to differentiate non-material goods subject to protection, select the type of protection for an individual one as well as use patent literature and patent bases;
B_1A_U25	Is able to interpret ethical and sociological programmes as well as analyse contemporary trends in culture, philosophy, art and design;
B_1A_U26	Behaves, both during the studies and in her/his professional work, in accordance with the principles of ethics, occupational health and safety, fire protection, the applicable legal regulations and social norms, including the academic traditions;
B_1A_U27	Has the awareness of the need of life-long learning;
Social competences	
B_1A_K01	Is able to inspire and organise the process of learning of other people;
B_1A_K02	Understands non-technical aspects and consequences of engineering activity and its influence on environment;
B_1A_K03	Is responsible for the safety of her/his own and the team;
B_1A_K04	Is aware of the responsibility for her/his own work and the readiness to comply with the principles of teamwork and incur responsibility for joint accomplishment of a task;
B_1A_K05	Is aware of the importance to behave in a professional manner and comply with the principles of professional ethics;
B_1A_K06	Is able to think and act in an enterprising manner;
B_1A_K07	Understands the need to communicate the knowledge of civil engineering to the society. Formulates conclusions and describes the results of her/his own work. Is communicative in media presentations;
B_1A_K08	The student acquires the competences of identifying ethical and social dilemmas as well as issues related to culture, philosophy, art and design, which enables her/him to participate in social and cultural events in a responsible and conscious manner;
B_1A_K09	Is prepared to work in a team, is aware of the responsibility for her/his own work and the tasks performed in a team as well as behaving in a professional manner and respecting the rules of professional ethics;

Załącznik nr 2

do zarządzenia nr 121 Rektora ZUT z dnia 30 października 2023 r.

Budownictwo, studia drugiego stopnia (na podstawie uchwały nr 88 Senatu ZUT z dnia 28 czerwca 2019 r.)

Programme of studies: *civil engineering*

Level of qualification: second cycle studies

Educational profile: general academic

Fields of science: Engineering and technology

Discipline of science: civil engineering and transport (100%)

Name of qualification (Title conferred): magister inżynier

Description of the planned educational effects

Code	Learning outcomes for programme of studies
Knowledge	
B_2A_W01	Has advanced and in-depth knowledge within the scope of mathematics and other areas of science useful for formulating and solving complex tasks within the scope of civil engineering;
B_2A_W02	Has detailed knowledge within the scope of the programmes of study related to civil engineering;
B_2A_W03	Knows the basics of continuum mechanics. Knows the analysis principles of surface and solid construction statics issues;
B_2A_W04	Has knowledge on the subject of construction modelling and theoretical foundations of the Finite Element Method;
B_2A_W05	Has theory-based, detailed knowledge related to selected issues in civil engineering;
B_2A_W06	Has advanced knowledge related to key issues within the scope of the selected specialisation;
B_2A_W07	Has knowledge concerning management of construction undertakings within the technical and economic aspect;
B_2A_W08	Knows the principles of constructing and dimensioning of the elements of complex constructions and building structures;
B_2A_W09	Knows advanced methods and computer programmes used in solving complex tasks within the scope of civil engineering;
B_2A_W10	Has knowledge concerning technical standards and norms within the scope of the specialisation studied;
B_2A_W11	Knows the principles of industrial manufacturing of construction materials and products as well as preparation of construction elements and structures;
B_2A_W12	Has basic knowledge within the scope of maintenance of structures and systems typical for the specialisation studied;
B_2A_W13	Has knowledge of developmental trends and the most significant new achievements in civil engineering;
B_2A_W14	Has knowledge necessary to understand social, economic, legal and other non-technical conditions of engineering activity, including the influence of carrying out construction investments on the environment;
B_2A_W15	Knows and understands basic concepts and rules within the scope of industrial property protection and copyrights;
B_2A_W16	Knows basic terms concerning ethics, philosophy, sociology, art, design and culture;

Code	Learning outcomes for programme of studies
Skills	
B_2A_U01	Is able to obtain information from literature, data bases and other properly selected sources, also in a foreign language; is able to integrate the obtained information, interpret it and evaluate it critically as well as draw conclusions, formulate and sufficiently justify opinions;
B_2A_U02	Is able to communicate with the use of various techniques with professionals and others, also in a foreign language;
B_2A_U03	Is able to prepare a scientific study in Polish and a short scientific report in a foreign language presenting the results of her/his own scientific research;
B_2A_U04	Is able to prepare and present, in Polish and a foreign language, an oral presentation concerning detailed issues within the scope specialisation studied;
B_2A_U05	Is able to determine the directions of further learning and carry out the process of self-education;
B_2A_U06	Has the ability to use a foreign language within the scope of fields of science and scientific disciplines appropriate for the programme of study, compliant with the requirements specified for B2+ level of the European Framework of Reference;
B_2A_U07	Uses advanced specialist tools in order to find useful information, communicate and obtain software aiding the work of a designer and an organiser of construction processes;
B_2A_U08	Is able to prepare technical documentation in the environment of selected CAD programmes;
B_2A_U09	Is able to, depending on the research problem, formulate assumptions concerning the experiments, including measurements and numerical simulations, plan and conduct research, interpret the obtained results and draw conclusions;
B_2A_U10	Is able to use analytic, simulation and experimental methods to formulate and solve engineering tasks as well as simple research problems;
B_2A_U11	While formulating and solving engineering tasks, is able to integrate knowledge within the scope of fields of science and scientific disciplines related to civil engineering and use a systemic approach, also including non-technical aspects;
B_2A_U12	Is able to formulate and test hypotheses connected with engineering problems and simple research problems;
B_2A_U13	Is able to assess the usefulness and possibility of using new (technical and technological) achievements in civil engineering;
B_2A_U14	Is able to classify simple and complex building structures;
B_2A_U15	Is able to assess and prepare a summary of loads acting on building structures;
B_2A_U16	Is able to identify and formulate a specification of complex engineering tasks characteristic for the specialisation studied, including atypical tasks, taking into consideration their non-technical aspects;
B_2A_U17	Is able to perform a classic static analysis of surface constructions;
B_2A_U18	Is able to assess the usefulness of methods and tools used for solving engineering tasks characteristic for the specialisation studied;
B_2A_U19	Is able to select, for solving of an engineering task within the scope of environmental engineering, methods, techniques and tools (analytic or numerical ones), adjust the existing tools an develop new ones;
B_2A_U20	Is able to design elements and complex constructions of building structures;
B_2A_U21	Is able to dimension construction details in various building structures depending on the specialisation studied;
B_2A_U22	Is able to design, in accordance with a predefined specification including also non-technical aspects, a complex structure or technological process appropriate for the specialisation studied and specify, at least in part, the manner of its accomplishment, using appropriate methods, techniques and tools;

Code	Learning outcomes for programme of studies
B_2A_U23	Is able to assess basic parameters: time, cost, quality while carrying out construction undertakings and implement appropriate corrective actions;
B_2A_U24	Is able to prepare the effectiveness analysis of construction undertakings and assess risk in the context of enterprise economics as well as plan basic investment parameters;
B_2A_U25	Is able to solve problems connected to the use and diagnostics of building structures Is able to propose improvements of the existing technical solutions;
B_2A_U26	Is able to interpret ethical and sociological programmes as well as analyse contemporary trends in culture, philosophy, art and design;
B_2A_U27	Has the awareness of the need of life-long learning;
Social competences	
B_2A_K01	Is able to professionally define, classify and apply the priorities used for accomplishment of an undertaken engineering task;
B_2A_K02	Is responsible for reliability of the obtained results of her/his work and evaluation of the work of a team of subordinates;
B_2A_K03	Is aware of their importance and understands non-technical aspects and consequences of engineering activity, including its influence on the environment and the related responsibility for the decisions taken;
B_2A_K04	Is aware of the necessity of sustainable development in civil engineering;
B_2A_K05	Is able to think and act in a creative and enterprising manner;
B_2A_K06	Is aware of the need to raise professional and personal competences; extends and develops alone the knowledge within the scope of modern processes, technologies and management methods in civil engineering;
B_2A_K07	Properly identifies and solves dilemmas related to job performance; is aware of acting in compliance with the rules of professional ethics;
B_2A_K08	Understands the need to communicate to the society the knowledge on the subject of civil engineering, formulates and presents information and opinions in a generally understandable manner with justification of various points of view;
B_2A_K09	The student acquires the competences of identifying ethical and social dilemmas as well as issues related to culture, philosophy, art and design, which enables her/him to participate in social and cultural events in a responsible and conscious manner;

Załącznik nr 3

do zarządzenia nr 121 Rektora ZUT z dnia 30 października 2023 r.

Inżynieria środowiska, studia pierwszego stopnia (na podstawie uchwały nr 89 Senatu ZUT z dnia 28 czerwca 2019 r.)

Programme of studies: *environmental engineering*

Level of qualification: first cycle studies

Educational profile: general academic

Fields of science: Engineering and technology

Discipline of science: environmental engineering, mining and energy (73%), civil engineering and transport (27%)

Name of qualification (Title conferred): inżynier

Description of the planned educational effects

Code	Learning outcomes for programme of studies
Knowledge	
IS_1A_W01	Has knowledge within the scope of mathematics, physics, chemistry, biology and other areas useful for formulating and solving simple tasks in environmental engineering;
IS_1A_W02	Has basic knowledge within the scope of descriptive geometry and technical drawing concerning, in particular, the recording and reading of architectural and construction drawings, geodetic and geological maps with the use of CAD;
IS_1A_W03	Has basic knowledge of technical mechanics and material strength useful for formulating and solving simple tasks in environmental engineering as well as designing devices for its needs;
IS_1A_W04	Has basic knowledge within the scope of civil engineering, construction and structure of buildings as well as the manner of shaping construction components as regards heat, strength, humidity, air tightness and fire protection;
IS_1A_W05	Has basic knowledge as regards soil mechanics, in particular within the scope connected with laying of heat ans sanitary networks in the ground as well as geotechnical tests used for selecting location of engineering structures, evaluation of their influence on neighbouring areas and the state of the environment as well as diagnostics of contaminated areas;
IS_1A_W06	Knows the structure and properties of materials used in environmental engineering, with particular inclusion of installation materials, knows the methods of joining wires and networks into systems, has knowledge concerning the corrosion process and anti-corrosive protection;
IS_1A_W07	Knows analytic calculation methods and computer programmes useful for design and calculation within the scope of environmental engineering;
IS_1A_W08	Has knowledge within the scope of information technology, with particular inclusion of its applications in environmental engineering;

Code	Learning outcomes for programme of studies
IS_1A_W09	Has systematic, theory-based, general knowledge including key issues in environmental engineering concerning: •technical thermodynamics, • heat and mass exchange, • fluid mechanics, • biology and chemistry;
IS_1A_W10	Has systematic, theory-based, general knowledge including processes and devices used in environmental engineering concerning, among other things: •fluid-flow and piston machines, •water and sewage management, •water and atmosphere protection, •melioration, •cooling technology, •ventilation and air-conditioning, •heating, •waste management;
IS_1A_W11	Has systematic, theory-based, general knowledge including devices, fittings, securities, distribution systems, water, gas and energy supplies as well as adjustment of sanitary installations;
IS_1A_W12	Has detailed knowledge connected with: •energy balancing, •heat conductivity, convection, radiation, heat penetration, •compressible and non-compressible fluid flow in installations, •compressible and non-compressible fluid flow in fluid-flow and piston machines used in environmental engineering, •thermodynamic transformations used in the main areas of environmental engineering, •fuel combustion, including low emission combustion;
IS_1A_W13	Has detailed knowledge within the scope of natural sciences, including the influence of geological conditions on shaping of the natural environment, hydrological processes as well as the genesis and use of underground and surface waters;
IS_1A_W14	Has detailed knowledge within the scope of protecting the environment from contaminations, noise and vibrations;
IS_1A_W15	Has detailed knowledge within the scope of technological and design solutions in environmental engineering;

Code	Learning outcomes for programme of studies
IS_1A_W16	Has basic knowledge of developmental trends within the scope of environmental engineering, concerning, among other things: •systems of technical equipment in buildings, •heat and coolness sources, heat exchangers, • water and sewage networks, • technologies, systems and devices for water cleaning as well as sewage treatment plants, • air protection engineering, • hydrology, • waste management;
IS_1A_W17	Has basic knowledge of the life cycle of technical devices, structures and systems in environmental engineering, including in particular: • systems of technical equipment in buildings, •energy supply systems, •heating, water supply and sewage networks, • water cleaning systems and sewage treatment plants, •air cleaning devices;
IS_1A_W18	Knows basic methods, techniques, tools and materials used in solving simple engineering tasks within the scope of environmental engineering;
IS_1A_W19	Has basic knowledge necessary to understand the conditions of engineering activity as well as the influence of various technical implementations on the environment, knows the standards and requirements used in environmental engineering;
IS_1A_W20	Has basic knowledge concerning investment cost assessment, organisation and management of an investment process, quality management of installation works, conducting business activity and managing works in sanitary industry;
IS_1A_W21	Knows the principles of measurements and organisation of work in laboratories;
IS_1A_W22	Has knowledge related to basic issues within the scope of the programme of study;
IS_1A_W23	Has elementary knowledge within the scope of intellectual property protection, knows the systems and sources of industrial property law and copyright law; has knowledge of he sources of patent information;
IS_1A_W24	Has basic knowledge on the subject of the necessity to include micro- and macroeconomic conditions in the decision process and management of a construction enterprise;
IS_1A_W25	Knows typical factors and types of dangers occurring in the industrial environment; knows the general principles of limiting hazard facors and risks in the working environment;
IS_1A_W26	Knows basic terms concerning ethics, philosophy, sociology, art, design and culture;
IS_1A_W27	Knows the system of education at a university, the principles of its functioning and the academic traditions;

Code	Learning outcomes for programme of studies
Skills	
IS_1A_U01	Is able to classify devices and installations within the scope of environmental engineering;
IS_1A_U02	Is able to select (analytic or numerical) tools for solving problems of analysis, design, execution of devices and installations within the scope of environmental engineering;
IS_1A_U03	Is able to read architectural and construction drawings, geodetic and geological maps; is able to prepare graphic documentation in the environment of selected CAD programmes;
IS_1A_U04	Is able to plan and conduct experiments, including computer measurements and simulations, interpret the obtained results and draw conclusions;
IS_1A_U05	Is able to solve basic engineering issues within the scope of the programme of study;
IS_1A_U06	Is able to prepare a simple cost estimation and schedule for sanitary works;
IS_1A_U07	Has preparation required for working in an industrial environment and aaplies the OHS rules;
IS_1A_U08	Is able to use Information Technologies, Internet resources and other sources for finding general information, for communication and for finding software aiding the work of a designer and organiser of works within the scope of environmental engineering;
IS_1A_U09	Has mastered the ability to communicate in a foreign language on B2 level including the knowledge of technical language elements within the scope of environmental engineering;
IS_1A_U10	Is able to apply regulations of building law and water law and environmental protection law;
IS_1A_U11	Is able to select and use various materials and devices for constructing installations within the scope of environmental engineering;
IS_1A_U12	Is able to organise work on the construction site and in another environment in accordance with the principles of technology and organisation of works;
IS_1A_U13	Is able to prepare documentation concerning the accomplishment of an engineering task;
IS_1A_U14	Is able to prepare and deliver a presentation concerning the results of carrying out an engineering task;
IS_1A_U15	Has the ability to learn alone;
IS_1A_U16	Is able to apply the knowledge within the scope of economics and management to make rational decisions in business activity;
IS_1A_U17	Is able to differentiate non-material goods subject to protection, select the type of protection for an individual one as well as use patent literature and patent bases;
IS_1A_U18	Is able to design and execute a simple device, structure, system or process typical for environmental engineering as well as evaluate the existing solutions;
IS_1A_U19	Is able to select an appropriate technology for solving of a simple task within the scope of environmental engineering;
IS_1A_U20	Is able to analyse and assess the influence of a device, process, technology or system on the environment;
IS_1A_U21	Is able to analyse and assess the energy and economic efficiency of technical processes, in particular such used in environmental engineering;
IS_1A_U22	Is able to interpret ethical and sociological programmes as well as analyse contemporary trends in culture, philosophy, art and design;
IS_1A_U23	Behaves, both during the studies and in her/his professional work, in accordance with the principles of ethics, occupational health and safety, fire protection, the applicable legal regulations and social norms, including the academic traditions;
IS_1A_U24	Has the awareness of the need of life-long learning;

Code	Learning outcomes for programme of studies
Social competences	
IS_1A_K01	Is able to inspire and organise the process of learning of other people;
IS_1A_K02	Understands non-technical aspects and consequences of engineering activity and its influence on environment;
IS_1A_K03	Is responsible for the safety of her/his own and the team;
IS_1A_K04	Is aware of the responsibility for her/his own work and the readiness to comply with the principles of teamwork and incur responsibility for joint accomplishment of a task;
IS_1A_K05	Is aware of the importance to behave in a professional manner and comply with the principles of professional ethics;
IS_1A_K06	Is able to think and act in an enterprising manner;
IS_1A_K07	Understands the need to communicate the knowledge of civil engineering to the society. Formulates conclusions and describes the results of her/his own work. Is communicative in media presentations;
IS_1A_K08	The student acquires the competences of identifying ethical and social dilemmas as well as issues related to culture, philosophy, art and design, which enables her/him to participate in social and cultural events in a responsible and conscious manner;
IS_1A_K09	Is prepared to work in a team, is aware of the responsibility for her/his own work and the tasks performed in a team as well as behaving in a professional manner and respecting the rules of professional ethics;

Załącznik nr 4

do zarządzenia nr 121 Rektora ZUT z dnia 30 października 2023 r.

Inżynieria środowiska studia drugiego stopnia (na podstawie uchwały nr 89 Senatu ZUT z dnia 28 czerwca 2019 r.)

Programme of studies: *environmental engineering*

Level of qualification: second cycle studies

Educational profile: general academic

Fields of science: Engineering and technology

Discipline of science: environmental engineering, mining and energy (66%), civil engineering and transport (34%)

Name of qualification (Title conferred): magister inżynier

Description of the planned educational effects

Code	Learning outcomes for programme of studies
Knowledge	
IS_2A_W01	Knows basic terms concerning ethics, philosophy, sociology, art, design and culture;
IS_2A_W02	Has advanced and in-depth knowledge within the scope of mathematics (including mainly mathematical statistics and probability calculus) as well as environmental chemistry useful for formulating and solving complex tasks in environmental engineering;
IS_2A_W03	Has detailed knowledge within the scope of other programmes of study related to environmental engineering, including within the scope of electrical engineering, mechanical engineering, environmental protection, spatial planning, security engineering, in particular security of installations and other technical systems;
IS_2A_W04	Knows the available environmental protection technologies, knows the principles of analysis of technical solutions in environmental engineering, civil engineering and industry as regards determining their influence on the environment;
IS_2A_W05	Has knowledge on the subject of modelling processes, configuration of systems and devices on environmental engineering;
IS_2A_W06	Has theory-based, detailed knowledge related to selected issues in automatic control, control and operation of technical devices as well as within the scope of dynamic properties of structures and systems in environmental engineering;
IS_2A_W07	Has advanced knowledge connected with key issues within the scope of environmental engineering;
IS_2A_W08	Has knowledge concerning management of undertakings within the scope of environmental engineering and civil engineering in the technical and economic aspect as well as organisation of an investment and cost assessment process;
IS_2A_W09	Knows the principles of system, process and device analysis in environmental engineering within widely understood area of behaviours and influences;
IS_2A_W10	Knows advanced methods and computer programmes used in solving complex tasks within the scope of environmental engineering;
IS_2A_W11	Has knowledge concerning technical standards and norms within the scope of environmental engineering;
IS_2A_W12	Knows the possibilities of using alternative sources of energy in civil engineering and industry;

Code	Learning outcomes for programme of studies
IS_2A_W13	Has basic knowledge within the scope of maintenance of structures and systems typical for environmental engineering;
IS_2A_W14	Has knowledge of developmental trends and the most significant achievements in environmental engineering;
IS_2A_W15	Has knowledge necessary to understand social, economic, legal and other non-technical conditions of engineering activity, including the influence of carrying out technical investments on the environment; has systematic knowledge within the scope of identifying dangers, knows the safety and protection measures as well as the criteria of their selection;
IS_2A_W16	Knows and understands basic concepts and rules within the scope of industrial property protection and copyrights;
Skills	
IS_2A_U01	Is able to interpret ethical and sociological programmes as well as analyse contemporary trends in culture, philosophy, art and design;
IS_2A_U02	Is able to obtain information from literature, data bases and other properly selected sources, also in a foreign language; is able to integrate the obtained information, interpret it and evaluate it critically as well as draw conclusions, formulate and sufficiently justify opinions;
IS_2A_U03	Is able to communicate with the use of various techniques with professionals and others, also in a foreign language;
IS_2A_U04	Is able to prepare a scientific study in Polish and a short scientific report in a foreign language presenting the results of his/her own scientific research;
IS_2A_U05	Is able to prepare and present, in Polish and a foreign language, an oral presentation concerning detailed issues within the scope of environmental engineering;
IS_2A_U06	Is able to determine the directions of further learning and carry out the process of self-education;
IS_2A_U07	Has the ability to use a foreign language within the scope of fields of science and scientific disciplines appropriate for the programme of study, compliant with the requirements specified for B2+ level of the European Framework of Reference;
IS_2A_U08	Uses advanced specialist tools in order to find useful information, communicate and obtain software aiding the work of a designer and an organiser of technical processes in environmental engineering;
IS_2A_U09	Is able to prepare technical documentation in the environment of selected CAD programmes;
IS_2A_U10	Is able to, depending on the research problem, formulate assumptions concerning the experiments, including measurements and numerical simulations, plan and conduct research, interpret the obtained results and draw conclusions;
IS_2A_U11	Is able to use analytic, simulation and experimental methods to formulate and solve engineering tasks as well as simple research problems within the scope of environmental engineering;
IS_2A_U12	While formulating and solving engineering tasks, is able to integrate knowledge within the scope of fields of science and scientific disciplines related to environmental engineering such as: civil engineering, power engineering, electrical engineering, security engineering, spatial planning, economic sciences and environmental protection as well as use a systemic approach, also including non-technical aspects;
IS_2A_U13	Is able to formulate and test hypotheses connected with engineering problems and simple research problems;
IS_2A_U14	Is able to assess the usefulness and possibility of using new (technical and technological) achievements in environmental engineering;
IS_2A_U15	Is able to classify simple and complex structures within the scope of environmental engineering;

Code	Learning outcomes for programme of studies
IS_2A_U16	Is able to identify and formulate a specification of complex engineering tasks characteristic for environmental engineering, including atypical tasks, taking into consideration their non-technical aspects, including in particular the influence on the natural environment;
IS_2A_U17	Is able to conduct measurements and tests of systems, processes and devices in environmental engineering within the scope of analysis of their proper operation, environmental impact and identification;
IS_2A_U18	Is able to assess the usefulness of methods and tools used for solving engineering tasks characteristic for environmental engineering;
IS_2A_U19	Is able to select, for solving of an engineering task within the scope of environmental engineering, methods, techniques and tools (analytic or numerical ones), adjust the existing tools an develop new ones;
IS_2A_U20	Is able to design elements, installations, systems and device included within the scope of environmental engineering;
IS_2A_U21	Is able to find solutions alternative to the existing ones within the scope of systems, processes and devices in environmental engineering;
IS_2A_U22	Is able to design, in accordance with a predefined specification including also non-technical aspects, a complex structure or technological process appropriate for the specialisation studied and specify, at least in part, the manner of its accomplishment, using appropriate methods, techniques and tools;
IS_2A_U23	Is able to assess the basic parameters: time, cost, quality during execution of undertakings within the scope of environmental engineering and implement correcting actions; is able to prepare the effectiveness analysis of undertakings within the scope of environmental engineering and perform risk analysis in the context of entrepreneurship economics, plan basic investment parameters;
IS_2A_U24	Is able to assess risks while carrying out construction works and implement appropriate safety rules;
IS_2A_U25	Is able to solve problems connected with operation of environmental engineering structures Is able to propose improvements of the existing technical solutions;
IS_2A_U26	Has the awareness of the need of life-long learning;
Social competences	
IS_2A_K01	The student acquires the competences of identifying ethical and social dilemmas as well as issues related to culture, philosophy, art and design, which enables her/him to participate in social and cultural events in a responsible and conscious manner;
IS_2A_K02	Is able to professionally define, classify and apply the priorities used for accomplishment of an undertaken engineering task;
IS_2A_K03	Is responsible for reliability of the obtained results of her/his work and evaluation of the work of a team of subordinates;
IS_2A_K04	Is aware of their importance and understands non-technical aspects and consequences of engineering activity, including its influence on the environment and the related responsibility for the decisions taken;
IS_2A_K05	Is aware of the necessity of sustainable development in environmental engineering;
IS_2A_K06	Is able to think and act in a creative and enterprising manner;
IS_2A_K07	Is aware of the need to raise professional and personal competences; extends and develops alone the knowledge within the scope of modern processes, technologies and management methods in environmental engineering;
IS_2A_K08	Properly identifies and solves dilemmas related to job performance; is aware of acting in compliance with the rules of professional ethics;
IS_2A_K09	Understands the need to communicate to the society the knowledge on the subject of environmental engineering, formulates and presents information and opinions in a generally understandable manner with justification of various points of view;

Załącznik nr 5

do zarządzenia nr 121 Rektora ZUT z dnia 30 października 2023 r.

Budownictwo studia pierwszego stopnia (na podstawie uchwały nr 109 Senatu ZUT z dnia 31 maja 2021 r.)

Programme of studies: *Civil Engineering*

Level of qualification: first cycle studies

Educational profile: general academic

Fields of science: Engineering and technology

Discipline of science: civil engineering and transport (100%)

Name of qualification (Title conferred): inżynier

Description of the planned educational effects

Code	Learning outcomes for programme of studies
Knowledge	
B_1A_W01	Knows and understands basic knowledge of selected areas of mathematics, physics, chemistry and other areas relevant to civil engineering, necessary to formulate and solve simple problems concerning civil engineering
B_1A_W02	Knows the rules of descriptive geometry and technical drawing concerning saving and reading architectural and construction drawings, geodetic and geological maps using CAD
B_1A_W03	Knows the rules and properly defines cartographic projections Knows the basic geodetic works in civil engineering
B_1A_W04	Knows and understands basic knowledge of general mechanics and strength of materials
B_1A_W05	Knows and understands basic general knowledge of fluid mechanics and hydrology
B_1A_W06	Knows and understands the principles of structural mechanics and the analysis of bar structures in the field of statics
B_1A_W07	Knows the standards and technical guidelines used in civil engineering
B_1A_W08	Knows and understands the principles of construction and dimensioning of building structure elements
B_1A_W09	Knows and understands the basic principles of foundation work
B_1A_W10	Knows and understands the principles of analysis and construction of selected general and industrial construction facilities, transport infrastructure and water engineering facilities
B_1A_W11	Knows and understands the basic knowledge of designing the land transport infrastructure facilities
B_1A_W12	Knows and understands basic general knowledge in the field of building systems
B_1A_W13	Knows and understands basic general knowledge in the field of civil engineering and knows its basic terminology in foreign language
B_1A_W14	Knows and understands selected analytical methods and computer programs supporting structural design and construction management plans

Code	Learning outcomes for programme of studies
B_1A_W15	Knows the most commonly used construction materials and products, as well as the basics of their production technology
B_1A_W16	Knows and understands the basics of construction physics
B_1A_W17	Knows and understands typical engineering technologies used in construction
B_1A_W18	Knows and understands basic general knowledge in the field of building quality management and its procedures, knows the work standards and guidelines in civil engineering and the organizations and principles of construction management
B_1A_W19	Knows and understands basic general knowledge in the field of organization and investment management and conducting business activities in civil engineering
B_1A_W20	Knows and understands the construction investments' impact on the environment
B_1A_W21	Knows and understands basic terminology and principles of intellectual property protection, including patents and copyright
B_1A_W22	Knows and understands basic knowledge on product life-cycle, building facilities and technical systems in civil engineering
B_1A_W23	Knows and understands basic general knowledge on development trends in civil engineering
B_1A_W24	Knows and understands basic general knowledge on the necessity of taking into account micro- and macro-economic conditions in decision-making process
B_1A_W25	Knows basic terminology in law, economics, ethics, philosophy, sociology, arts, design and culture
B_1A_W26	Knows the tertiary education system, understands its principles and academic habits
Skills	
B_1A_U01	Can classify building objects
B_1A_U02	Can prepare the list of loads operating on construction objects
B_1A_U03	Can correctly define computational models of computer structure analysis
B_1A_U04	Can perform a static analysis of statically determinate and indeterminate rod structures, define the stresses and strains in structural elements and set their dimensions
B_1A_U05	Can correctly select tools (analytical or numerical) to solve the problems of analysis, design, execution of structural elements and building objects
B_1A_U06	Can use selected computer programs supporting design decisions in construction industry and critically evaluate the obtained results
B_1A_U07	Can design selected elements and simple engineering structures as well as evaluate existing solutions
B_1A_U08	Can solve basic engineering issues in civil engineering
B_1A_U09	Can design simple buildings' foundations
B_1A_U10	Can plan, carry out experiments, including measurements and computer simulations, interpret the obtained results and draw conclusions
B_1A_U11	Can read architectural and construction drawings, geodetic and geological maps. Can prepare graphic documentation in CAD programs
B_1A_U12	Can prepare simple cost estimate and construction works' schedule
B_1A_U13	Can assess the risks accompanying the implementation of construction works and implement appropriate safety measures
B_1A_U14	Can use information technology, internet resources and other sources to search for general information, communication and software supporting designer's work and the construction works' organizer

Code	Learning outcomes for programme of studies
B_1A_U15	Can communicate in foreign modern language at B2 level, including technical vocabulary on civil engineering
B_1A_U16	Can apply the provisions of construction and water law
B_1A_U17	Can select materials and construction products
B_1A_U18	Can organize work on the construction site in accordance with the principles of construction technology and its organization
B_1A_U19	Can prepare the documentation regarding the completion of engineering work
B_1A_U20	Can prepare the documentation regarding the preparation and execution of building investment
B_1A_U21	Can prepare and deliver a presentation about the outcome of engineering work and can discuss its results
B_1A_U22	Can independently plan and carry out the process of self-learning
B_1A_U23	Can use knowledge on Economics in order to take reasonable decisions in business activities
B_1A_U24	Can distinguish the goods subject to protection, can choose the relevant kind of protection for certain good, can make use of patent literature and patent databases
B_1A_U25	Can interpret ethical and sociological programs, on law and economics, as well as analyze contemporary trends in culture, philosophy, arts and design
B_1A_U26	Can act, during studies and professional work, in accordance with the ethical principles, safety and fire protection regulations, law and social standards, including academic customs
B_1A_U27	Can work individually and collaborate in a team
Social competences	
B_1A_K01	Is ready to independently undertake different tasks, demonstrating proper work organization
B_1A_K02	Is ready to reflect on non-technical aspects and effects of engineering activities and their impact on environment
B_1A_K03	Is ready to follow and disseminate models of proper conduct in the work environment and beyond
B_1A_K04	Is ready to think creatively while solving engineering problems; effectively uses the ability to think creatively and can act in an entrepreneurial way
B_1A_K05	Is ready to act professionally and take into account ethical aspects related to professional work and its ethic
B_1A_K06	Is ready to provide the society with knowledge on construction. Can draw conclusions and the results of own work in an accessible way. Is communicative in presentations
B_1A_K07	Is ready to communicate effectively and initiate social activities that would allow to responsibly and consciously participate in social and cultural events

Załącznik nr 6

do zarządzenia nr 121 Rektora ZUT z dnia 30 października 2023 r.

Budownictwo studia drugiego stopnia (na podstawie uchwały nr 109 Senatu ZUT z dnia 31 maja 2021 r**.)**

Programme of studies: *Civil Engineering*

Level of qualification: second cycle studies

Educational profile: general academic

Fields of science: Engineering and technology

Discipline of science: civil engineering and transport (100%)

Name of qualification (Title conferred): magister inżynier

Description of the planned educational effects

Code	Learning outcomes for programme of studies
Knowledge	
B_2A_W01	Knows and understands in an in-depth manner knowledge of maths and other areas of science, useful for formulating and solving complex tasks in the field of civil construction
B_2A_W02	Knows and understands advanced general knowledge in the field of civil engineering. Knows specialized terminology in a foreign language consistent with the field of studies
B_2A_W03	Knows and understands the basics of continuum mechanics. Knows the principles of the analysis of statics of surface and solid structures
B_2A_W04	Knows and understands advanced genera knowledge on the issues of modeling structures and theoretical foundations of the finite element method
B_2A_W05	Knows and understands detailed general knowledge in the field of selected issues related to civil engineering
B_2A_W06	Knows and understands detailed general knowledge including key issues on civil engineering
B_2A_W07	Knows and understands the principles of managing construction projects in the technical and economic aspect
B_2A_W08	Knows and understands the principles of analysis, construction and dimensioning of complex structures and building objects
B_2A_W09	Knows and understands the advanced methods and computer programs used in solving complex issues in the field of civil engineering
B_2A_W10	Knows and understands advanced general knowledge on standards and technical standards relevant to the studied discipline
B_2A_W11	Knows and understands the principles of industrial production of building materials. Knows and understands the principles of production technology and the execution of building elements and structures
B_2A_W12	Knows and understands advanced general knowledge on maintenance of civil engineering typical facilities and systems
B_2A_W13	Knows and understands advanced general knowledge about development trends and the most important latest developments in civil engineering. Knows and understands basics principles on developing individual entrepreneurship in civil engineering

Code	Learning outcomes for programme of studies
B_2A_W14	Knows and understands advanced general knowledge necessary to understand social, economic, legal and other non-technical conditions of engineering activities, including the impact of construction investment on environment
B_2A_W15	Knows and understands the principles of intellectual property protection and copyright
B_2A_W16	Knows and understands the advanced terminology of ethics, economics, law, philosophy, sociology, art, design and culture
Skills	
B_2A_U01	Can obtain information from literature, database and other properly selected sources, including those in foreign language; Can analyze and interpret the obtained information as well as critically assess, draw conclusions, formulate and comprehensively justify the opinions
B_2A_U02	Can communicate using various techniques in a professional environment as well as in other settings, including in a foreign language
B_2A_U03	Can prepare scientific study in Polish and a short scientific report in foreign language, presenting the result of their own research
B_2A_U04	Can prepare and deliver an oral presentation on specific civil engineering issues; can make contact with the listeners
B_2A_U05	Can determine the directions of further learning and implement the process of self-learning
B_2A_U06	Can speak a foreign language including specialist vocabulary according two the requirements of level B2 plus of the Common European Framework for Languages
B_2A_U07	Can use the advanced specialist tools to search for useful information and communication, and to obtain software supporting the designer and organizer of construction processes
B_2A_U08	Can prepare technical documentation in the environment of selected CAD programs
B_2A_U09	Can, in accordance with the reaserch problem, formulate the assumptions regarding the experiments, incl. numerical measurements and simulation; can plan and conduct research, interpret its outcome, assess critically and draw conclusions
B_2A_U10	Can use analytical, simulation and experimental methods to formulate and solve engineering issues
B_2A_U11	While formulating and solving engineering problems the student can integrate knowledge in the field of science and scientific disciplines, related to civil engineering, and can apply a systemic approach, taking into account non-technical aspects
B_2A_U12	Can formulate and test hypotheses concerning engineering issues and simple reaserch problems
B_2A_U13	Can assess the usefulness of latest achievements in civil engineering
B_2A_U14	Can clarify simple and complex building objects
B_2A_U15	Can assess and comply the loads acting on building objects
B_2A_U16	Can identify and formulate a specification of complex engineering tasks, characteristic of the studied specialty, including non-standard tasks, taking into account their non-technical aspects
B_2A_U17	Can prepare static analysis of surface structures
B_2A_U18	Can evaluate the usefulness of methods and tools for solving engineering issues
B_2A_U19	Can correctly choose methods, techniques and tools (analytical or numerical) to solve engineering tasks, adopting current tools and developing new ones
B_2A_U20	Can design the elements and complex constructions, and building objects

Code	Learning outcomes for programme of studies
B_2A_U21	Is able to dimension construction details in various objects typical for civil engineering
B_2A_U22	In compliance with given specification and taking into account non-technical aspects, the student can design complex construction object or technological process and specify at least partially, the method of their implementation, using appropriate methods, techniques and tools used in civil engineering
B_2A_U23	Can assess te basic parameters:time, costs, quality while implementing the construction projects and implement proper corrective actions
B_2A_U24	Can prepare the effectiveness analysis of construction projects and assess the financial risk, as well as plan the main investment parameters
B_2A_U25	Can solve problems related to the exploitation and diagnosis of construction objects Can suggest the improvements to existing technical solutions
B_2A_U26	Can interpret the ethical and sociological programs in the field of law and economics, can analyze contemporary trends in culture, philosophy, art and design
B_2A_U27	Can independently plan and implement life-long self education, and guide others in this regard
Social competences	
B_2A_K01	Is ready to independently integrate the acquired knowledge and undertake new and comprehensive activities in an organized manner in order to carry out the engineering task, also in conditions of limited access to the necessary information
B_2A_K02	Is ready to inspire others and organize the process of self-improvement in professional area
B_2A_K03	Is ready to reflect on non-technical aspects and the effects of engineering activities, including its impact on environment in connection with the responsibilities for undertaken decisions
B_2A_K04	Is ready to initiate activities in the field of sustainable development in civil engineering
B_2A_K05	Is ready to take decisions in creative and entrepreneurial way
B_2A_K06	Is ready to improve professional and personal competence, independently expands knowledge in the field of modern processes, technologies and management methods in civil engineering
B_2A_K07	Is ready to identify and resolve dilemmas related to the profession, is aware how to act ethically
B_2A_K08	Is ready to transfer professional knowledge; can formulate and deliver information and opinions in a comprehensible manner explaining various standpoints
B_2A_K09	Is ready to identify ethical and sociological dilemmas as well as issues related to culture, philosophy and art, which allow to responsibly and consciously participate in social and cultural events

Załącznik nr 7

do zarządzenia nr 121 Rektora ZUT z dnia 30 października 2023 r.

Inżynieria środowiska studia pierwszego stopnia (na podstawie uchwały nr 109 Senatu ZUT z dnia 31 maja 2021 r.)

Programme of studies: *Environmental Engineering*

Level of qualification: first cycle studies

Educational profile: general academic

Fields of science: Engineering and technology

Discipline of science: environmental engineering, mining and energy (73%), civil engineering and transport (27%)

Name of qualification (Title conferred): inżynier

Description of the planned educational effects

Code	Learning outcomes for programme of studies
Knowledge	
IS_1A_W01	Knows and understands the basic knowledge in the field of mathematics, physics, chemistry, biology, and other areas that are useful for formulating and solving simple tasks in the field of environmental engineering
IS_1A_W02	Knows the principles of descriptive geometry and technical drawing, particularly regarding the notation and interpretation of architectural drawings, construction drawings, geodetic maps, and geological maps using CAD
IS_1A_W03	Knows and understands the basic knowledge of technical mechanics and strength of materials that is useful for formulating and solving simple tasks in the field of environmental engineering and designing devices for its needs
IS_1A_W04	Knows and understands the basic knowledge in the field of construction, building structures, and the way components are shaped in terms of thermal, structural, moisture-related, and air tightness aspects
IS_1A_W05	Knows and understands the basic knowledge related to soil mechanics, particularly in the context of installing heat and sanitary networks in the ground, as well as geotechnical investigations used for selecting the location of engineering structures, assessing their impact on adjacent areas and the environment, and diagnosing contaminated areas
IS_1A_W06	Knows and understands the structure and properties of materials used in environmental engineering, with particular emphasis on installation materials; is familiar with methods of connecting pipes and networks into systems and has knowledge about the corrosion process and anti-corrosion protection measures
IS_1A_W07	Knows and understands selected analytical computational methods and computer programs that are useful for designing and making calculations in the field of environmental engineering
IS_1A_W08	Knows and understands the basics of information technology, with particular emphasis on its applications in environmental engineering

Code	Learning outcomes for programme of studies
IS_1A_W09	Knows and understands basic general knowledge covering key topics in environmental engineering, including: • technical thermodynamics, • heat and mass transfer, • fluid mechanics, • biology and chemistry
IS_1A_W10	Knows and understands the basic knowledge covering the processes and devices used in environmental engineering, including: • fluid and reciprocating machinery, • water and wastewater management, • water and air pollution control, • land reclamation, • refrigeration technology, • ventilation and air conditioning, • heating systems, • waste management, • renewable energy sources. Knows the basic terminology in a modern foreign language
IS_1A_W11	Knows and understands the basic general knowledge covering devices, fittings, safeguards, distribution systems, water supply, gas supply, energy supply, and regulation in sanitary installations
IS_1A_W12	Knows and understands basic knowledge related to: • energy balancing, • heat conduction, convection, radiation, heat transfer, • flow of compressible and incompressible fluids in installations, • flow of compressible and incompressible fluids in flow and reciprocating machines used in environmental engineering, • thermodynamic transformations used in major areas of environmental engineering, • fuel combustion, including low-emission combustion
IS_1A_W13	Knows and understands basic knowledge in the field of Earth science, including the impact of geological conditions on shaping the natural environment, hydrological processes, and the origin and utilization of groundwater and surface water
IS_1A_W14	Knows and understands basic knowledge in the field of environmental protection against pollution, noise, and vibrations
IS_1A_W15	Knows and understands basic knowledge in the field of technological and design solutions in environmental engineering

Code	Learning outcomes for programme of studies
IS_1A_W16	Knows and understands basic knowledge about development trends in environment engineering, including: • technical equipment systems for buildings, • heat and cooling sources, heat exchangers, • water supply sewage networks, • water treatment technologies, wastewater treatment, • air pollution control engineering • geotechnics, • hydrology waste management
IS_1A_W17	Knows and understands the basic knowledge about the life cycle of devices, objects, and technical systems in environmental engineering, including in particular: • technical equipment systems of buildings, • energy supply systems, • heating, water supply, and sewage networks, • water treatment and wastewater treatment systems, • air protection devices
IS_1A_W18	Knows and understands the basic methods, techniques, tools, and materials used in solving simple engineering tasks in the field of environmental engineering
IS_1A_W19	Knows and understands the basic knowledge necessary to understand the legal aspects of engineering activities and the impact of various technical implementations on the environment; is familiar with standards and technical guidelines used in environmental engineering
IS_1A_W20	Knows and understands the basic knowledge regarding the valuation of investment costs, organization and management of the investment process, quality management of installation works, conducting business activities, and managing construction projects in the sanitation industry
IS_1A_W21	Knows the principles of conducting measurements and organizing work in laboratories
IS_1A_W22	Knows and understands the knowledge associated with the basic concepts within the scope of the studied field
IS_1A_W23	Knows and understands the basic concepts and principles related to intellectual property, systems and sources of industrial property rights, copyright law, and sources of patent information
IS_1A_W24	Knows and understands the basic knowledge regarding the need to consider micro- and macroeconomic conditions in the decision-making process and the management of a construction company
IS_1A_W25	Knows and understands typical types of hazards occurring in industrial environment; is familiar with general principles for limiting exposure factors and hazards in the workplace environment

Code	Learning outcomes for programme of studies
IS_1A_W26	Knows the basic terminology related to law, economics, ethics, philosophy, sociology, art, design, and culture
IS_1A_W27	Knows the higher education system, understands the principles of its functioning, and is familiar with academic customs and practices
Skills	
IS_1A_U01	Can classify devices and installations in the field of environmental engineering
IS_1A_U02	Can correctly select analytical or numerical tools for solving problems related to analysis, design, and implementation of devices and installations in the field of environmental engineering
IS_1A_U03	Can read architectural, construction drawings, as well as geodetic and geological maps; can also prepare graphical documentation in the environment of selected CAD software programs
IS_1A_U04	Can plan and conduct experiments, including measurements and computer simulations, interpret the obtained results, and draw conclusions
IS_1A_U05	Can solve basic engineering problems within the scope of the studied field
IS_1A_U06	Can prepare a basic cost estimate and schedule for sanitary works
IS_1A_U07	Can work in an industrial environment and apply occupational health and safety principles
IS_1A_U08	Can use information technology, Internet resources, and other sources to search for general information, communicate, and search for software tools to assist in the work of a designer and organizer of environmental engineering projects
IS_1A_U09	Can communicate in a modern language at a B2 level, including knowledge of technical language elements related to environmental engineering
IS_1A_U10	Can apply the regulations of building law, water law, geological law, and environmental protection in practice
IS_1A_U11	Can select and utilize various materials and equipment in the construction of installations in the field of environmental engineering
IS_1A_U12	Can organize work on construction sites and in other work environments according to the principles of technology and work organization
IS_1A_U13	Can prepare documentation regarding the implementation of an engineering task and conduct its analysis
IS_1A_U14	Can prepare and deliver a presentation regarding the results of the implementation of an engineering task and engage in discussions about them
IS_1A_U15	Is capable of self-learning
IS_1A_U16	Can use knowledge in the field of economics and management to make rational decisions in business activities
IS_1A_U17	Is capable of distinguishing intangible goods subject to protection, selecting the type of protection for a given good, and being able to use patent literature and patent databases
IS_1A_U18	Can design and implement simple devices, objects, systems, or processes typical for environmental engineering, as well as evaluate existing solutions
IS_1A_U19	Can select the appropriate technology for solving a simple task in the field of environmental engineering
IS_1A_U20	Can analyze and assess the impact of a device, process, technology, or system on the environment
IS_1A_U21	Can perform an analysis and evaluation of the energy efficiency, economic viability, and environmental impact of technical processes, particularly those used in environmental engineering
IS_1A_U22	Can interpret ethical and sociological programs, as well as analyze contemporary trends in culture, philosophy, art, and design

Code	Learning outcomes for programme of studies
IS_1A_U23	Can adhere to the principles of ethics, occupational health and safety, fire protection, applicable laws, and social norms, including academic customs, during both academic studies and professional work
IS_1A_U24	Can independently plan and pursue lifelong learning throughout life
Social competences	
IS_1A_K01	Is ready to independently undertake independent work, demonstrating proper work organization, including working effectively as part of a team
IS_1A_K02	Is ready to engage in reflection on the non-technical aspects and consequences of engineering activities, as well as their impact on the environment
IS_1A_K03	Is ready to adhere to and promote the principles of proper conduct in the workplace and beyond
IS_1A_K04	Is ready to critically assess the knowledge, the information I receive, and the outcomes of work
IS_1A_K05	Is ready to act in a professional manner and consider the ethical aspects associated with work and professional ethos
IS_1A_K06	Is ready to engage in creative thinking while solving engineering problems. Can effectively use creative thinking skills and engage in entrepreneurial approaches to work
IS_1A_K07	Is ready to disseminate knowledge to society regarding environmental engineering issues
IS_1A_K08	Is ready to effectively communicate and initiate actions within society, as well as actively participate in social and cultural events with awareness
IS_1A_K09	Is ready to work as part of a team and take responsibility for their own work and the tasks assigned within the team; can conduct in a professional manner and adhere to professional ethics principles

Załącznik nr 8

do zarządzenia nr 121 Rektora ZUT z dnia 30 października 2023 r.

Inżynieria środowiska studia drugiego stopnia (na podstawie uchwały nr 109 Senatu ZUT z dnia 31 maja 2021 r.)

Programme of studies: *Environmental Engineering*

Level of qualification: second cycle studies

Educational profile: general academic

Fields of science: Engineering and technology

Discipline of science: environmental engineering, mining and energy (66%), civil engineering and transport (34%)

Name of qualification (Title conferred): magister inżynier

Description of the planned educational effects

Code	Learning outcomes for programme of studies
Knowledge	
IS_2A_W01	Knows and understands advanced terminology related to ethics, law, economics, philosophy, sociology, art, design, and culture
IS_2A_W02	Knows and understands advanced and in-depth theoretical knowledge in mathematics, including mathematical statistics and probability theory, as well as environmental chemistry, which is useful for formulating and solving complex tasks in the field of environmental engineering
IS_2A_W03	Knows and understands advanced knowledge and understanding of the general areas of study related to environmental engineering, including electrical engineering, mechanical engineering, environmental protection, spatial planning, and safety engineering, particularly safety of installations and other technical systems
IS_2A_W04	Knows and understands advanced technologies for environmental protection, principles of analyzing technical solutions in environmental engineering, construction, and industry to assess their impact on the environment
IS_2A_W05	Knows and has comprehensive understanding of advanced general knowledge related to process modeling, system configuration, and devices in environmental engineering
IS_2A_W06	Has advanced general knowledge related to selected topics in automation, control, and operation of technical devices, as well as the dynamic properties of objects and systems in environmental engineering
IS_2A_W07	Has advanced general knowledge in key areas assigned to the field of environmental engineering. Is also familiar with specialized terminology in foreign languages related to the studied field
IS_2A_W08	Is familiar with and understands advanced general knowledge related to project management in the field of environmental and civil engineering, including technical-economic aspects, as well as the organization of the investment process and cost estimation.
IS_2A_W09	Is familiar with and understands the principles of analyzing systems, processes, and devices in environmental engineering within the broad scope of behaviors and interactions.

Code	Learning outcomes for programme of studies
IS_2A_W10	Is familiar with and understands advanced methods and computer programs used in solving complex tasks in the field of environmental engineering.
IS_2A_W11	Is familiar with and understands general knowledge regarding standards and technical norms in the field of environmental engineering
IS_2A_W12	Knows and understands advanced general knowledge about the possibilities of utilizing alternative energy sources in the construction and industrial sectors
IS_2A_W13	Knows and understands general knowledge regarding the maintenance of facilities and systems typical for environmental engineering
IS_2A_W14	Knows and understands general knowledge about developmental trends and significant new advancements in environmental engineering
IS_2A_W15	Knows and understands advanced general knowledge necessary for understanding the social, economic, legal, and other non-technical aspects of engineering activities, including the impact of technical investments on the environment. They have organized knowledge in identifying hazards, understanding safety and protection measures, and criteria for their selection
IS_2A_W16	Knows and understands the basic concepts and principles of industrial property protection and copyright law
Skills	
IS_2A_U01	Is capable of interpreting ethical and sociological programs, as well as programs related to law, economics, and analyzing contemporary trends in culture, philosophy, art, and design
IS_2A_U02	Is able to gather information from literature, databases, and other properly selected sources, including foreign language sources. They can integrate the acquired information, interpret and critically evaluate it, draw conclusions, and formulate and thoroughly justify opinions
IS_2A_U03	Is capable of effectively communicating using various techniques in a professional environment and in other settings, including foreign languages
IS_2A_U04	Is able to prepare a scientific paper in Polish and a brief scientific report in a foreign language, presenting the results of their own scientific research
IS_2A_U05	Is capable of preparing and delivering an oral presentation in both Polish and a foreign language, focusing on detailed topics within the field of environmental engineering
IS_2A_U06	Is capable of identifying directions for further learning and undertaking the process of self-education
IS_2A_U07	Can speak a foreign language, including specialized terminology in the fields of science and academic disciplines relevant to chosen field of study, in accordance with the requirements specified for the B2+ level of the Common European Framework of Reference for Languages
IS_2A_U08	Is capable of using advanced specialized tools for searching useful information, communication, and acquiring software to assist in the work of a designer and organizer of technical processes in environmental engineerinig
IS_2A_U09	Can create technical documentation in the environment of selected CAD software programs
IS_2A_U10	Is capable of formulating assumptions regarding experiments, including measurements and numerical simulations, in accordance with the research problem; can plan and conduct research, interpret the obtained results, and draw conclusions
IS_2A_U11	Can use analytical, simulation, and experimental methods to formulate and solve engineering tasks and simple research problems in the field of environmental engineering

Code	Learning outcomes for programme of studies
IS_2A_U12	Is capable of integrating knowledge from various scientific disciplines related to environmental engineering, such as construction, energy, electrical engineering, safety engineering, spatial planning, economics, and environmental protection, in formulating and solving engineering tasks. Can also apply a systems approach that considers both technical and non-technical aspects
IS_2A_U13	Can formulate and test hypotheses related to engineering problems and simple research problems
IS_2A_U14	Is able to assess the usefulness and potential of new advancements (techniques and technologies) in environmental engineering.
IS_2A_U15	Is able to classify complex objects in the field of environmental engineering
IS_2A_U16	Is able to identify and formulate specifications for complex engineering tasks specific to environmental engineering, including non-typical tasks, taking into account their non-technical aspects, particularly their impact on the natural environment
IS_2A_U17	Is able to perform measurements and studies of systems, processes, and devices in environmental engineering, focusing on analyzing their proper functioning, environmental impact, and identification of key parameters
IS_2A_U18	Is able to assess the suitability of methods and tools used to solve engineering tasks specific to environmental engineering
IS_2A_U19	Is able to select appropriate methods, techniques, and tools (analytical or numerical) to solve engineering tasks in the field of environmental engineering; can adapt existing tools to suit the requirements of the specific engineering problem and develop new tools if necessary
IS_2A_U20	Is capable of designing elements, installations, systems, and devices within the field of environmental engineering
IS_2A_U21	Is capable of finding alternative solutions in relation to existing systems, processes, and devices in environmental engineering
IS_2A_U22	Is able to design a complex object or technological process in accordance with the given specification, taking into account non-technical aspects. Additionally, can determine, at least partially, the method of its implementation using appropriate methods, techniques, and tools, relevant to the studied specialization
IS_2A_U23	Is capable of assessing the fundamental parameters such as time, cost, and quality in the implementation of environmental engineering projects and implementing appropriate corrective actions; can prepare an analysis of the effectiveness of environmental engineering projects and evaluate risk in the context of the company's economics; additionally, can plan the basic parameters of investments
IS_2A_U24	Can assess the hazards involved in construction and installation works and implement appropriate safety measures
IS_2A_U25	Can solve problems related to the operation of environmental engineering facilities. He can propose improvements to existing technical solutions
IS_2A_U26	Can independently plan and implement own lifelong learning and guide others in this regard
Social competences	
IS_2A_K01	Is ready to identify ethical and sociological dilemmas and address issues related to culture, philosophy, and art; which enables to responsibly and consciously participate in social and cultural events
IS_2A_K02	Is ready to independently integrate acquired knowledge and undertake new and comprehensive actions in an organized manner to accomplish the engineering task at hand, even in conditions of limited access to necessary information
IS_2A_K03	Is ready to enhance professional and personal competencies and independently supplement and expand the knowledge in the field of modern processes, technologies, and management methods in environmental engineering

Code	Learning outcomes for programme of studies
IS_2A_K04	Is ready to reflect on the non-technical aspects and consequences of engineering activities, including their impact on the environment, while being mindful of the responsibility associated with decision-making
IS_2A_K05	Is ready to initiate actions related to sustainable development in environmental engineering
IS_2A_K06	Is ready to make decisions in a creative and entrepreneurial manner
IS_2A_K07	Is ready to inspire and organize the process of improving his own professional skills and also those of others
IS_2A_K08	Is ready to identify and resolve dilemmas related to the practice of his profession. He is aware of the importance of conducting himself in accordance with ethical principles
IS_2A_K09	Is ready to disseminate knowledge about environmental engineering to society. He formulates and presents information and opinions in a universally understandable manner, providing justification for different perspectives