

**The learning outcomes with their reference to the outcomes
for the area of engineering and technical**

<i>Field of study:</i> Management and Production Engineering		
<i>Level of education:</i> first-cycle studies		
<i>Education profile:</i> general-academic		
Major-oriented outcomes code	Major-oriented learning outcomes	PRK (Coordination Point for Polish Qualifications) component code - level 6
1	2	3
Knowledge (W)		
K_W01	knowledge in the field of mathematics, including the basics of linear algebra, differential and integral calculus, probability and mathematical statistics necessary to formulate and solve simple tasks in the field of <i>Management and Production Engineering</i> implemented with Mechanical Engineering methods	P6S_WG-01
K_W02	knowledge of numerical methods, operational research and the experimental planning principles necessary to conduct theoretical and empirical research in the field of <i>Management and Production Engineering</i> with the use of <i>Mechanical Engineering</i> methods	P6S_WG-01
K_W03	general knowledge of the concepts of classical, relativistic and quantum physics, in particular: – basic knowledge of the general laws of physics, physical quantities and fundamental interactions, – well-established knowledge of: mechanics of a material point and a rigid body, electromagnetism, oscillating and wave motion, optics	P6S_WG-01
K_W04	basic knowledge of the principles of carrying out and processing the results of physical measurements, types of measurement uncertainties, ways of calculating and expressing them	P6S_WG-01
K_W05	knowledge in the field of chemistry used for formulating and solving simple tasks in the field of <i>Production Engineering</i> using Mechanical Engineering methods	P6S_WG-01
K_W06	knowledge of operations research and numerical methods used for formulating and solving simple tasks related to Management and Production Engineering	P6S_WG-01
K_W07	knowledge in the field of computer science and computer networks used for formulating and solving simple tasks in the field of Management and <i>Production Engineering</i> with the use of <i>Mechanical Engineering</i> methods	P6S_WG-01
K_W08	basic knowledge of mechanics, materials science and strength of materials as well as designing machine elements and mechanical systems, necessary to formulate and solve simple tasks in the field of <i>Production Engineering</i> with the use of <i>Mechanical Engineering</i> methods	P6S_WG-01 P6S_WG-I1
K_W09	basic knowledge in the field of mechanical engineering, construction notation and the fundamentals of machine design, including structural and technological design, necessary to formulate and solve simple tasks in the	P6S_WG-01 P6S_WG-I1

	field of <i>Production Engineering</i> using Mechanical Engineering methods	
K_W10	basic knowledge of the techniques of manufacturing and operating machines, mechanical systems and manufacturing systems necessary to formulate and solve simple tasks in the field of Production Engineering using Mechanical Engineering methods; knowledge of the basic methods, techniques, tools and materials used in solving simple engineering tasks	P6S_WG-O1 P6S_WG-I1
K_W11	basic knowledge in the field of automation systems and robotic systems, machine and device drives, along with the selection of automation and robotization systems for technological processes as an engineering discipline related to Management and Production Engineering	P6S_WG-O1
K_W12	structured, built-up knowledge in the field of basic manufacturing techniques related to Management and Production Engineering	P6S_WG-O1 P6S_WG-I1
K_W13	basic knowledge of economics, including microeconomics and macroeconomics useful for formulating and solving simple tasks in the field of Production Management	P6S_WK-O2.2
K_W14	basic knowledge of financial management and accounting in the field of Production Management	P6S_WK-O2.2
K_W15	basic knowledge of workshop metrology methods, measurement techniques, including microprocessor measurement techniques, related to the issues of Management and Production Engineering with the use of Mechanical Engineering methods	P6S_WG-O1 P6S_WG-I1
K_W16	basic knowledge of calibration methods used in mechanical engineering of measuring instruments and devices, as well as the methods to calculate calibration uncertainty	P6S_WG-O1 P6S_WG-I1
K_W17	structured, general knowledge of basic marketing and customer relationship management, strategic management as well as project and innovation management	P6S_WG-O1 P6S_WK-I2
K_W18	structured, well-founded knowledge of the basics of management related to Management and Production Engineering	P6S_WG-O1 P6S_WK-I2
K_W19	structured knowledge in the field of human resource management	P6S_WG-O1
K_W20	structured knowledge of production logistics using mechanical engineering methods	P6S_WG-O1
K_W21	structured knowledge of designing methods and optimizing production processes using Mechanical Engineering methods	P6S_WG-O1 P6S_WG-I1
K_W22	knowledge of the rules applicable in mechanical engineering for introducing information about special requirements (tolerances, fits, technological limitations) to the construction and technological documentation	P6S_WG-O1
K_W23	structured (and well-founded on theory) general knowledge of quality management, occupational safety and ergonomics in production using the Mechanical Engineering methods	P6S_WG-O1 P6S_WG-I1
K_W24	structured (and well-founded on theory) general knowledge of environmental management, including recycling of <i>Mechanical Engineering</i> products	P6S_WG-O1 P6S_WG-I1
K_W25	knowledge of the basics of law and intellectual property protection related to the activities in the field of Management and <i>Production Engineering</i>	P6S_WK-O2.2

	using <i>Mechanical Engineering</i> methods	
K_W26	theoretically-based, detailed knowledge related to selected issues of shaping the properties of finished products	P6S_WG-01 P6S_WG-I1
K_W27	theoretically-based, detailed knowledge related to selected issues of shaping the structure and properties of engineering materials	P6S_WG-01 P6S_WG-I1
K_W28	structured knowledge in the field of integrated management systems and decision support systems in production management using Mechanical Engineering methods	P6S_WG-01
K_W29	basic knowledge of the systemic approach to quality based on the ISO 9000 series standards, has general knowledge of the requirements set by standards, including industry standards: quality management according to PN EN ISO 9001, environment management according to PN EN ISO 14001 and work safety management according to the standard PN EN ISO 18001, related to Management and Production Engineering	P6S_WG-01
K_W30	structured knowledge in the field of industrial production management and the organization of production systems implemented with the Mechanical Engineering methods	P6S_WG-01 P6S_WG-I1
K_W31	theoretically based detailed knowledge related to selected issues of processes and manufacturing technologies using Mechanical Engineering methods	P6S_WG-01 P6S_WG-I1
K_W32	basic knowledge of methods and tools used in quality management, including knowledge of mathematical methods, especially mathematical statistics, useful in quality control and solving simple tasks related to Management and Production	P6S_WG-01
K_W33	knowledge of information systems and databases as well as computer-aided engineering work systems in the field of mechanical engineering and Production Management.	P6S_WG-01
K_W34	theoretically-based detailed knowledge related to selected issues in the field of designing machines and mechanical devices, mechanical systems and manufacturing systems using Mechanical Engineering methods	P6S_WG-01 P6S_WG-I1
K_W35	basic knowledge of modern mechanical engineering materials and the techniques to improve their properties	P6S_WG-01 P6S_WG-I1
K_W36	knowledge of development trends and new achievements of IT applications in the field of Management and Production Engineering	P6S_WG-01
K_W37	knowledge of development trends in production management using Mechanical Engineering methods	P6S_WG-01
K_W38	basic knowledge of the life cycle of devices, facilities and technical systems in the field of mechanical engineering	P6S_WG-01 P6S_WG-I1
K_W39	basic knowledge of methods, techniques and tools used for solving simple engineering tasks related to Management and Production Engineering	P6S_WG-01 P6S_WG-I1
K_W40	general knowledge necessary to understand the social, historical, economic, legal and other non-technical conditions of engineering activities and their inclusion in engineering practice	P6S_WK-O2.1
K_W41	elementary knowledge of running a business	P6S_WK-O2.3 P6S_WK-I2
K_W42	basic knowledge of industrial property protection and copyright law;	P6S_WK-O2.2

	ability to use patent information resources	
K_W43	knowledge of general principles in creating and developing forms of individual entrepreneurship in the field of mechanical engineering and their management processes	P6S_WK-O2.3 P6S_WK-I2
Skills (U)		
1) general skills (not related to the field of engineering education)		
K_U01	ability to obtain information from literature, databases and other sources, to integrate and interpret them and to draw conclusions and formulate opinions	P6S_UW-O3
K_U02	ability to apply mathematical methods and plan experiments and engineering activities in the field of mechanical engineering and to develop the results of those tests and engineering works, and to draw conclusions and formulate opinions on technical matters	P6S_UW-O3
K_U03	ability to work individually and in a team; ability to organise the team for a specific task, indicate expectations towards its members and manage the work of a small team	P6S_UO-O5.1 P6S_UO-O5.2
K_U04	ability to acquire, integrate, interpret, draw conclusions and formulate opinions on the basis of: catalogue notes of equipment manufacturers, advertising materials, information obtained from literature, databases and other modern means of communication, that relate to mechanical engineering issues and management methods in this area	P6S_UW-O3
K_U05	ability to prepare, document and elaborate in written form the issues related to mechanical engineering processes and their management	P6S_UW-O3
K_U06	ability to prepare and present an oral presentation on mechanical engineering processes and their management	P6S_UK-O4.2
K_U07	self-learning skills (e.g. in order to improve qualifications and professional competence) using library sources, electronic sources and databases	P6S_UU-O6
K_U08	ability to communicate fluently using a variety of techniques in the scientific environment and other environments	P6S_UK-O4.1
K_U09	knowledge of at least one foreign language in professional and everyday life, at least at the B2 level of the Common European Framework of Reference for Languages, especially English or another foreign language recognized as the language of international communication	P6S_UK-O4.3
K_U10	ability to use terminology related to Management and Production Engineering	P6S_UK-O4.1
2) basic engineering skills		
K_U11	ability to select and use appropriate computer applications for calculations, simulations, design and verification of the solutions to tasks in the field of <i>Management and Production Engineering</i> using the Mechanical Engineering methods	P6S_UW-O3 P6S_UW-I4
K_U12	ability to choose the right modules and use integrated management information systems.	P6S_UW-O3 P6S_UW-I4 P6S_UW-I6
K_U13	ability to use the known analytical, simulation and experimental methods in the decision-making process related to production planning and control	P6S_UW-O3 P6S_UW-I3

K_U14	ability to select and apply appropriate optimization methods to solve engineering tasks related to Mechanical Engineering	P6S_UW-O3 P6S_UW-I4
K_U15	ability document the course of work in the form of a test report or measurement report; ability to develop test results and present them in a clear report	P6S_UW-O3 P6S_UW-I3
K_U16	ability to use the known mathematical methods and models or computer simulations to analyse and evaluate management and decision-making systems	P6S_UW-O3 P6S_UW-I3
K_U17	ability to perceive the systemic, economic, legal and social aspects when formulating and solving tasks related to mechanical engineering or to the management and production with its use	P6S_UW-O3 P6S_UW-I4
K_U18	applying the principles of occupational health and safety, ability to design and apply safe working conditions in the vicinity of complex production systems	P6S_UW-O3 P6S_UW-I6
K_U19	ability to plan and conduct experiments, including simulation ones, regarding mechanical engineering and methods of managing its processes, as well as to interpret the results and draw conclusions	P6S_UW-O3 P6S_UW-I3
K_U20	ability to estimate the initial costs and estimated costs of engineering projects in the field of mechanical engineering; ability to make a preliminary economic analysis of the undertaken engineering activities	P6S_UW-O3 P6S_UW-I4
3) skills directly related to solving engineering tasks		
K_U21	ability to design a manufacturing system based on mechanical engineering and select methods for managing process flows, design workstations and make a critical analysis of the proposed solutions	P6S_UW-O3 P6S_UW-I6
K_U22	ability to formulate requirements for the supply network and to design a logistics system.	P6S_UW-O3 P6S_UW-I6
K_U23	ability to choose a method of supporting decision-making in quality management and control, and the ability to improve the implemented processes	P6S_UW-O3 P6S_UW-I4
K_U24	ability to design a simple automation system and a simple automated/robotized system using appropriate techniques, methods and tools	P6S_UW-O3 P6S_UW-I6
K_U25	ability to design databases in the field of mechanical engineering and its process management	P6S_UW-O3 P6S_UW-I6
K_U26	ability to propose improvements to existing technical solutions in mechanical engineering; ability to assess the usefulness of routine methods and techniques related to quality management and process improvements	P6S_UW-O3 P6S_UW-I5
K_U27	ability to design and implement a simple device, facility, system or process related to mechanical production engineering using appropriate methods, techniques and tools, in accordance with the given specification and taking into account the non-technical aspects	P6S_UW-O3 P6S_UW-I6
K_U28	ability to use measuring instruments and devices used in mechanical engineering and to calculate the measurement uncertainty	P6S_UW-O3 P6S_UW-I4
K_U29	ability to develop and implement calibration procedures for measuring instruments and devices used in mechanical engineering and to calculate	P6S_UW-O3 P6S_UW-I3

	the uncertainty of calibration	
K_U30	ability to interpret the requirements of the ISO 9001:2009 standard, create system documentation, formulate a quality policy, define environmental aspects according to the ISO 14001 standard and assess occupational risk based on the requirements of the ISO 18001 standard	P6S_UW-03 P6S_UW-I4
K_U31	ability to use the appropriate technique for manufacturing machine parts in regard to the type of material, semi-finished product, shape, structure and functional properties of the product and the production volume.	P6S_UW-03 P6S_UW-I6
SOCIAL COMPETENCIES (K)		
K_K01	understanding the need for lifelong learning; ability to inspire and organize the learning process of others	P6S_UU-06 P6S_KK-07.1 P6S_KK-07.2
K_K02	understanding the importance of non-technical aspects and effects of engineering activities, including their impact on the environment and the related responsibility for the decisions made	P6S_KO-08.1
K_K03	ability to interact or work in a group, taking various roles	P6S_UO-05.2 P6S_KK-07.2
K_K04	ability to properly define priorities for the implementation of tasks defined by oneself or others	P6S_UO-05.1 P6S_KK-07.2
K_K05	ability to correctly identify and resolve dilemmas related to professional practice	P6S_KR-09
K_K06	ability to think and act in an entrepreneurial way	P6S_KO-08.3
K_K07	understanding the social role of a technical university graduate and, in particular, of the need to formulate and pass on to the society (e.g. through the mass media) the information and opinions on the achievements of technology and other aspects of the engineer's activity; tendency to provide such information and opinions in a generally understandable way	P6S_KO-08.1 P6S_KO-08.2