Resolution No. 49/IX/XVIII/2025 of the Senate of Bialystok University of Technology of 29 May 2025 on the establishment of a study programme for environmental engineering, full-time and part-time first-cycle studies with a general academic profile at Bialystok University of Technology starting from the academic year 2025/2026

Reference of the learning outcomes defined for the first-cycle studies in the field of environmental engineering, referring to the descriptors of the first and second stage and to the engineering competences

Learning outcome symbol – Description of learning outcomes field of study: environmental engineering first cycle studies with a general academic profile – Reference to qualifications attained at level 6 in accordance with the first stage and the second stage descriptors of the Polish Qualifications Framework – Reference to engineering competences – Reg. of the Minister of Science and Higher Education of 28 November 2018 (Journal of Laws, item 2218) and the Act of 22 December 2015 on the Integrated Qualifications System (Journal of Laws of 2018, item 2153)

KNOWLEDGE: the graduate knows and understands

IS1_W01 – on an advanced level, issues in mathematics, physics, chemistry and biology enabling the formulation of hypotheses, solving typical research and engineering tasks, including computational and design tasks, forming theoretical foundations, constituting basic general knowledge in the field of environmental engineering – P6U_W, P6S_WG – P6S_WG

IS1_W02 – on an advanced level, methods of physico-chemical and biological analyses, as well as the composition of air, water, and soil, and methods and theories explaining complex interrelations between them, as well as facts and phenomena causing environmental pollution, the processes of its formation and effective methods of pollution reduction – P6U_W, P6S_WG – P6S_WG

IS1_W03 – on an advanced level, objects, phenomena, processes, as well as technologies and devices used in water treatment, wastewater treatment, and solid waste disposal and management – P6U_W, P6S_WG – P6S_WG

IS1_W04 – on an advanced level, the necessity of protecting air, water, and soil, managing environmental resources, the complex interrelations between them, and strategies for sustainable development, including issues related to product life cycles and the impact of human activity on the natural environment – P6U_W, P6S_WG – P6S_WG

IS1_W05 – on an advanced level, key facts, theories, phenomena, processes, and objects constituting general foundational knowledge in hydrology, geodesy, descriptive geometry, Geographic Information Systems (GIS), computer-aided design, and engineering graphics, as well as their application in environmental engineering – P6U_W, P6S_WG – P6S_WG

IS1_W06 – fundamental general knowledge in structural mechanics, strength of materials, and methodology for determining internal forces in simple building structures; principles for optimising impacts, shaping, sizing, and visualising simple engineering structures while considering their functionality and durability – P6U_W
P6S_WG – P6S_WG

IS1_W07 – selected issues of specialist knowledge in the simulation and design of water supply, sewage, gas, and district heating networks, as well as sanitary, heating, gas, ventilation, air-

conditioning, and fire protection installations; structural solutions and material selection for these systems, considering their efficiency, durability, and compliance with applicable standards – P6U_W, P6S_WG – P6S_WG

IS1_W08 – at an advanced level, selected structures and phenomena related to municipal, hydraulic, and transport construction; their characteristics, principles of operation, and impact on the environment and infrastructure – P6U_W, P6S_WG – P6S_WG

IS1_W09 – at an advanced level, detailed knowledge of selected facts, phenomena, and issues related to noise protection, environmental reclamation techniques, and remediation of contaminated sites; principles and necessity of obtaining water-law permits in the context of environmental engineering activities – P6U_W

P6S_WG – P6S_WG

IS1_W10 – theoretical foundations in refrigeration, heat pumps, and the basics of automation necessary in environmental engineering; key operational principles, facts, processes, and theories and their application in the design and operation of systems related to environmental protection and shaping – P6U_W, P6S_WG – P6S_WG

IS1_W11 – theoretical foundations and detailed knowledge of legal regulations, design guidelines and standards, and implementation of simple systems and structures in environmental engineering and their components; principles governing the design, construction, and operation of these systems, ensuring compliance with current standards and regulations – P6U_W, P6S_WG – P6S_WG

IS1_W12 (H1_W01) – fundamental dilemmas of modern civilisation and their basic implications with particular emphasis on issues related to environmental engineering – P6U_W, P6S_WK –

IS1_W13 (H1_W02) – basic economic, legal, ethical, and other conditions related to professional activity in environmental engineering, including basic concepts and principles concerning industrial property protection and copyright – P6U_W, P6S_WK – P6S_WG

IS1_W14 (H1_W03) – basic principles of creating and developing various forms of entrepreneurship, taking into account occupational health and safety (OHS) and universal design, with particular emphasis on the principles of sustainable development – P6U_W, P6S_WK –

SKILLS: the graduate is able to

IS1_U01 – use interdisciplinary knowledge from the fields of natural sciences, technical sciences and engineering to analyse, formulate, and solve complex and non-standard engineering tasks and problems related to environmental engineering, including situations characterised by incomplete predictability and variable conditions – P6U_U, P6S_UW – P6S_UW

IS1_U02 – apply acquired knowledge to perform precise physical, chemical and biological measurements of environmental components, using appropriate methods, techniques and measuring tools; monitor environmental changes and critically analyse, assess and interpret the results – P6U_U, P6S_UW – P6S_UW

IS1_U03 – formulate, plan and carry out advanced experiments, including measurements of technical-technological and operational parameters of devices used in environmental engineering; interpret the obtained results, draw conclusions and formulate recommendations

for further actions – P6U_U, P6S_UW – P6S_UW
IS1_U04 – properly select information sources and effectively obtain information related to issues in environmental engineering; perform critical analysis, synthesis and evaluation, draw conclusions, justify one's position and formulate opinions and recommendations based on reliable data and conducted analyses – P6U_U, P6S_UW – P6S_UW
IS1_U05 – apply acquired knowledge to use analytical methods for modelling physical, chemical, thermal and flow phenomena in environmental engineering; analyse and interpret modelling results to support design processes and optimisation of engineering systems – P6U_U, P6S_UW – P6S_UW
IS1_U06 – apply learned methods and tools, including advanced numerical, simulation and experimental techniques, to solve complex and non-standard engineering problems in environmental engineering; evaluate the effectiveness of applied methods, considering system and non-technical aspects, including ethical aspects – P6U_U, P6S_UW – P6S_UW
IS1_U07 – design networks, installations and systems in environmental engineering in accordance with accepted assumptions and technical requirements; perform tasks innovatively by appropriately selecting technologies, methods, tools and materials, ensuring efficiency, durability and compliance with applicable norms and standards; perform a preliminary economic assessment of proposed solutions – P6U_U, P6S_UW – P6S_UW
IS1_U08 – prepare and read installation drawings and prepare technical documentation using specialist design-support software, including advanced Information and Communication Technologies (ICT); apply appropriate drawing standards and norms, ensuring clarity and correctness of documentation – P6U_U, P6S_UW – P6S_UW
IS1_U09 – identify, classify and assess the properties of engineering materials, taking into account their application in environmental engineering; recognise non-technical aspects, including environmental impact, economic costs and legal regulations, when making informed and responsible engineering decisions – P6U_U, P6S_UW – P6S_UW
IS1_U10 – communicate using specialised terminology in the field of environmental engineering; use a foreign language at B2 level of the Common European Framework of Reference for Languages (CEFR) – P6U_U, P6S_UK –
IS1_U11 (H1_U01) – participate in substantive debate, present and analyse different positions, and have a constructive discussion on them – P6U_U, P6S_UK –
IS1_U12 (H1_U02) – effectively plan and organise both independent and team work, taking into account OHS regulations; perform various roles within a team, cooperate with others – P6U_U, P6S_UO –
IIS1_U13 – independently plan and carry out the process of lifelong learning – P6U_U, P6S_UU –

SOCIAL COMPETENCES: a graduate is ready to
IS1_K01 (H1_K01) – responsibly perform a professional role, adhere to professional ethics, require others to adhere to them, and uphold the heritage and traditions of their profession – P6U_K, P6S_KR –
IS1_K02 (H1_K02) – fulfil and respect the responsibilities arising from membership in various professional and social communities, communicate to the public, in a clear and comprehensible manner, information and opinions on the achievements of environmental engineering and other

aspects of engineering activity; think creatively and take a problem-solving approach; initiate and co-organise activities in the public interest – P6U_K, P6S_KO –

BT1_K03 (H1_K03) – think and act in an entrepreneurial way, promote and implement a sustainable development policy – P6U_K, P6S_KO –

IS1_K04 – critically assess the acquired knowledge, recognise its importance in solving cognitive and practical problems and assess the content used; recognise the need to seek expert opinions in the event of difficulties and doubts when solving problems independently – P6U_K, P6S_KK –

Meaning of symbols:
IS1_ – learning outcomes for the first-cycle study programme in Environmental Engineering;
W – category of knowledge; U – category of skills; K – category of social competence;
01, 02, 03 and the following - number of the learning outcome;
P6S_... – second stage descriptors of the Polish Qualifications Framework