

Learning outcomes for the *construction* major

First-cycle degree programme – practical profile

Level of study according to the Polish Qualifications Framework (PQF) – 6

Professional title obtained by the graduate - engineer

Assignment of learning outcomes to relevant academic disciplines

construction 93%

other disciplines 7%

Key to symbols:

Column *Symbol*

K (followed by the underscore) major-related learning outcomes

Column *Reference to outcomes...*¹

T technical sciences education area

1 first-cycle degree programme

P (preceded with a number) practical profile

All column

W knowledge category

U skill category

K (preceded with the underscore) social competence category

01, 02, 03 et seq. learning outcome number

Symbol	Learning outcomes for the <i>construction</i> major. The graduate, on completion of the first-cycle degree programme in the <i>construction</i> major:	Code for the component of the PQF description – P6S detailed characteristics
KNOWLEDGE		
K_W01	has knowledge in mathematics, physics, chemistry and other areas of science needed to formulate and solve tasks related to the construction industry	P6S_WG, P6S_WK,
K_W02	is familiar with the principles of descriptive geometry and technical drawing relating to the creation and reading of construction, surveying, architectural drawings, and their preparation using CAD	P6S_WG, P6S_WK, P6S_WG_Inż
K_W03	has basic knowledge of surveying, concerning topographical and completion surveying as well as as-built quantity surveying	P6S_WG, P6S_WG_Inż
K_W04	has knowledge of theoretical mechanics, strength of materials and general principles of structural design; knows the principles of structural theory and analysis of bar structures in terms of statics, basics of dynamics and stability	P6S_WG, P6S_WG_Inż
K_W05	is familiar with building law, national and EN standards, technical conditions and guidelines for the design and construction of buildings and their parts	P6S_WG, P6S_WK, P6S_WG_Inż, P6S_WK_Inż

¹Only the symbols in use are to be left

K_W06	is familiar with the principles of design and dimensioning of elements and joints of building structures made of metal, reinforced concrete, timber and masonry	P6S_WG, P6S_WK, P6S_WG_Inž, P6S_WK_Inž,
K_W07	is familiar with the basics of geology, has knowledge of soil mechanics and the foundation of buildings	P6S_WG, P6S_WK, P6S_WG_Inž, P6S_WK_Inž,
K_W08	is familiar with building materials and the basic elements of their production process; is familiar with the principles of industrial production of building materials and elements and their installation; is familiar with contemporary building techniques and systems	P6S_WG, P6S_WK, P6S_WG_Inž, P6S_WK_Inž,
K_W09	is familiar with the principles of design and analysis of selected buildings and has knowledge related to the construction, operation, maintenance and demolition of buildings	P6S_WG, P6S_WK, P6S_WG_Inž, P6S_WK_Inž,
K_W10	is familiar with norms and guidelines for the design of buildings, taking into account the requirements for low-energy buildings, and has a basic level of knowledge of building physics concerning heat and moisture distribution in buildings	P6S_WG, P6S_WK, P6S_WG_Inž, P6S_WK_Inž,
K_W11	is familiar with selected computer programs assisting in the calculation and design of structures, energy calculations and cost estimates	P6S_WG, P6S_WK, P6S_WG_Inž, P6S_WK_Inž,
K_W12	is familiar with the principles of construction and analysis of selected industrial and traffic buildings; is familiar with the design of road transport infrastructure facilities	P6S_WG, P6S_WK, P6S_WG_Inž, P6S_WK_Inž,
K_W13	has a basic level of knowledge of running a business in the construction industry and the principles of creating and developing forms of individual entrepreneurship; has knowledge of the impact of construction projects on the environment	P6S_WG, P6S_WK, P6S_WG_Inž, P6S_WK_Inž,
K_W14	has a basic level of knowledge of issues related to the major of construction, especially architecture and urban planning, transport, installation, fire safety engineering, hydraulics and hydrology; is familiar with the principles of design and operation of installation equipment	P6S_WG, P6S_WK, P6S_WG_Inž, P6S_WK_Inž,
K_W15	has knowledge of quality management of construction works and the knowledge necessary to understand the principles of planning, controlling construction costs, estimating the effectiveness of construction projects; knows the organisation and principles of site management;	P6S_WG, P6S_WK, P6S_WG_Inž, P6S_WK_Inž,

K_W16	has a basic level of knowledge necessary to understand the social, economic, legal (including building law) and non-technical conditions of engineering activity; is familiar with the basic principles of occupational safety and health as well as ergonomics in the construction industry	P6S_WG, P6S_WK, P6S_WG_Inž, P6S_WK_Inž,
K_W17	is familiar with and understands the basic concepts and principles of industrial property protection, copyright law is able to use patent information resources	P6S_WG, P6S_WK, P6S_WG_Inž, P6S_WK_Inž
K_W18	has knowledge of current OHS regulations ensuring safe completion of the internship, is able to characterise the profile of activity of the institution, discuss its structure, taking into account the specificity of individual departments (in the place of internship), is able to present an example of an employee promotion path in the place of internship, is able to name basic rights of an employee, name basic rules of organisation of time and place of work	P6S_WG, P6S_WK, P6S_WG_Inž, P6S_WK_Inž,
K_W19	has knowledge of the methods and tools used and data processing techniques; has a basic level of knowledge of the methods, techniques and materials used in solving simple engineering tasks in the field of construction;	P6S_WG, P6S_WK, P6S_WG_Inž, P6S_WK_Inž,
K_W20	has knowledge in the execution of engineering work including the stage of gathering literature, designing or constructing buildings, performing experiments, elaborating the results and presenting them in the context of a discussion; has profound specialist, professional knowledge; has knowledge related to contemporary trends in construction in the broad sense with particular attention to the selection of techniques and methods for solving engineering problems	P6S_WG, P6S_WK, P6S_WG_Inž, P6S_WK_Inž,
K_W21	has knowledge of selected areas of science (materials science, automation, control theory, electrical engineering, electronics) to formulate and solve simple tasks related to mechatronics	P6S_WG, P6S_WK, P6S_WG_Inž, P6S_WK_Inž,
K_W22	is familiar with the basics of the BIM process, in keeping with the concept of PLM systems for modelling, design, analysis, construction management and building management	P6S_WG, P6S_WK, P6S_WG_Inž, P6S_WK_Inž,
SKILLS		
General Skills (not related to the field of engineering education)		
K_U01	is able to efficiently obtain information from literature, databases, also in English or another foreign language recognized as the language of international	P6S_UW, P6S_UK, P6S_UO, P6S_UU

	communication in the field of construction; is able to integrate information obtained, interpret it, as well as draw conclusions and formulate and substantiate opinions;	
K_U02	communicates effectively using various techniques in a professional and other environment	P6S_UK, P6S_UO
K_U03	is able to prepare, in Polish and in a foreign language that is considered basic for construction, a well-documented study of problems	P6S_UK, P6S_UO
K_U04	is able to prepare and deliver in Polish and in a foreign language an oral presentation concerning construction issues	P6S_UK, P6S_UO
K_U05	has the ability for self-education, including with a view to improving professional competence	P6S_UU
K_U06	has language skills in the field of construction in line with the requirements set out for level B2 of the Common European Framework of Reference for Languages	P6S_UK
Engineering Skills		
K_U07	is able to classify buildings, is able to assess and list the loads acting on buildings and is able to assess the geotechnical category of soil	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż
K_U08	is able to design selected elements and simple structures in metal, reinforced concrete, timber and masonry, is able to size basic structural elements in buildings and engineering structures, is able to design simple foundations for buildings;	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż
K_U09	is able to correctly define computational models for the computer analysis of structures; is able to use selected computer programs to support design decisions in construction; is able to critically evaluate the results of the numerical analysis of building structures;	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż
K_U10	is able to conduct a linear stability or ultimate load-bearing capacity analysis of simple systems with respect to critical and limit states of the structure; is able to conduct a dynamic analysis of simple bar systems	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż
K_U11	is able to draw up an energy balance of the building, assess the thermal and moisture quality of space dividers and structural nodes, is able to perform an energy assessment of technical solutions of buildings to the extent necessary for drawing up an energy	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż

	performance certificate, is able to select an appropriate measurement method in thermal diagnostics of a building and interpret the obtained results	
K_U12	is able to determine internal forces, stresses and displacements in statically determinate systems; is familiar with simple and complex strength cases, is able to conduct strength laboratory tests, analyse the results and interpret them, is able to accept and interpret static diagrams of bar structures; is able to formulate and use static equilibrium equations	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż
K_U13	is able to conduct static calculations for statically determinate and non-determinate bar structures	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż
K_U14	is able to carry out simple laboratory experiments leading to quality assessment of applied construction materials and design concrete in accordance with assumed structural requirements and assess its technical properties, is familiar with the principles of production and application of construction materials to assumed process and engineering solutions, is able to determine properties of engineering materials and suggest techniques of their testing	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż
K_U15	is able to use information and communication techniques appropriate for the performance of tasks typical for engineering activity in the construction industry, including the principles of making structural and executive drawings; is able to read architectural, construction and land survey drawings and, in accordance with the principles of drafting geometry, is able to prepare graphic documentation in the environment of selected CAD programs; uses information technology, Internet resources and other sources to find general information, communication and acquisition of software supporting the work of a designer and organiser of construction works	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż
K_U16	is able to prepare a simple cost estimate and schedule of construction works, is able to plan, analyse and monitor the costs of construction processes	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż
K_U17	is able to analyse the execution conditions; is able to analyse and select the methodology of construction works and create the schedule of construction works on this basis; is able to design the construction site, to manage construction works in accordance with the technical specification and the applicable building regulations; is prepared to manage the investment project process at its various stages, to draw up	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż

	construction contracts	
K_U18	knows and applies the provisions of the building law and legislation relating to buildings; applies the principles of occupational health and safety and fire protection	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż
K_U19	cooperates in the design and execution with architects and installation engineers; is able to describe solutions for sanitary and electrical installations in buildings and understands the principles of their operation;	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż
K_U20	is able - when formulating and solving tasks involving the design of buildings, construction works and investment projects - to notice their non-technical aspects, including environmental, economic and legal aspects	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż
K_U21	is able to use traditional and electronic optical surveying instruments, make measurements for surveying services during the installation of building structures not requiring a land survey licence	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż
K_U22	is able to plan and manage construction processes for renovation, upgrading and operation of buildings, is able to organise tenders for construction works and skilfully negotiate a construction works contract	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż
K_U23	is able to use technical equipment, which is necessary for the work position he/she prepares for in the course of his/her internship, is able to perform tasks assigned to him/her, which require both self-reliance and cooperation in a group, has the ability to communicate effectively, is able to look for new and innovative ways to solve problems, is able to demonstrate his/her knowledge in the form of a public speech, also using modern technology, is able to use IT technologies effectively to collect, process and analyse data	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż
K_U24	understands the basic concepts and problems of algebra, analysis and geometry and has the ability to use them to solve practical tasks; is able to work out the results of statistical investigations and to analyse and interpret the results of investigations	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż
K_U25	has the ability to measure basic physical quantities; understand basic physical phenomena and processes occurring in construction; use the laws of nature in technology and everyday life	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż
K_U26	is skilled in analysing the composition and properties of materials used in construction; understands the influence	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż

	of chemical composition and external factors on the quality of materials; has basic skills in laboratory analysis of building material samples	
K_U27	is experienced in the application of technologies specific to construction, gained in professional engineering environments	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż
K_U28	is able to evaluate the effectiveness, functionality and economy of existing and planned mechatronic devices and systems; is able to select the type and parameters of components included in the control and/or management system depending on the specific nature of the device	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż
K_U29	is able to apply computer techniques in support of interdisciplinary coordination and to use hardware technologies to support information processing in an interdisciplinary team environment	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż
K_U30	is able to select construction materials suitable for a given application; is able to assess the suitability and possibility of using modern composite materials in construction	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż
K_U31	is able to assess the type of corrosion of construction materials and provide examples of how to protect and safeguard materials from the effects of corrosion	P6S_UW, P6S_UK, P6S_UO, P6S_UU, P6S_UW_Inż
SOCIAL COMPETENCE		
K_K01	is aware of the need for, and is familiar with opportunities for, ongoing training (second and third cycle studies, postgraduate studies, courses) to improve professional, personal and social competence	P6S_KK, P6S_KR
K_K02	comprehends the non-technical aspects and implications of engineering activities, including their impact on the environment and the related responsibility for decisions made; acts in a professional manner, in accordance with ethical principles and respects the diversity of views and cultures	P6S_KK, P6S_KO, P6S_KR
K_K03	is able to lead a group, inspire its actions and control its effects; is able to work independently and to cooperate in a team on a given task; is responsible for the reliability of its own and the team's results	P6S_KK, P6S_KO
K_K04	is able to demonstrate entrepreneurial skills and ingenuity in acting on engineering tasks	P6S_KK, P6S_KO
K_K05	comprehends the social role of the engineer and participates in the provision of reliable information and opinions to the public concerning the development of technology and the risks involved	P6S_KO, P6S_KR
K_K06	is aware of the need to take care of his/her own health and fitness	P6S_KR
K_K07	is aware of the need for sustainable development in construction; independently supplements and extends knowledge in the field of modern processes and	P6S_KK, P6S_KO, P6S_KR

	technologies	
K_K08	is aware of the benefits of applying numerical computational techniques to the solution of mathematical problems including structural engineering issues related to the processing of experimental data, design, optimisation as well as the analysis of the behaviour of materials and structures	P6S_KK, P6S_KO
K_K09	is aware of the responsibility for the consequences of the engineering solutions adopted	P6S_KK, P6S_KO, P6S_KR
K_K10	adopts the attitude of tolerance in interpersonal relations to different views and behaviours of co-workers, based on the principles of partnership, improves his/her communication skills, based on the principles of dialogue, working on the ability to listen to others and properly execute orders, in accordance with assigned roles in the organisation, in his/her behaviour is guided by the principles of ethics, accepts responsibility for his/her behaviour and tasks entrusted to him/her, is able to indicate the areas of knowledge and skills which he/she should develop and improve; presents the attitude of readiness to learn and work on the desired qualities of an employee: regularity, diligence, self-discipline and perseverance to achieve long-term work results	P6S_KK, P6S_KO, P6S_KR