Learning outcomes of the programme:

1.	**Field of study**	**Chemical Technology**
2.	Academic year of entry	2015/2016 (winter term), 2016/2017 (winter term)
3.	Level of qualifications/degree	first-cycle studies (in engineering)
4.	Degree profile	general academic

Code of the learning outcome of the programme	**Learning outcomes** The graduate:	Codes of the learning outcomes of the areas of education to which the learning outcome of the programme is related
	KNOWLEDGE	
TCH_W47	has a general knowledge of the selected scientific methods and is familiar with issues characteristic of the discipline of science not related to the programme	
TCh_W01	has knowledge of basic chemical concepts and laws, concerning the structure of compounds and chemical substances and the basic types of chemical reactions and basic physical phenomena	T1A_W01
TCh_W02	has knowledge of the properties and reactivity of elements and selected classes of inorganic compounds	T1A_W01
TCh_W03	has knowledge of analytical chemistry, including basic instrumental techniques and methods of chemical analysis of technological processes	T1A_W01
TCh_W04	recognizes the role of chemistry in everyday life, understands its importance for the development of civilization and technology and understands the interdisciplinary nature of chemistry as a science	T1A_W01
TCh_W05	recognizes the role of chemistry in everyday life, understands its importance for the development of civilization and technology and understands the interdisciplinary nature of chemistry as a science	T1A_W01
TCh_W06	knows and can explain the electron structure of small particles	T1A_W01
TCh_W07	knows the mechanism of formation of bonds and knows their types	T1A_W01
TCh_W08	knows the electron structure of atoms in correlation with the position of the elements in the periodic table	T1A_W01
TCh_W09	explains the relationship between the molecular structure and macroscopic properties of the surrounding matter	T1A_W01
TCh_W10	describes states of matter and their properties, knows the structure of the atom, properties of elements and inorganic compounds and their applications	T1A_W01
TCh_W11	has knowledge of the basic concepts of organic chemistry, including the structure and reactivity of organic compounds	T1A_W01
TCh_W12	has knowledge of chemical compound nomenclature and general nomenclature used in chemistry	T1A_W01
TCh_W13	has knowledge of methods for determining the structure of chemical compounds	T1A_W01
TCh_W14	has knowledge of the basic concepts and laws of physical chemistry	T1A_W01
TCh_W15	has knowledge to observe the physicochemical foundations in different areas of knowledge	T1A_W02
TCh_W16	has knowledge of the chemistry and technology of crystalline substances and materials, applications of crystalline substances and materials	T1A_W03, T1A_W05
TCh_W17	knows the basics of error calculation and mathematical statistics	T1A_W01, T1A_W02
TCh_W18	demonstrates knowledge of labour law and the legal basis necessary to perform the profession	T1A_W08, T1A_W09
TCh_W19	knows the importance of protecting intellectual property rights	T1A_W10
TCh_W20	knows the general principles of creating and developing forms of individual entrepreneurship using knowledge of chemistry	T1A_W09
TCh_W21	knows different types of modern technical materials, including nanomaterials, has knowledge of these materials, knows the most important technological aspects related to the production and use of different materials	T1A_W01, T1A_W02, T1A_W04, T1A_W05, T1A_W07
TCh_W22	has knowledge about the selection of raw materials for chemical processes and about process control in organic and inorganic technology	T1A_W03, T1A_W04, T1A_W06
TCh_W23	has knowledge of the basic concepts of higher mathematics	T1A_W01, T1A_W02
TCh_W24	has knowledge of differential calculus and integral calculus of multivariable function and basic methods of statistics, numerical analysis and optimization theory	T1A_W01
TCh_W25	knows and understands basic physical processes and phenomena	T1A_W01
TCh_W26	has knowledge of the application of thermodynamics to the issues of chemical technology	T1A_W03, T1A_W04

TCh_W27	knows the basic concepts and laws of electrical engineering and electronics	T1A_W04
TCh_W28	has knowledge in the field of metrology of measurements of quantities encountered in chemical technologies	T1A_W04
TCh_W29	has knowledge of the basics of industrial automation and knows the basics of data acquisition using information technology	T1A_W07
TCh_W30	has basic knowledge of modern information technologies	T1A_W05, T1A_W07
TCh_W31	has knowledge of fluid flow, mass exchange and heat exchange	T1A_W01
TCh_W32	knows the principles of operation of basic electrical machines, control and measurement systems	T1A_W06, T1A_W07
TCh_W33	has knowledge of the equipment used in the chemical industry	T1A_W06, T1A_W07
TCh_W35	has knowledge of the use of catalysts in chemical technology and environmental protection	T1A_W05, T1A_W08, T1A_W09
TCh_W37	has knowledge of the dangers in the chemical industry, chemical trade and knows the law related to this area	T1A_W08
TCh_W38	has basic knowledge of safety engineering in the chemical industry	T1A_W09, T1A_W11
TCh_W39	has knowledge of literature resources in chemistry and chemical technology	T1A_W10
TCh_W40	has basic knowledge of calculation methods used in chemistry and methods of planning and optimizing experiments	T1A_W07
TCh_W41	has a basic knowledge of statistical and chemometric control of technological processes	T1A_W07
TCh_W42	has knowledge needed to solve problems related to the selected specialty	T1A_W04, T1A_W05, T1A_W08
TCh_w43	knows and understands the basic concepts and issues in interdisciplinary subjects not related to the programme	T1A_W01
SKILLS		
TCH_U34	uses SI units	T1A_U01
TCH_U35	has the ability to pose and analyze problems on the basis of the acquired contents from the discipline of science not related to the programme	
TCH_Ui01	is able to evaluate the implementation of the process on an industrial scale	T1A_U07, T1A_U08, T1A_U10, T1A_U12
TCH_Ui02	has the ability to use industrial automation to control industrial processes	T1A_U07, T1A_U09, T1A_U11
TCH_Ui03	has the ability to use computerised data acquisition systems	T1A_U07
TCH_Ui04	is able to control the technological process and determine product quality	T1A_U07, T1A_U08, T1A_U10, T1A_U11
TCH_Ui05	has the ability to determine the physicochemical, mechanical and thermal properties of materials and the use of plastics, metallic and ceramic materials; to handle waste and use environmentally friendly technologies	T1A_U07, T1A_U08, T1A_U09, T1A_U10, T1A_U11
TCH_Ui06	uses control and measurement equipment, has the ability to apply analytical methods to control technological processes in the chemical industry	T1A_U07, T1A_U08, T1A_U09, T1A_U11
TCH_Ui07	can use control systems in the chemical industry	T1A_U07, T1A_U08, T1A_U09, T1A_U11
TCH_Ui08	is able to classify hazardous materials, knows the legal regulations in Poland concerning trade in chemicals and transport of chemicals	T1A_U10, T1A_U11
TCH_Ui09	is able to perform simple catalytic reactions in the laboratory and plan the catalyst for selected, not very complex chemical reactions	T1A_U08, T1A_U09
TCH_Ui10	can calculate the size of the reactor, select the size of other necessary apparatus and equipment such as heat exchangers, crystallizer, centrifuge, dryer, and can make a mass and heat balance of the technology and a sketch of the process diagram	T1A_U08, T1A_U09
TCH_Ui11	can perform basic design calculations related to mass and heat exchange and mass flow	T1A_U08, T1A_U09, T1A_U11, T1A_U12
TCH_Ui12	has the ability to describe and apply unit operations in chemical technology	T1A_U08, T1A_U09
TCH_Ui13	can read and make structural drawings and prepare technical documentation	T1A_U07, T1A_U08, T1A_U11
TCH_Ui14	is able to use a mathematical instrument to describe issues related to technical hazards and technical safety (calculates risk) and is able to prepare an installation safety report	T1A_U08, T1A_U09, T1A_U11
TCH_Ui15	is able to determine the performance of designed processes within pure chemistry	T1A_U08, T1A_U09, T1A_U10, T1A_U11, T1A_U12
TCH_Ui16	has the ability to use integrated chemical systems in chemical technology	T1A_U07, T1A_U08, T1A_U09
TCH_Ui17	has the ability to use renewable raw materials in chemical technology	T1A_U08, T1A_U10
TCH_Ui18	is able to work properly in a chemical accident, knows basic rescue equipment and basic procedures	T1A_U10, T1A_U11

TCH_Ui19	can find information on the properties and methods of industrial-scale synthesis of organic and inorganic compounds	T1A_U07
TCH_Ui20	has the ability to apply known methods of chemical recycling and waste disposal in the conditions of a specific industrial plant	T1A_U10, T1A_U11
TCH_Ui21	has the ability to use compounds and materials of high and special purity in chemical technology and beyond it	T1A_U08
TCh_U01	can make basic chemical calculations	T1A_U01
TCh_U02	uses the chemical nomenclature of the various classes of chemical compounds as recommended by IUPAC	T1A_U01
TCh_U03	records chemical reaction equations	T1A_U01
TCh_U04	solves basic calculation tasks from specific chemistry sections	T1A_U01
TCh_U05	analyses the properties of elements and selected classes of inorganic compounds in the context of periodic trends	T1A_U01
TCh_U06	uses basic concepts from organic chemistry to solve problems related to construction, reactivity and obtaining organic compounds	T1A_U01
TCh_U07	interprets simple mechanisms of chemical reactions of inorganic and organic compounds	T1A_U01
TCh_U09	conducts simple syntheses of selected inorganic and organic compounds	T1A_U01
TCh_U10	can apply an analytical procedure to determine the composition of composite materials	T1A_U01
TCh_U11	is able to use analytical techniques, perform calculations and interpret analytical results	T1A_U01
TCh_U12	is able to make their own selection of the method and apparatus needed to perform a specific analytical task	T1A_U01, T1A_U05
TCh_U13	is able to correctly analyse and interpret the results obtained, including the assessment of their reliability	T1A_U03
TCh_U14	is able to solve problems related to construction, reactivity and obtaining inorganic compounds and substances	T1A_U01
TCh_U15	can solve problems and tasks using physical chemistry concepts	T1A_U01
TCh_U16	can interpret simple molecular spectra	T1A_U01
TCh_U17	is able to solve standard problems related to the structure of molecules, can find applications for spectroscopy in different branches of chemistry and beyond it	T1A_U01
TCh_U18	is able to calculate limits, derivatives, integrals and solve systems of linear equations and some classes of ordinary differential equations	T1A_U01
TCh_U19	is able to apply mathematical methods to solve problems arising from chemistry and physics	T1A_U01
TCh_U20	is able to measure basic physical quantities	T1A_U01
TCh_U22	can use thermodynamic models to solve practical physicochemical problems	T1A_U01
TCh_U23	is able to perform syntheses of chemical compounds on a laboratory and enlarged scale, up to technology	T1A_U01, T1A_U02
TCh_U24	has basic skills in the effective use of computer and network systems	T1A_U01
TCh_U25	has the ability to use the knowledge resources of chemistry and chemical technology	T1A_U01
TCh_U26	has the basic skills necessary to apply calculation methods (e.g. DFT) to describe the structure and properties of molecules	T1A_U01
TCh_U27	has the ability to plan and optimise experiments	T1A_U01
TCh_U28	prepares and presents short oral presentations in Polish and/or English on specific issues using various sources	T1A_U03, T1A_U04
TCh_U29	speaks at least one foreign language to the extent necessary to read professional literature specific to their major and communicates at B2 level in this language	T1A_U06
TCh_U30	discusses and assesses the judgments and opinions presented by other students on the basis of the knowledge gained	T1A_U02
TCh_U31	uses typical application software	T1A_U04
TCh_U32	calculates limits, derivatives and integrals, resolves systems of linear equations and some classes of ordinary differential equations	T1A_U01
TCh_U33	measures basic physical quantities	T1A_U01
TCh_u21	can use instruments for measuring basic electrical and non-electrical quantities	T1A_U01
Tch_U08	analyzes and predicts the properties and reactivity of inorganic, coordinating and metal-organic compounds	T1A_U01
SOCIAL COMPETENCES		
TCH_K03	is interested in the basic chemical processes in the environment	T1A_K01, T1A_K02
TCH_K17	understands the need for an interdisciplinary approach to solving problems, integrating knowledge from different disciplines and practising self-education to deepen the acquired knowledge	
TCh_K01	can use the laws of nature in technology and in everyday life	T1A_K01, T1A_K02

TCh_K02	is aware of their level of knowledge and understands the need for lifelong learning	T1A_K01
TCh_K04	is aware of the need to perceive chemical processes in general, and bases on the knowledge gained in their interpretation	T1A_K02
TCh_K05	is responsible for jointly implemented tasks	T1A_K02
TCh_K06	understands the need to work systematically on long-term projects	T1A_K05
TCh_K07	is responsible for their own and others' work safety	T1A_K03
TCh_K08	can independently search for information in the literature to improve professional and personal competences	T1A_K01
TCh_K09	understands the need for popular science to present selected chemical issues to lay people	T1A_K01, T1A_K02, T1A_K03
TCh_K10	understands the importance of intellectual honesty and acts ethically	T1A_K05, T1A_K06
TCh_K11	is able to influence the public perception of chemistry and chemical technologies as friendly and determining the progress of civilization	T1A_K01, T1A_K07
TCh_K13	can identify social risks associated with chemical technologies and take action to reduce the negative environmental impact of chemical technologies	T1A_K05
TCh_K14	is able to cooperate with technologists, constructors of chemical equipment, designers of technologies and of process lines	T1A_K03
TCh_K15	can interact and work in a group	T1A_K03

Code of the learning outcome of the programme	**Learning outcomes leading to the acquisition of engineering competences** The graduate:	Codes of the learning outcomes of the areas of education to which the learning outcome of the programme is related
	KNOWLEDGE	
TCh_W34	knows typical engineering technologies in the programme	InzA_W05, T1A_W06
TCh_W36	has a basic knowledge of management, including quality management and knowledge how to run business	InzA_W04, T1A_W09, T1A_W11
TCh_W44	has a basic knowledge of the life cycle of equipment, facilities and technical systems	InzA_W01
TCh_W45	knows basic methods, techniques, tools and materials used to solve simple engineering tasks in the programme	InzA_W02
TCh_W46	has a basic knowledge necessary to understand social, economic, legal and other non-technical conditions of engineering activity	InzA_W03
	SKILLS	
TCh_Ui22	can make a critical analysis of the manner of functioning and asses existing technical solutions, in particular, devices, objects, systems, processes and services, especially in relation to the programme	InzA_U05, T1A_U13
TCh_Ui23	is able to identify and formulate a specification of simple engineering tasks of a practical nature, characteristic of the programme	InzA_U06, T1A_U14
TCh_Ui24	is able to assess the suitability of routine methods and tools to solve a simple engineering task of a practical nature, characteristic of the programme and select and apply the appropriate method and tools	InzA_U07, T1A_U15
TCh_Ui25	is able to design and implement a simple device, object, system or process, typical of the programme, using appropriate methods, techniques and tools according to a given specification	InzA_U08, T1A_U16
TCh_Ui26	is able to plan and conduct experiments, including computer measurements and simulations and interpret the results and draw conclusions	InzA_U01
TCh_Ui27	can use analytical, simulation and experimental methods to formulate and solve engineering tasks	InzA_U02
TCh_Ui28	can recognise systemic and non-technical aspects when formulating and solving engineering tasks	InzA_U03
TCh_Ui29	is able to make a preliminary economic analysis of the undertaken engineering activities	InzA_U04
	SOCIAL COMPETENCES	
TCh_K12	can think and act in an entrepreneurial way	InzA_K02, T1A_K04, T1A_K06
TCh_K16	is aware of the importance and understands non-technical aspects and the consequences of engineering activities, including their environmental impact, and the associated responsibility for the undertaken decisions	InzA_K01