

Learning outcomes for the field of study ENVIRONMENTAL ENGINEERING 2nd cycle (MSc degree), general academic education profile

Explanation of symbols:

- K - learning outcomes as per of field of study
- W - knowledge category
- U - category of skills
- KB - learning outcomes for the field of Environmental Engineering
- (O) - (general) characteristics of 2st degree in the Polska Rama Kwalifikacji (PRK) – level 7
- (I) - characteristics of 2st degree in the PRK for qualifications comprising engineering competence – level 7

DESCRIPTION OF THE FIELD-SPECIFIC LEARNING OUTCOMES		
Efekty uczenia się na kierunku Inżynieria Środowiska (KIS2)	Having completed the 2 nd cycle (MSc degree) studies in the field of ENVIRONMENTAL ENGINEERING, the graduates:	Kod składnika opisu / odniesienie do charakterystyk drugiego stopnia PRK
KNOWLEDGE		
KIS2_W01	have extended and in-depth knowledge in mathematics, physics, chemistry, environmental biology, biochemistry and other fields of science, suitable to formulate and solve complex problems concerning environmental engineering.	P7S_WG (O)
KIS2_W02	have structured and theoretically based knowledge in the field of building engineering, concerning: <ul style="list-style-type: none"> - construction and structure of buildings and the methods for shaping building components with respect to their thermal, moisture, air leakproofness aspects, - low-energy and passive building engineering, - foundation engineering of buildings and structures, foundation in soil of thermal and sanitary networks, - installation materials and methods for connecting leads and networks into systems, - rules of performing building works in the field of thermal and sanitary systems. 	P7S_WG (O/I)
KIS2_W03	have structured and theoretically based general knowledge concerning: technical thermodynamics, heat and mass exchange, fluid mechanics, environmental biology and chemistry, technical microbiology.	P7S_WG (O)

<p>KIS2_W04</p>	<p>have theoretically based detailed knowledge concerning:</p> <ul style="list-style-type: none"> - methodology of calculating fluid flow processes and heat exchange, - methods for calculating diaphragm expansion (vessel) calculations (e.g. heaters and recuperators), soil heat exchangers and heat losses in pipelines, - principles of energy balancing of building units with complex consumer function, - selection of structures for heat, ventilation, air conditioning (HVAC) systems of buildings with different energy characteristics, - structures of control systems in building, - engineering and urban engineering, - principles of energy and exergetic balancing of complex installations and systems utilized in urban economy, - dust and gas contamination reduction processes, - processes of biological sewage treatment, - microbiological methods for environment control, - principles of analysing the physical and chemical composition of sewage as well as balancing pollution loads. 	<p>P7S_WG (O/I)</p>
<p>KIS2_W05</p>	<p>have knowledge of development trends and the most relevant new achievements in the field of environmental engineering, including:</p> <ul style="list-style-type: none"> - technical fitting of buildings systems, - automatic control systems, - conventional and renewable heat and coolness sources, - water conditioning systems and sewage treatment, - water supply systems, - sewage disposal systems, - air protection systems, - energy technologies based on conventional and renewable primary energy carriers, - environmental pollution control systems, - water, sewage, and air microbiology, - waste disposal systems and land reclamation, - global phenomena influencing and shaping land development. 	<p>P7S_WG (I)</p>
<p>KIS2_W06</p>	<p>have detailed knowledge of life cycle of devices, objects and technical systems applied in environmental engineering, including:</p> <ul style="list-style-type: none"> - technical fitting of buildings systems, - conventional and renewable heat and coolness sources, - water conditioning systems and sewage treatment, - water supply systems, - sewage disposal systems, - air protection systems, - energy technologies based on conventional and renewable primary energy carriers, - methods of environmental research. 	<p>P7S_WG (I)</p>

KIS2_W07	<p>know basic methods, techniques, tools and materials, including elements of BIM technology, applied to solve complex engineering tasks in environmental engineering, including:</p> <ul style="list-style-type: none"> - technical fitting of buildings systems, - automatic control systems, - conventional and renewable heat and coolness sources, - water conditioning systems and sewage treatment, - water supply systems, - sewage disposal systems, - air protection systems, - energy technologies based on conventional and renewable primary energy carriers, - water, sewage and air disinfection processes, - waste disposal management and land reclamation. 	P7S_WG (I)
KIS2_W08	<p>have basic knowledge necessary to understand social, economic, legal and other non-technical conditions of engineering activity, including the rules of sustainable development.</p>	P7S_WK (O)
KIS2_W09	<p>have basic knowledge on management, including quality management and business activity.</p>	P7S_WK (O)
KIS2_W10	<p>know and understand basic ideas and regulations in the field of industrial and intellectual property protection, as well as the necessity to manage the intellectual property resources; are able to utilize patent information resources.</p>	P7S_WK (O)
KIS2_W11	<p>know general rules of developing individual entrepreneurship, utilizing knowledge obtained in the field of environmental engineering.</p>	P7S_WK (O/I)
SKILLS		
KIS2_U01	<p>are able to obtain information from literature, databases and other properly selected information sources, also in English, or in another foreign language recognised as a language of international communication in environmental engineering; can integrate, interpret and evaluate the obtained information as well as draw conclusions, formulate, discuss, and comprehensively justify opinions.</p>	P7S_UW (O)
KIS2_U02	<p>are able to use advanced information and communication technologies (ICT), appropriate to perform typical engineering tasks.</p>	P7S_UW (O)

KIS2_U03	<p>are able to plan and carry out experiments, including measurements and computer simulation in the field of:</p> <ul style="list-style-type: none"> - technical fitting of buildings systems, - conventional and renewable sources of heat and coolness, and heat exchangers, - water conditioning systems and sewage treatment, - water supply systems, - sewage disposal systems, - air protection systems, - testing and control systems for environmental processes, including biochemical and microbiological processes at different stages of sewage treatment and water production; <p>are also able to clearly present and interpret the obtained results and draw conclusions.</p>	P7S_UW (I)
KIS2_U04	<p>in order to formulate and solve engineering tasks and simple research problems in environmental engineering, are able to apply analytic, simulation and experimental methods.</p>	P7S_UW (I)
KIS2_U05	<p>when formulating and solving engineering tasks, are able to integrate knowledge within different scientific fields and disciplines, appropriate for environmental engineering as well as apply systemic approach, including non-technical aspects and the principles of sustainable development.</p>	P7S_UW (O/I)
KIS2_U06	<p>can formulate and test hypotheses related to engineering and simple research problems in the field of environmental engineering, including:</p> <ul style="list-style-type: none"> - technical fitting of buildings systems, - conventional and renewable sources of heat and coolness, and heat exchangers, - water conditioning systems and sewage treatment, - water supply systems, - sewage disposal systems, - air protection systems, - energy technologies based on conventional and renewable primary energy carriers, - biological processes utilized in environmental engineering, - water, sewage and air disinfection systems, - waste disposal management and land reclamation systems. 	P7S_UW (I)
KIS2_U07	<p>can evaluate the usefulness and application potential of new achievements in the field of engineering and technology (Best Available Technology – BAT), applied in environmental engineering.</p>	P7S_UW (I)

KIS2_U08	<p>are able to perform preliminary economic analysis of engineering activities in the field of environmental engineering, including:</p> <ul style="list-style-type: none"> - technical fitting of buildings systems, - automatic control systems, - heat and coolness systems, - water conditioning systems and sewage treatment, - water supply systems, - sewage disposal systems, - air protection systems, - energy technologies based on conventional and renewable primary energy carriers, - waste disposal management and land reclamation systems. 	P7S_UW (I)
KIS2_U09	are able to critically analyse the performance and evaluate the existing technical solutions, especially devices, objects, systems, processes, services utilized in environmental engineering.	P7S_UW (I)
KIS2_U10	can improve the existing technical solutions applied in environmental engineering.	P7S_UW (I)
KIS2_U11	can identify and specify complex engineering tasks, characteristic for environmental engineering, including unusual tasks, including their non-technical aspects.	P7S_UW (I)
KIS2_U12	<p>can identify and specify complex engineering tasks, characteristic for environmental engineering, including unusual tasks, including their non-technical aspects;</p> <p>can evaluate the usefulness of methods and tools dedicated to solve simple practical engineering tasks, typical for environmental engineering; can also notice the limitations of those methods and tools;</p> <p>utilizing new conceptual methods, are able to solve complex engineering tasks in the field of environmental engineering, including unusual tasks and research-oriented tasks.</p>	P7S_UW (O/I)
KIS2_U13	<p>are able – according to a given specification – including non-technical aspects, to design a complex device, object, system or process related to environmental engineering;</p> <p>can carry out such a project, at least partly with the application of appropriate methods, techniques and tools, including BIM technologies;</p> <p>can also adapt the existing tools for that purpose, or develop new tools.</p>	P7S_UW (I)
KIS2_U14	can communicate with the use of different techniques in professional environment and in other environments, also in English or other foreign language regarded as a language of international communication in the field of environmental engineering.	P7S_UK (O/I)
KIS2_U15	can prepare a scientific publication in the Polish language and a brief scientific information in the English language, in order to present the research results.	P7S_UK (O/I)

KIS2_U16	<p>can prepare and present in the Polish and English language an oral presentation concerning detailed problems of environmental engineering, such as:</p> <ul style="list-style-type: none"> - technical fitting of buildings, - automatic control systems, - heat and coolness sources, - water conditioning systems and sewage treatment, - water supply systems, - sewage disposal systems, - air protection systems, - hydrology, - technical microbiology and biochemistry, - energy technologies based on conventional and renewable primary energy carriers, - disinfection systems, - waste disposal management and land reclamation systems. 	P7S_UK (O/I)
KIS2_U17	have language skills in the field of science and scientific disciplines, appropriate for environmental engineering, according to the Common European Framework of Reference for Languages, B2 level.	P7S_UK (O)
KIS2_U18	are prepared to work in industrial environment of environmental engineering, and know the safety rules related to that work.	P7S_UO (O/I)
KIS2_U19	can cooperate and work in a team, taking different roles; can correctly define priorities for performing tasks defined by themselves and other people.	P7S_UO (O)
KIS2_U20	can define the directions of further learning and realise the self-education process; understand the need of Life Long Learning (LLL); can inspire and organise the learning process for other people.	P7S_UU (O)
KOMPETENCJE SPOLECZNE		
KIS2_K01	are aware of non-technical aspects and effects of engineering activity, including its environmental impact.	P7S_KK (O)
KIS2_K02	are aware of negative effects of activities exceeding the engineer's competence, and understand the need of expertise.	P7S_KK (O)
KIS2_K03	are aware of responsibility for taking decision.	P7S_KK (O)
KIS2_K04	are ready to think and act in a business-like way.	P7S_KO (O)
IS2_K05	are aware of the social role of technical university graduate, are prepared to formulate and transfer information and opinions concerning the achievements of technology and other aspects of engineering activity in a commonly comprehensible way.	P7S_KO (O)

KIS2_K06	are prepared to correctly identify and solve problems concerning the pursuit of the occupation.	P7S_KR (O)
KIS2_K07	are aware of how necessary it is to obey the principles of professional ethics, being a result of the social role of technical university graduate.	P7S_KR (O)