

Zarządzenie nr 126

**Rektora Zachodniopomorskiego Uniwersytetu Technologicznego w Szczecinie
z dnia 30 października 2023 r.**

**w sprawie opisu efektów uczenia się w tłumaczeniu na język angielski
dla kierunków studiów prowadzonych na Wydziale Technologii i Inżynierii Chemicznej**

Na podstawie art. 23 ustawy z dnia 20 lipca 2018 r. Prawo o szkolnictwie wyższym i nauce (tekst jedn. Dz. U. z 2023 r. poz. 742, z późn. zm.) w związku z § 3 ust. 7 zarządzenia nr 64 Rektora ZUT z dnia 1 października 2019 r. w sprawie zasad sporządzania i wydawania dyplomów ukończenia studiów i suplementów do dyplomu (z późn. zm.) zarządza się, co następuje:

§ 1.

1. W celu wydania na wniosek absolwenta odpisu suplementu do dyplomu w tłumaczeniu na język angielski wprowadza się – uchwalone przez Senat – opisy efektów uczenia się w tłumaczeniu na język angielski dla kierunków studiów prowadzonych na Wydziale Technologii i Inżynierii Chemicznej.
2. Opis efektów uczenia się w tłumaczeniu na język angielski dla poszczególnych kierunków studiów stanowi integralną część odpisu suplementu do dyplomu.

§ 2.

Opisy efektów w tłumaczeniu na język angielski w wydawanych odpisach suplementów do dyplomu dla kierunków studiów rozpoczynających się:

1) od roku akademickiego 2019/2020:

- a) chemia, studia pierwszego stopnia – stanowi załącznik nr 1,
- b) inżynieria chemiczna i procesowa, studia pierwszego stopnia – stanowi załącznik nr 2,
- c) inżynieria chemiczna i procesowa, studia drugiego stopnia – stanowi załącznik nr 3,
- d) nanotechnologia, studia pierwszego stopnia – stanowi załącznik nr 4,
- e) nanotechnologia, studia drugiego stopnia – stanowi załącznik nr 5,
- f) technologia chemiczna, studia pierwszego stopnia – stanowi załącznik nr 6,
- g) technologia chemiczna, studia drugiego stopnia – stanowi załącznik nr 7;

2) od roku akademickiego 2021/2022:

- a) technologia chemiczna, studia pierwszego stopnia – stanowi załącznik nr 8,
- b) technologia chemiczna, studia drugiego stopnia – stanowi załącznik nr 9,
- c) inżynieria materiałów i nanomateriałów, studia pierwszego stopnia – stanowi załącznik nr 10,
- d) inżynieria materiałów i nanomateriałów, studia drugiego stopnia – stanowi załącznik nr 11;

3) od roku akademickiego 2022/2023 – inżynieria w medycynie, studia pierwszego stopnia – stanowi załącznik nr 12.

§ 3.

W zarządzeniu nr 94 Rektora Zachodniopomorskiego Uniwersytetu Technologicznego w Szczecinie z dnia 6 listopada 2019 r. w sprawie opisu efektów uczenia się w tłumaczeniu na język angielski dla poszczególnych kierunków studiów prowadzonych w ZUT (z późn. zm.) uchyla się § 1 pkt 10 oraz załącznik nr 10 – Kierunki Wydziału Technologii i Inżynierii Chemicznej.

§ 4.

Zarządzenie wchodzi w życie z dniem podpisania.

W zastępstwie Rektora

prof. dr hab. inż. Jacek Przepiórski
prorektor ds. nauki

Programme of studies: *chemistry***Level of qualification:** first cycle studies**Educational profile:** general academic**Fields of science:** Natural sciences**Discipline of science:** chemical sciences (100%)**Name of qualification (Title conferred):** inżynier**Description of the planned educational effects**

Code	Learning outcome for programme of studies
Knowledge	
KCh_1A_W01	Has organised knowledge within the scope of chemistry. Knows the basic concepts and theories of chemistry. Knows the terminology, nomenclature and units of chemistry.
KCh_1A_W02	Knows the techniques of higher mathematics within the scope necessary for quantitative description and for understanding and modelling basic chemical phenomena and processes.
KCh_1A_W03	Knows chemical and physical phenomena occurring in nature and can provide an explanation for observed regularities with the help of the language of mathematics, and, in particular, can independently recreate basic laws and theorems.
KCh_1A_W04	Is familiar with computational and statistical methods used in solving typical problems within the scope of chemistry and knows how to apply suitable computational methods and computer software in their solutions; Knows the fundamentals of programming and of software engineering.
KCh_1A_W05	Knows the basic aspects of the structure and the operation of scientific instruments in a chemical laboratory.
KCh_1A_W06	Knows the basic principles of occupational health and safety in a chemical laboratory. Knows the principles of the use of chemical substances and their neutralization.
KCh_1A_W07	Has basic knowledge of the legal and the ethical aspects of scientific and academic activity.
KCh_1A_W08	Knows and understands the basic concepts and principles within the scope of industrial and intellectual property protection. Can use patent information resources.
KCh_1A_W09	Knows the general principles of creation and development of forms of the individual enterprise that uses knowledge within the scope of chemistry, Has basic knowledge of management, including quality and business operations management.
KCh_1A_W10	Has basic knowledge of the life cycle of technical devices, structures, and systems used in a chemical laboratory and the chemical industry.
KCh_1A_W11	Knows basic methods, techniques, tools, and materials used in solutions of simple engineering tasks within the scope of chemistry.
KCh_1A_W12	Has basic knowledge necessary for understanding social, economic, legal, and other non-technical determinants of engineering practices.

Code	Learning outcome for programme of studies
KCh_1A_W13	Knows the typical engineering technologies used in a chemical laboratory and the chemical industry.
Skills	
KCh_1A_U01	Can analyse problems within the scope of chemistry, in particular problems of utilitarian character and find solutions on the basis of familiar theorems and methods.
KCh_1A_U02	Can carry out quantitative analysis, in particular with the use of chemical and physical methods, as well as use them as a basis for formulation of qualitative conclusions.
KCh_1A_U03	Can plan and carry out simple experimental research and computer simulations within the scope of chemistry, interpret obtained results and formulate conclusions
KCh_1A_U04	Can use numerical and analytical methods to formulate tasks, solve mathematical and engineering problems, and analyse obtained measurement data. Can use basic software packages and selected and selected programming languages.
KCh_1A_U05	Can evaluate the existing technical solutions within the scope of chemistry and prepare a study of a given engineering problem related to their functionality and suggest potential solutions.
KCh_1A_U06	Can present basic chemical concepts and problems in a comprehensible way.
KCh_1A_U07	Can self-educate for the purpose of improving own professional competences, among others.
KCh_1A_U08	Can prepare typical essays in Polish and English or German about selected topics within the scope of chemistry and related disciplines on the basis of a variety of sources and using basic theoretical approaches.
KCh_1A_U09	Can prepare oral presentation in Polish and English or German about selected topics within the scope of chemistry and related disciplines on the basis of a variety of sources and using basic theoretical approaches.
KCh_1A_U10	Can communicate in English or German within the scope necessary for using specialized literature within the area of chemistry and related sciences in accordance with the requirements specified for B2 Level of Common European Framework of Reference for Languages.
KCh_1A_U11	While formulating and solving engineering tasks within the scope of chemistry, can identify their systemic and non-technical aspects.
KCh_1A_U12	Can carry out a preliminary economic analysis of engineering tasks undertaken within the scope of chemistry.
KCh_1A_U13	Can carry out a critical analysis of the form of operation and evaluate the existing technical solutions used in a chemical laboratory and the chemical industry.
KCh_1A_U14	Can identify and formulate a specification of simple, practically-oriented engineering tasks within the scope of chemistry
KCh_1A_U15	Can evaluate the suitability of basic measurement instrument and routine methods used for solving simple, practically-oriented engineering tasks in the area of chemistry, as well as identify and implement the correct solution.

Code	Learning outcome for programme of studies
KCh_1A_U16	On the basis of given specifications, can design a simple instrument set, a structure, a system or a process used for carrying out of typical chemical transformations and operations, as well as use the suitable methods in order to build essential devices and carry out a planned process.
Social competences	
KCh_1A_K01	Understands the need for continuing education and improving own professional and personal competences and motivates colleagues to do so.
KCh_1A_K02	Assumes the responsibility for completion of entrusted tasks, engaging in team work and cooperation and assuming various roles within the team.
KCh_1A_K03	Can appropriately set priorities for execution of own task and of tasks formulated by others.
KCh_1A_K04	Being aware of the environmental impact of own activities, can correctly identify and resolve the dilemmas associated with the profession of a chemical engineer and accepts the responsibility for own occupational safety and safety of others.
KCh_1A_K05	Understands the social aspects of the practical application of the acquired knowledge and skills and the resulting responsibility for own decisions. is aware of the importance of and understands the non-technical aspects and consequences of engineering work, including its environmental impact.
KCh_1A_K06	Can think and act in an entrepreneurial way.

Programme of studies: *chemical and process engineering***Level of qualification:** first cycle studies**Educational profile:** general academic**Fields of science:** Engineering and technology**Discipline of science:** chemical engineering (100%)**Name of qualification (Title conferred):** inżynier**Description of the planned educational effects**

Code	Learning outcome for programme of studies
Knowledge	
ICHP_1A_W01	Has knowledge within the scope of higher mathematics necessary for description and analysis of engineering problems, modelling and calculations within the scope of chemical and process engineering.
ICHP_1A_W02	Has knowledge within the scope of physics necessary for understanding basic physical phenomena and processes.
ICHP_1A_W03	Has knowledge within the scope of chemistry encompassing the foundations of general and inorganic chemistry, organic chemistry, physical and analytical chemistry, applicable in solving basic tasks within the scope of chemical and process engineering.
ICHP_1A_W04	Has knowledge within the scope of electronic engineering and electrotechnology, automation and industrial surveying, information technology and computer graphics
ICHP_1A_W05	Knows principles of environmental protection and waste management.
ICHP_1A_W06	Has basic knowledge within the scope of product and quality engineering.
ICHP_1A_W07	Has basic knowledge within the scope of chemical technology.
ICHP_1A_W08	Has organised and theoretically well-founded general knowledge within the scope of chemical and process engineering and chemistry.
ICHP_1A_W09	Has organised and theoretically well-founded knowledge of the key areas of the chemical and process engineering major such as: - Unit operations and processes - Transfer and balancing of mass, momentum and energy
ICHP_1A_W10	Has organised and theoretically well-founded knowledge of the kinetics of physical and chemical changes, thermodynamics, and chemical reactors engineering.

Code	Learning outcome for programme of studies
ICHP_1A_W11	Has knowledge within the scope of machine engineering and chemical industry instruments and related industries, as well as the foundations of instrument and process design.
ICHP_1A_W12	Has specific knowledge of selected topics within the scope of chemical and process engineering and chemistry.
ICHP_1A_W13	Has knowledge of the current state of art and latest development trends of chemical and process engineering and related disciplines on national and international level.
ICHP_1A_W14	Has basic knowledge of the life cycle of products, devices and installations in the chemical industry and related industries.
ICHP_1A_W15	Knows basic methods, techniques, tools, and materials used in solutions of simple engineering tasks within the scope of chemical and process engineering.
ICHP_1A_W16	Has knowledge necessary for understanding the non-technical aspects of engineering practices. Knows the basic principles of occupational health and safety applicable to the industrial sector.
ICHP_1A_W17	Has basic knowledge of management, including quality management, business operations, and technology transfer.
ICHP_1A_W18	Has elementary knowledge within the scope of intellectual property protection and patent protection.
ICHP_1A_W19	Knows the general principles of creation and development of the forms of individual enterprise.
ICHP_1A_W20	Knows the functioning of typical processes in chemical and process engineering.
Skills	
ICHP_1A_U01	Can obtain information from literature, databases, and other sources related to chemical and process engineering and other related disciplines. Can integrate and interpret obtained information, as well as formulate conclusions, formulate opinions and provide satisfactory justification.
ICHP_1A_U02	Can communicate in the professional environment and other settings by means of a variety of communication techniques, also in a foreign language.
ICHP_1A_U03	Can prepare a well-documented a study of problems within the scope of chemical and process engineering in Polish and in a foreign language, can create documentation of execution of an engineering task.
ICHP_1A_U04	Can prepare an oral presentation within the scope of chemical and process engineering and related fields in Polish or a foreign language and using technical terminology.
ICHP_1A_U05	Can self-educate for the purpose of improving own professional competences, among others.
ICHP_1A_U06	Has a B2 level competence in English and a foreign language in accordance with The Common European Framework for Reference for Languages, in particular within the scope of chemical and process engineering.
ICHP_1A_U07	Can use computer software (text and presentation editors, spreadsheets, databases) supporting the completion of basic engineering tasks.
ICHP_1A_U08	Can plan and carry out process experiments including measurements and computer simulations, as well as interpret obtained results and formulate conclusions.

Code	Learning outcome for programme of studies
ICHP_1A_U09	Can use analytical, numerical and experimental methods to formulate and solve engineering tasks.
ICHP_1A_U10	On the basis of general knowledge, can explain the basic phenomena related to important processes in chemical and process engineering.
ICHP_1A_U11	Can identify the systemic and non-technical aspects when formulating and solving engineering tasks.
ICHP_1A_U12	Can enforce basic legal regulations and comply with occupational health and safety principles applicable in the industrial sector. Can assess hazards related to the application of chemical products and processes.
ICHP_1A_U13	Can carry out a preliminary economic analysis of undertaken engineering tasks.
ICHP_1A_U14	Can use the acquired knowledge for critical analysis and evaluation of the execution method, particularly within the scope of chemical and process engineering, the existing technical solutions, in particular processes, devices, instrument, installations, structures, and systems.
ICHP_1A_U15	Can identify and formulate a specification of simple and practically-oriented engineering tasks, characteristic for area u chemical and process engineering.
ICHP_1A_U16	Can evaluate the suitability of routine methods and tools used for solving a simple practically-oriented engineering task characteristic for chemical and process engineering, choose and apply the correct execution method and select the suitable tools.
ICHP_1A_U17	Can design and execute a simple device and instrument, object, process or system, typical for chemical and process engineering, using the correct methods, techniques and tools.
Social competences	
ICHP_1A_K01	Understands the need for continuing education and improving own professional and personal competences and motivates colleagues to do so.
ICHP_1A_K02	Is aware of the importance of and understands the non-technical aspects and consequences of engineering practices, including their environmental impact and the resulting liability for own decisions.
ICHP_1A_K03	Can cooperate and work in a team and assume the role of the team leader or manager; can estimate the time required for completion of a commissioned task.
ICHP_1A_K04	Can set the priorities as regards the completion of own tasks and those of other group members in order to meet set targets.
ICHP_1A_K05	Can manage own professional development by taking decisions and solving problems, including interpersonal and related to performed work.
ICHP_1A_K06	Can think and act in a creative, innovative and entrepreneurial way.
ICHP_1A_K07	Understands the need for informing the public, by means of mass media among others, about the matters related to manufacturing activity and can provide such information in a comprehensible way.

Programme of studies: *chemical and process engineering*

Level of qualification: second cycle studies

Educational profile: general academic

Fields of science: Engineering and technology

Discipline of science: chemical engineering (100%)

Name of qualification (Title conferred): magister inżynier

Description of the planned educational effects

Code	Learning outcome for programme of studies
Knowledge	
ICHP_2A_W01	Has advanced and in-depth knowledge of mathematics, necessary for formulation and solution of complex tasks within the scope of chemical and process engineering processes.
ICHP_2A_W02	Has advanced and in-depth knowledge of physics necessary for formulation of models of operations, processes, and systems related to chemical and process engineering.
ICHP_2A_W03	Has advanced and in-depth knowledge of chemistry necessary for formulation and experimental verification of physical models and processes and with chemical transformation within the scope of chemical and process engineering.
ICHP_2A_W04	Has advanced, in-depth, and detailed knowledge of comprehensive analysis of mathematical models pertaining to the operations and processes of chemical engineering necessary for formulation and execution of complex engineering tasks, including design concepts.
ICHP_2A_W05	Has organised and theoretically-founded general knowledge of the key operations and processes within the scope of the selected specialization of chemical and process engineering.
ICHP_2A_W06	Has theoretically-founded and detailed knowledge of the key areas of chemical and process engineering within the scope of the selected specialization.
ICHP_2A_W07	Has knowledge of the development trends occurring in industrial processes related to chemical engineering operations and processes and to the selected specialization.
ICHP_2A_W08	Has basic knowledge about the lifetime of devices, structures, systems and products in manufacturing processes.
ICHP_2A_W09	Has in-depth knowledge about the methods, techniques, tools, and materials used in solutions of complex engineering tasks within the scope of the selected specialization.
ICHP_2A_W10	Has knowledge necessary for understanding the non-technical aspects of engineering practices and for taking them into account in engineering work.

Code	Learning outcome for programme of studies
ICHP_2A_W11	Knows and understands the basic concepts and principles of protection of industrial property and copyright, as well as the need for management of intellectual property resources. Can use patent information resources.
ICHP_2A_W12	Has basic knowledge within the scope of business operations, management, including quality management.
Skills	
ICHP_2A_U01	Can critically evaluate and obtain information from literature, databases, and other sources, also in a foreign language, as well as use it to formulate comprehensive opinions and reports.
ICHP_2A_U02	Can communicate in the professional environment and in other settings, also in a foreign language, within the scope of chemical and process engineering.
ICHP_2A_U03	Can draw up a scientific study in Polish and a brief scientific report in a foreign language presenting the results of scientific research within the scope of the selected specialization.
ICHP_2A_U04	Can prepare and deliver in Polish and in a foreign language, an oral presentation concerning specific topics within the scope of chemical and process engineering.
ICHP_2A_U05	Can determine the directions of continuing education and complete the self-education process.
ICHP_2A_U06	Can communicate in a foreign language, in particular within the scope of chemical and process engineering, in accordance with the requirements specified for B2+ level of The Common European Framework for Reference for Languages.
ICHP_2A_U07	Can use the suitable ICT techniques in execution of tasks typical for engineering practices.
ICHP_2A_U08	Can plan and carry out experiments, including computer measurements and simulations, as well as interpret obtained results and formulate conclusions
ICHP_2A_U09	Can use analytical, simulation, and experimental methods to formulate and solve engineering tasks and simple research problems.
ICHP_2A_U10	When formulating and solving engineering problems, can integrate the acquired knowledge within the scope of chemistry, chemical and process engineering, environmental protection, and specialised courses, as well as apply a systemic approach, also taking into account the non-technical aspects.
ICHP_2A_U11	Can verify suggested engineering solutions against the current state of the art of chemical and processing engineering, and in particular within the scope of the selected specialization.
ICHP_2A_U12	Can assess the suitability and the potential applications of new processes, research methods, technical solutions within the scope of the selected specialization.
ICHP_2A_U13	Possesses the skills necessary for work in the industrial environment and in research teams. Knows and complies with the principles of occupational health and safety applicable to the work environment.
ICHP_2A_U14	Can carry out a preliminary economic analysis of undertaken engineering practices.

Code	Learning outcome for programme of studies
ICHP_2A_U15	Can apply the acquired knowledge in critical analysis and assessment of the performance of technical solutions used and executed in processes within the scope of the selected specialization.
ICHP_2A_U16	Can verify existing technical solutions and suggest technical improvements and process optimization.
ICHP_2A_U17	Can analyse simple and complex engineering tasks, characteristic for the selected specialization, including non-typical tasks, taking into account their non-technical aspects.
ICHP_2A_U18	Can evaluate the suitability of methods and tools used in engineering task solutions taking into account the practical aspects within the scope of the selected specialization. Can use scientific research within the scope of chemical and process engineering and related areas.
ICHP_2A_U19	Can design a simple and a complex device, in accordance with specifications and taking into account the non-technical aspects and its process performance within the scope of the selected specialization, using suitable methods, techniques, and tools, as well as adapting the existing tools or developing new tools towards this end.
Social competences	
ICHP_2A_K01	Is aware of the need for continuous education and professional advancement. Can inspire and organise the education process of others.
ICHP_2A_K02	Is aware of the importance of and understands the non-technical aspects and consequences of engineering practices, including their environmental impact and the resulting liability for own decisions.
ICHP_2A_K03	Complies with all the rules of team work. Is aware of the responsibility for joint projects and achievements in professional work.
ICHP_2A_K04	Can appropriately define priorities for execution of own task or of a task formulated by others.
ICHP_2A_K05	Can correctly identify and solve the dilemmas related to professional practice.
ICHP_2A_K06	Can think and act in a creative, innovative, and entrepreneurial way.
ICHP_2A_K07	Is aware of the social role of a technical university graduate, and in particular understands the need for formulation and dissemination, especially by mass media, of information and opinions concerning the technological accomplishments, as well as other aspects of engineering practices. Undertakes efforts in order to disseminate such information and opinions in a generally comprehensible way.

Programme of studies: *nanotechnology***Level of qualification:** first cycle studies**Educational profile:** general academic**Fields of science:** Engineering and technology**Discipline of science:** materials engineering (100%)**Name of qualification (Title conferred):** inżynier**Description of the planned educational effects**

Code	Learning outcomes for programme of studies nanotechnology
Knowledge	
Nano_1A_W01	Has knowledge within the scope of mathematics including the issues of mathematical analysis, algebra and elements of applied mathematics necessary to understand the quantitative description of nanotechnological and chemical phenomena and processes as well as to model technical phenomena and processes.
Nano_1A_W02	Has systematic, theory-based, general knowledge within the scope of physical, inorganic, organic and analytical chemistry, biotechnology, physics and their technical applications necessary for understanding and describing basic physical phenomena as well as understanding the role of physics in various areas of technology and nanotechnology.
Nano_1A_W03	Has basic knowledge within the scope of electrical engineering, electronics and metrology necessary to formulate and solve simple tasks in technology and nanotechnology.
Nano_1A_W04	Has knowledge within the scope of matter structure, mechanisms of chemical processes and their application in nanotechnology of producing modern materials.
Nano_1A_W05	Has detailed knowledge related to issues in modern physics necessary to understand basic physical mechanisms and to use physical knowledge in nanotechnology.
Nano1A_W06	Has basic knowledge within the scope of computer techniques, including programming methodology and techniques, computer graphic as well as operation and maintenance of IT tools necessary in nanotechnology.
Nano_1A_W07	Has knowledge of the directions of development in chemical industry in Poland and abroad as well as of waste management.
Nano_1A_W08	Has knowledge within the scope of techniques and methods of identification and characteristics of nanomaterials as well as knowledge of raw materials, products and processes used in chemical industry related to nanotechnology.
Nano_1A_W09	Has basic knowledge of the directions of development and applications of physics in selected technical and technological issues.

Code	Learning outcomes for programme of studies nanotechnology
Nano_1A_W10	Has basic knowledge of the life cycle of materials as well as the principles of functioning of instruments, devices and systems using methods of chemical technology and technical physics, in particular within the aspect of manufacturing nanomaterials.
Nano_1A_W11	Knows basic methods, techniques, tools, materials and nanomaterials for designing, modelling, simulation and manufacturing of technical instruments and devices as well as solving simple technical and research issues with their use.
Nano_1A_W12	Has basic knowledge concerning professional ethics within the scope of performance quality as well as the principles of operation of technical devices and the basics of OHS.
Nano_1A_W13	Has general knowledge necessary to understand social, economic, legal and non-technical conditions of engineering activity.
Nano_1A_W14	Has basic knowledge concerning management, including quality management, conducting business activity and transfer of technologies.
Nano_1A_W15	Has elementary knowledge within the scope of intellectual property protection, copyrights and patent law.
Nano_1A_W16	Knows general principles of establishing and developing of individual entrepreneurship forms as well as conducting business activity.
Skills	
Nano_1A_U01	Is able to obtain information from literature, data bases and other properly selected sources, also in English or another foreign language considered to be a language of international communication within the scope of nanotechnology, nanomaterials, chemistry, materials engineering and related sciences; is able to integrate the obtained information, interpret it as well as draw conclusions, formulate and justify opinions.
Nano_1A_U02	Is able to communicate with the use of various techniques with professionals and others, also in English or another foreign language considered to be a language of international communication within the scope of nanotechnology and nanomaterials.
Nano_1A_U03	Is able to prepare, in Polish and a foreign language considered to be basic for the fields of science and scientific disciplines appropriate for nanotechnology, a well-documented study of problems within the scope nanotechnology and nanomaterials.
Nano_1A_U04	Is able to prepare and present, in Polish and a foreign language, an oral presentation concerning detailed issues related to the subject matter of the curriculum content.
Nano_1A_U05	Has the ability to learn, e.g. to raise professional competences.
Nano_1A_U06	Uses English (or another foreign language) in compliance with the requirements specified for B2 level of the European Framework of Reference, in an extent necessary to understand technical instructions, articles, student's books in the area of exact sciences, in particular within the scope of nanotechnology and nanomaterials.
Nano_1A_U07	Is able to use typical IT tools for designing, modelling and computer simulations of selected chemical, physical and technical issues.
Nano_1A_U08	Is able to plan and conduct chemical experiments, interpret and present the obtained results and draw conclusions.
Nano_1A_U09	Is able to identify physical and chemical problems in natural phenomena and technological processes as well as use physico-chemical research methodology (experimental results, simulations) to formulate and solve engineering tasks.
Nano_1A_U10	Is able to select analytical methods and instruments appropriate for conducted laboratory tests as well as conduct a critical analysis of the manners of their use and evaluate the existing technical solutions, including the devices, facilities, systems, processes and services.
Nano_1A_U11	Is able to use the experimental methods, computer simulations and theoretical models learned to analyse and solve engineering problems.

Code	Learning outcomes for programme of studies nanotechnology
Nano_1A_U12	Is able to notice environmental, economic and social consequences of specific technical solutions and knows the rules of occupational health and safety.
Nano_1A_U13	Is able to assess the risks related to using chemical and physical products and processes and apply the rules of occupational health and safety.
Nano_1A_U14	Is able to determine the physical and chemical properties of chemical compounds, in particular nanomaterials, with the use of appropriate research techniques.
Nano_1A_U15	Is able to estimate initially the costs of a planned engineering task.
Nano_1A_U16	Based on the analysis of an existing process, is able to propose its modernisation leading to improvement of economic and environmental indexes.
Nano_1A_U17	Is able to design a simple technological process, in compliance with a predefined specification, characteristic for the specialisation completed and evaluate its correctness with the use of appropriate methods, techniques and devices.
Social competences	
Nano_1A_K01	Understands the need of raising his/her qualifications; understands constant adaptation of his/her knowledge and skills to changes occurring in technology and nanotechnology; is able to organise the process of gaining knowledge by other people and encourage them to independent work.
Nano_1A_K02	Has the awareness of non-technical consequences of using nanotechnology and nanomaterials, with particular inclusion of the influence on the environment and the human body; understands the importance of responsibility for the decisions taken.
Nano_1A_K03	Is able to work in a team; understands the responsibility for the actions of his/her own and other people.
Nano_1A_K04	Is able to determine the priority tasks properly used for accomplishment of other tasks set alone or by others as well as aim at their accomplishment; is able to adjust the actions to unexpected problems.
Nano_1A_K05	Understands the principles of professional ethics; properly evaluates the contribution of team members to the achievement of results; is aware of and appreciates the importance of intellectual honesty in the job performed.
Nano_1A_K06	Is able to think and act in an enterprising manner.
Nano_1A_K07	Understands the need to communicate to the society, e.g. through mass media, information on the latest achievements in nanotechnology as well as the benefits and problems related to them; is able to communicate such information in a generally understandable manner.

Programme of studies: *nanotechnology*

Level of qualification: second cycle studies

Educational profile: general academic

Fields of science: Engineering and technology

Discipline of science: materials engineering (100%)

Name of qualification (Title conferred): magister inżynier

Description of the planned educational effects

Code	Learning outcomes for programme of studies nanotechnology
Knowledge	
Nano_2A_W01	Has advanced and in-depth knowledge within the scope of mathematics, with mathematical methods of computer modelling, chemistry and chemical technology for solving complex tasks within the scope of the specialisation completed.
Nano_2A_W02	Has detailed knowledge on materials, nanomaterials, products and processes used in chemical industry, in particular related to the specialisation completed, as well as within the scope of selected issues in physics and engineering as well as chemical technology concerning modern materials, nanomaterials and biomaterials.
Nano_2A_W03	Has detailed knowledge within the scope of using specialist measurement procedures, electronic measurement devices and computer measurement systems in technology, nanotechnology and nanobiotechnology.
Nano_2A_W04	Has advanced and systematic knowledge within the scope of modern materials engineering and spectroscopy/microscopy of nanomaterials and nanobiomaterials.
Nano_2A_W05	Has advanced and systematic knowledge on developmental trends and the most significant new achievements within the scope of nanotechnology.
Nano_2A_W06	Has advanced knowledge on developmental trends in designing and manufacturing materials, including nanomaterials and nanobiomaterials.
Nano_2A_W07	Knows basic measurement, calculation and multimedia technique used in manufacturing and analysis of products included in the curriculum of the selected specialisation.
Nano_2A_W08	Has basic knowledge concerning management, including quality and production management as well as conducting business activity and organization of workplace.
Nano_2A_W09	Knows and understands the concepts and rules within the scope of industrial property protection and copyrights as well as the necessity of managing intellectual property resources; is able to use patent information resources.

Code	Learning outcomes for programme of studies nanotechnology
Skills	
Nano_2A_U01	Is able to obtain information from literature, data bases and other properly selected sources, also in English or another foreign language considered to be a language of international communication within the scope of nanotechnology, nanomaterials, nanobiomaterials, physics, chemistry, materials engineering and related sciences; is able to select it in a critical manner, interpret and integrate it with previous knowledge.
Nano_2A_U02	Is able to communicate with the use of various techniques with professionals and others, also in English or another foreign language considered to be a language of international communication within the scope of nanotechnology and nanobiotechnology.
Nano_2A_U03	Based on literature data and his/her own scientific research, is able to prepare a scientific study (publication) in Polish and a short scientific report in English within the scope of the issues appropriate for nanotechnology.
Nano_2A_U04	Is able to prepare and present, in Polish and English, oral presentations concerning detailed issues related to the subject matter of the curriculum content.
Nano_2A_U05	Is able to determine the directions of further learning and make use of the process of self-education in his/her workplace.
Nano_2A_U06	Has language skills, within the scope of the fields of science and scientific disciplines appropriate for nanotechnology, in compliance with the requirements specified for B2+ level of the European Framework of Reference in an extent sufficient for communicating and reading specialist literature, technical documentation, articles and student's books with understanding.
Nano_2A_U07	Is able to use specialist measurement methods and procedures within the scope of chemical technology, physics and nanotechnology to plan a complex laboratory experiment as well as interpret the obtained results and draw conclusions.
Nano_2A_U08	Is able to select analytic methods and instruments appropriate for conducted laboratory tests through integration of the obtained knowledge.
Nano_2A_U09	Is able to assess the usefulness and usability as well as operate a complex, modern measuring device with the use of electronic measuring systems and advanced IT tools.
Nano_2A_U10	While formulating and solving engineering tasks, is able to integrate the knowledge obtained within the scope of chemical and process engineering, chemical technology, technical physics and specialisation subjects, to use a systemic approach, including non-technical aspects.
Nano_2A_U11	Is able to perceive and evaluate critically the systemic and non-technical consequences, including environmental, economic and social ones, of the introduction of specific technical solutions on an advanced level within the scope of his/her specialisation.
Nano_2A_U12	Is able to evaluate the scope of usability of the research methods and technologies studied as well as new solutions in industrial conditions.
Nano_2A_U13	Is able to notice faults and propose improvements of the existing technical solutions as well as design and implement (at least in part) a new project or engineering task using appropriate methods, techniques and tools.
Nano_2A_U14	Has the ability to select chemical reactions, laboratory techniques and engineering solutions for performance of specific tasks within the scope of the specialisation completed with a varied degree of difficulty.
Nano_2A_U15	Is able to prepare a complex physicochemical characteristics of nanomaterials based on the knowledge obtained in the area of physics, chemistry and materials engineering.

Code	Learning outcomes for programme of studies nanotechnology
Social competences	
Nano_2A_K01	Is able to develop and expand alone his/her knowledge on the issues related to nanotechnology, nanomaterials and nanobiomaterials as well as problems included in other engineering and non-engineering specialisations; is able to conduct and organise seminars and trainings as well as show others the sources of specialist information.
Nano_2A_K02	Knows the influence of the implemented techniques and technologies on the natural environment, the health of employees, users and other people as well as the legal consequences of this influence; is able to use the idea of sustainable development in practice.
Nano_2A_K03	Is able to work in research and production teams and, if necessary, to take the function of a leader; is able to estimate the time necessary for the accomplishment of an assigned task; is able to prepare and comply with the schedule of work that guarantees meeting deadlines.
Nano_2A_K04	Has the awareness of the social importance of knowledge in the society in the field of natural and technical sciences; presents various aspects of their use with particular focus on nanotechnology and its achievements; is able to present a problem including various points of view.

Programme of studies: *chemical technology*

Level of qualification: first cycle studies

Educational profile: general academic

Fields of science: Engineering and technology

Discipline of science: chemical engineering (100%)

Name of qualification (Title conferred): inżynier

Description of the planned educational effects

Code	Learning outcomes for programme of studies chemical technology
Knowledge	
TCh_1A_W01	Has knowledge of mathematics within the scope that enables the use of mathematical methods for describing chemical operations and processes in chemical technology as well as making calculations needed in practical engineering solutions.
TCh_1A_W02	Has knowledge of physics within the scope that enables understanding of physical phenomena and processes.
TCh_1A_W03	Has knowledge within the scope of chemistry necessary to understand the quantitative description of chemical phenomena and laws as well as technological processes.
TCh_1A_W04	Has knowledge within the scope of basic materials science and corrosion that enables selection of materials used for constructing chemical instruments and installations.
TCh_1A_W05	Has knowledge within the scope of electrical engineering, electronics, automation and IT within the scope necessary for solving and formulating of simple tasks and calculations connected with chemical technology.
TCh_1A_W06	Has knowledge within the scope of environmental protection connected with chemical production and related industries as well as waste and semi-product management.
TCh_1A_W07	Has systematic, theory-based general knowledge within the scope of general, inorganic, organic, physical and analytical chemistry.
TCh_1A_W08	Has well-established knowledge within the scope of kinetics and catalysis of chemical processes as well as thermodynamics.
TCh_1A_W09	Has knowledge within the scope of methods of identifying, determining the composition and characterising of chemical industry products.
TCh_1A_W10	Has knowledge within the scope of construction of chemical reactors and instruments used in chemical industry.
TCh_1A_W11	Has knowledge of raw materials in chemical industry and the related processes used in their processing into usable products.
TCh_1A_W12	Has knowledge of chemical engineering, theory of machines and operation of chemical industry instruments.
TCh_1A_W13	Has knowledge of developmental trends in chemical industry.
TCh_1A_W14	Has basic knowledge within the scope of water and sewage technology.

Code	Learning outcomes for programme of studies chemical technology
TCh_1A_W15	Knows basic methods, techniques, tools and materials used for solving simple engineering tasks connected with chemical technology.
TCh_1A_W16	Has general knowledge necessary to understand social, economic, legal and non-technical aspects of engineering activity.
TCh_1A_W17	Has basic knowledge concerning management, including quality management, conducting business activity and transfer of technologies.
TCh_1A_W18	Has elementary knowledge within the scope of intellectual property protection, patent law and patent information.
TCh_1A_W19	Has knowledge of basic processes of industrial chemical synthesis and technical safety.
TCh_1A_W20	Has knowledge within the scope of separating mixtures, in particular with membrane methods.
TCh_1A_W21	General knowledge within the scope of culture and art.
Skills	
TCh_1A_U01	Is able to obtain literature information from data bases and other sources related to chemical and physical sciences; is able to integrate the obtained information, interpret it, draw proper conclusions and formulate opinions together with their justification.
TCh_1A_U02	Is able to communicate with the use of various techniques with professionals and others also in at least one foreign language of the following: English, French, German or Russian.
TCh_1A_U03	Is able to prepare, in Polish and at least one foreign language of the following: English, French, German or Russian, a well-documented study of problems within the scope of chemical technology; is able to develop, in compliance with the applicable regulations, technical documentation of a process within the scope of the specialisation completed as well as cooperate on preparation of engineering documentation with specialists in other areas.
TCh_1A_U04	Is able to prepare oral presentations concerning detailed issues within the scope of chemical technology, in Polish and at least one foreign language of the following: English, French, German or Russian.
TCh_1A_U05	Has the ability to learn on his/her own.
TCh_1A_U06	Has the ability to use one foreign language of the following: English, French, German or Russian on B2 level of the European Framework of Reference, within the scope of chemical technology, including also the ability to use technical vocabulary within the specialisation completed.
TCh_1A_U07	Is able to use computer programmes supporting the accomplishment of tasks typical for engineering activity within the scope of chemical technology.
TCh_1A_U08	Is able to plan and conduct chemical experiments, interpret the obtained results and draw proper conclusions.
TCh_1A_U09	Is able to use simulators supporting chemical determinations as well as experimental and engineering works in chemical technology (ChemCAD).
TCh_1A_U10	Is able to use the knowledge of mathematics and IT to formulate and solve simple engineering tasks within the scope of chemical technology.
TCh_1A_U11	Is able to use basic methods of experiment planning as well as various experimental and analytic methods for solving engineering tasks within the scope of chemical technology.
TCh_1A_U12	Is able to notice systemic and non-technical aspects of the performed engineering tasks.
TCh_1A_U13	Is able to use basic legal regulations and comply with the rules of occupational safety applicable in chemical industry.
TCh_1A_U14	Is able to assess risks related to using raw materials and products of chemical industry as well as dangers occurring while conducting chemical processes.
TCh_1A_U15	Is able to perform an initial evaluation of the economic effects of modernization engineering activities related to the operation of chemical technology processes.

Code	Learning outcomes for programme of studies chemical technology
TCh_1A_U16	Is able to use the obtained knowledge for critical analysis and evaluation of the functioning of instruments and existing technical solutions in chemical technology processes.
TCh_1A_U17	Is able to determine the physical and chemical properties of chemical compounds and materials used in chemical technology.
TCh_1A_U18	Is able to foresee the reactivity of chemical compounds based on their construction as well as calculate the thermal effects of chemical reactions and processes.
TCh_1A_U19	Has the ability to select chemical reactions to conduct specific technological processes and perform tasks within the scope of chemical technology, in particular within the scope of the specialisation completed.
TCh_1A_U20	Is able to use basic analytic and laboratory technique methods for analysis, synthesis, separation and purification of chemical compounds used in chemical technology, in particular within the scope of the specialisation completed.
TCh_1A_U21	Is able to use technological principles in developing new solutions within the scope of chemical technology.
TCh_1A_U22	Based on the analysis of the existing process, is able to propose changes and modernisation, improving economic indexes and environmental impact.
TCh_1A_U23	Is able to design and use tools and methods included in a test stand for evaluation of physico-chemical properties of substances in a technological process, depending on the specialisation completed.
TCh_1A_U24	Is able to design a simple technological process consisting of unit operations and processes as well as to evaluate its functioning with the use of appropriate methods and tools.
Social competences	
TCh_1A_K01	Understands the need of learning and raising professional and personal competences.
TCh_1A_K02	Is able to cooperate in a group within the scope of organising self-education.
TCh_1A_K03	Is aware of their importance and understands non-technical aspects and consequences of engineering activity, including its influence on the environment.
TCh_1A_K04	Has full awareness of the responsibility for professional decisions taken.
TCh_1A_K05	Is able to use the ideas of sustainable development in practice.
TCh_1A_K06	Is able to work in a group, being aware of the influence of his/her own actions on the work effects of the whole team.
TCh_1A_K07	Is able to perform the function of a research team leader: to estimate the time necessary for accomplishment of an assigned task, to develop and implement a work schedule that guarantees meeting deadlines for accomplishment of the task.
TCh_1A_K08	Is able to determine the priorities used for performance of the tasks of his/her own or other team members in order to achieve the goal set.
TCh_1A_K09	Is able to identify and solve dilemmas related to job performance; is aware of the importance of professional behaviour and compliance with the rules of professional ethics.
TCh_1A_K10	Is able to act and think in an enterprising manner.
TCh_1A_K11	Understands the need to communicate to the society in an understandable manner, e.g. through mass media, information on positive and negative aspects of the activity related to production and use of chemical compounds.

Programme of studies: *chemical technology*

Level of qualification: second cycle studies

Educational profile: general academic

Fields of science: Engineering and technology

Discipline of science: chemical engineering (100%)

Name of qualification (Title conferred): magister inżynier

Description of the planned educational effects

Code	Learning outcomes for programme of studies chemical technology
Knowledge	
TCh_2A_W01	Has advanced knowledge in the area of biotechnology, organic and inorganic chemical technology as well as polymer technology, the scope of which is adjusted to formulating and solving complex tasks within the scope of the specialisation completed.
TCh_2A_W02	Has advanced knowledge within the scope of developing chemical process models, performing thermodynamic analysis, kinetic chemical process calculations as well as optimization.
TCh_2A_W03	Has detailed knowledge within the scope of issues related to chemical technology, including in particular such as: chemical reactors, intellectual property.
TCh_2A_W04	Has advanced knowledge within the scope of the influence of technological processes on the environment, the safety of industrial production and legal conditions within the scope of environmental dangers.
TCh_2A_W05	Depending on the specialisation completed, has detailed knowledge within the scope of issues directly related to this specialisation
TCh_2A_W06	Has systematic, theory-based general knowledge within the scope of inorganic, organic, polymer and chemical analytics technology.
TCh_2A_W07	Knows the fundamentals of surface phenomena occurring on the phase boundary in connection with homogeneous and heterogeneous catalysis.
TCh_2A_W08	Has systematic knowledge within the scope of techniques and methods of separation, identification and characteristics of chemical products, waste management, product processing and development of waste-free technologies.
TCh_2A_W09	Has advanced knowledge within the scope of mathematical description of a technological process, studying of the influence of technological parameters on the process speed, efficiency and selectivity of transformation into a desired product and by-products as well as the degree of conversion.
TCh_2A_W10	Has systematic, in-depth knowledge on raw materials, products and processes used in chemical industry within the scope connected with the specialisation completed.
TCh_2A_W11	Has theory-based, detailed knowledge on the issues of chemical technology of using raw materials, semi-products, auxiliary agents and products characteristic for the specialisation completed.

Code	Learning outcomes for programme of studies chemical technology
TCh_2A_W12	Has knowledge of directions of technological development, the most significant novelties within the scope of chemical technology, the life cycle of devices and objects as well as directions of development and progress related to the specialisation completed.
TCh_2A_W13	Has in-depth knowledge on the subject of methods, techniques, tools and materials used during implementation and conducting of technological processes as required by the specialisation completed.
TCh_2A_W14	Has in-depth knowledge of understanding social, economic, legal and other non-technical conditions of engineering activity as well as including them in the engineering practice and business activity.
TCh_2A_W15	Has knowledge of and understands the concepts and principles of intellectual property protection.
Skills	
TCh_2A_U01	Is able to obtain information from Polish and English literature, data bases and other sources connected with chemical technology and related sciences.
TCh_2A_U02	Is able to interpret and analyse the information obtained from literature as well as draw proper conclusions, is able to formulate opinions with their justification in Polish and in English within the scope of the specialisation completed.
TCh_2A_U03	Is able to communicate with other professionals with the use of various techniques in Polish and in English as well as in other groups of people in Polish and at least one of the following foreign languages: English, French, German or Russian.
TCh_2A_U04	Based on data from literature and own scientific research, is able to prepare, in Polish and in English, scientific publications within the scope of chemical technology, in compliance with publishers' requirements, in particular within the subject matter of the specialisation completed.
TCh_2A_U05	Is able to prepare and present, in Polish and in English, oral presentations concerning chemical technology issues within the scope of the specialisation completed.
TCh_2A_U06	Is able to determine alone the directions of self-education and further gaining of knowledge.
TCh_2A_U07	Is able to use English within the scope of technical vocabulary depending on the specialisation completed and has language skills within the scope of chemical technology on B2+ level of the European Framework of Reference, at least within the scope of one of the following languages: English, French, German or Russian.
TCh_2A_U08	Is able to use analytical and experimental methods to solve research problems within the scope of chemical technology, in particular within the specialisation completed.
TCh_2A_U09	Is able to integrate knowledge within the scope of chemistry, chemical technology, chemical and process engineering, environmental protection and specialisation subjects to formulate and solve engineering tasks.
TCh_2A_U10	Is able to assess the usefulness and usability of new technological developments and research methods within the scope of the specialisation completed.
TCh_2A_U11	Is able to use knowledge to analyse and evaluate the functionality of technical solutions used in various technological processes within the scope of the specialisation completed.
TCh_2A_U12	Is able to compare various technological solutions and propose their changes in order to reduce energy consumption, improve product quality or process efficiency.

Code	Learning outcomes for programme of studies chemical technology
TCh_2A_U13	Is able to develop methods of separating mixtures of reaction products and isolating chemical substances from natural resources, in particular with reference to chemical compounds and processes characteristic for the specialisation completed.
TCh_2A_U14	Is able to develop instrumental solutions, methodology of conducting syntheses of chemical compounds characteristic for the specialisation completed, to select process parameters based on the analysis of the process flow in a laboratory scale proportionally to the intended scale of industrial production.
TCh_2A_U15	Is able to give a compound a specific functional form and to perform formulation into other functional forms, in particular within the scope of the specialisation completed.
TCh_2A_U16	Has the ability to select laboratory techniques and engineering solutions to perform tasks, in particular within the scope of the specialisation completed.
TCh_2A_U17	Is able to present a concept of research methods to implement new technologies and perform it in a laboratory and pilot plant scale within the scope of the specialisation completed.
TCh_2A_U18	Is able to design and prepare, in a laboratory as well as pilot plant scale, a test stand to accomplish an engineering task within the scope of the specialisation completed.
TCh_2A_U19	Is able to assess the correctness and quality of existing test stands also with regard to occupational safety, in particular within the scope of the specialisation completed.
TCh_2A_U20	Is able to perform the economic analysis of undertaken engineering activities.
Social competences	
TCh_2A_K01	Is able to think and act in a creative and enterprising manner, is aware of the importance of non-technical aspects of engineering activity and responsibility for the decisions made.
TCh_2A_K02	Understands the need to communicate to the society, through popular science publications, press, radio and television, opinions concerning modern solutions within the scope of chemical technology, abandoning of old-fashioned technologies, the need to provide information on positive and negative aspects of the activity related to chemical technology.
TCh_2A_K03	Understands the need of life-long learning through individual and group work.
TCh_2A_K04	Properly identifies priorities and is able to solve dilemmas related to tasks performed alone or by others.

Programme of studies: *chemical technology*

Level of qualification: first cycle studies

Educational profile: general academic

Fields of science: Engineering and technology

Discipline of science: chemical engineering (100%)

Name of qualification (Title conferred): inżynier

Description of the planned educational effects

Code	Learning outcomes for programme of studies chemical technology
Knowledge	
TCH_1A_W01	The graduate knows and understands at an advanced level selected topics in the area of mathematical analysis as well as elements of logics, algebra, linear algebra, mathematical statistics and numerical methods that can be used to solve different problems in the area of the studied course
TCH_1A_W02	The graduate knows and understands problems of physics and physical chemistry that can be used to describe and interpret phenomena that are important from the point of view of chemical technology.
TCH_1A_W03	The graduate knows and understands at an advanced level selected topics regarding analytical, inorganic and organic chemistry, the chemistry of polymers, including the structure, properties and reactivity of elements and compounds, main methods of synthesis of compounds, including processes and individual operations and the rules of methods of chemical analysis
TCH_1A_W04	The graduate knows and understands at an advanced level the problems regarding typical technological processes, including raw materials, manufactured products, methods of their characterization and sequences of physical operations and chemical processes that are used in different technologies of chemical production
TCH_1A_W05	The graduate knows the rules of design, modeling and simulation and understands the rules of methods, research tools, imaging techniques and diagnostics (including IT techniques), and particularly those that can be used to design, model and simulate chemical processes and to analyze and describe empirical data
TCH_1A_W06	The graduate knows the structure and functioning of apparatus and equipment used in the chemical industry and related industries, control mechanisms, their calibration, individual operations and processes that are conducted in such apparatus and equipment.
TCH_1A_W07	The graduate knows and understands at an advanced level safety and work hygiene rules, basic notions of production management and quality control in the chemical industry and related industries and necessary legislation regarding chemical safety.
TCH_1A_W08	The graduate knows and understands problems regarding the properties and selection of materials that can be used to solve the basic engineering problems in chemical technology

Code	Learning outcomes for programme of studies chemical technology
TCH_1A_W09	The graduate knows and understands at an advanced level the problems of environmental protection, waste management, wasteless technologies in the chemical industry, water, waste and flue gas treatment technologies.
TCH_1A_W10	The graduate knows and understands the basic problems of the modern world and chemical production, including economic, legal and other determinants
TCH_1A_W11	The graduate knows the basic notions and rules of protection of industrial property, copy and patent rights and scientific information.
TCH_1A_W12	The graduate knows and understands the basic rules of developing different forms of individual business activity using knowledge in the area of chemical technology and related disciplines.
Skills	
TCH_1A_U01	The graduate can use the mathematical apparatus that they studied to describe and analyze empirical data, basic engineering and technical problems in the area of the studied course
TCH_1A_U02	The graduate can use the learned rules and methods of chemistry and physics to plan, conduct and describe experiments, can interpret obtained results and draw conclusions
TCH_1A_U03	The graduate knows and understands at an advanced level selected topics regarding analytical, inorganic and organic chemistry, the chemistry of polymers to formulate and solve complex and not typical engineering problems in the area of the studied courses
TCH_1A_U04	The graduate can speak a foreign language (English) at B2 level according to The Common European Framework of Reference for Languages
TCH_1A_U05	The graduate can plan and carry out production processes of selected technological processes using the studied methods of synthesis and characterization of obtained products, taking into consideration real physical operations and chemical processes
TCH_1A_U06	The graduate can understand the significance of systemic, non-technical, environmental, economic and ethical aspects of implementing some concrete technical solutions. The graduate knows the safety and hygiene rules at work environment
TCH_1A_U07	Based on the right reference material, the graduate can critically analyze the way current technical solutions function and assess such solutions in the area of the studied courses.
TCH_1A_U08	The graduate can communicate using specialist terminology in the area of chemical technology and can take part in a debate – can present and assess different points of view and is able to discuss them.
TCH_1A_U09	The graduate can plan and organize individual and team work, cooperate with other members of the team as part of team work.
TCH_1A_U10	The graduate can on their own plan and execute their own life-long learning goals
TCH_1A_U11	The graduate can use reference sources, including scientific data bases, such as Scopus, Web of Science, Reaxys, SciFinder (Chemical Abstract) and others
TCH_1A_U12	The graduate can use the rules of work safety and hygiene and the right legislation regarding chemical safety.
TCH_1A_U13	The graduate can use the rules of construction of apparatus and equipment used in the chemical and related industries and can control and calibrate their operation.
TCH_1A_U14	The graduate knows the rules of design, modeling and simulation (including IT techniques) typical for technical sciences to design and model and simulate chemical processes and to analyze and describe empirical data.

Code	Learning outcomes for programme of studies chemical technology
Social competences	
TCH_1A_K01	The graduate can critically assess the knowledge they have and data they get and is ready to constantly deepen their knowledge on their own.
TCH_1A_K02	The graduate acknowledges the importance of science in solving cognitive and practical problems, can ask an expert for an opinion if they have trouble to solve their problems themselves.
TCH_1A_K03	The graduate is willing to meet their social obligations by working for their social environment, by initiating actions for commonly shared goals, by showing respect for diversity of opinions and cultures, by caring about the natural environment
TCH_1A_K04	The graduate is ready to responsibly play their professional roles, by observing the ethical rules of the profession and requiring others to respect the rules too, respecting the heritage and traditions of the profession, by showing entrepreneurial spirit

Programme of studies: *chemical technology***Level of qualification:** second cycle studies**Educational profile:** general academic**Fields of science:** Engineering and technology**Discipline of science:** chemical engineering (100%)**Name of qualification (Title conferred):** magister inżynier**Description of the planned educational effects**

Code	Learning outcomes for programme of studies chemical technology
Knowledge	
TCH_2A_W01	The graduate knows and understands at an advanced level the problems regarding typical technological processes, including raw materials, manufactured products, methods of their characterization and sequences of physical operations and chemical processes that are used in chemical and biochemical processes
TCH_2A_W02	The graduate knows the rules of design, modeling and simulation and understands the rules of methods, research tools, imaging techniques and diagnostics (including IT techniques), and particularly those that can be used to design, model and simulate chemical processes and to analyze and describe empirical data
TCH_2A_W03	The graduate has systemized and theoretically founded knowledge of kinetics, thermodynamics, Surface phenomena and catalysis of chemical processes.
TCH_2A_W04	The graduate has extended knowledge of state-of-the-art. Chemical and materials technologies, knows the current trends of how chemical technology is developing and how to apply that in selected areas of science and technology.
TCH_2A_W05	The graduate knows and understands at an advanced level the problems of environmental protection, waste management and threats posed by chemical processes in the area of the studies specialization including dilemmas and risks involved and knows work safety and hygiene rules
TCH_2A_W06	The graduate has extended knowledge of entrepreneurship, management, including quality management
TCH_2A_W07	The graduate has extended knowledge of legal and ethical rules, including the legislation about the protection of industrial ownership and copyrights

Code	Learning outcomes for programme of studies chemical technology
Skills	
TCH_2A_U01	The graduate can use their extended knowledge of production of materials/biomaterials, the right selection of raw materials, methods, techniques, equipment and can apply characterization methods of raw materials and obtained products.
TCH_2A_U02	The graduate can use their extended knowledge of IT tools necessary to model, plan, design and optimize technological processes of production of materials and biomaterials and knows analysis methods and ways to processes empirical data.
TCH_2A_U03	The graduate can use their extended knowledge of the most recent technologies of materials and biomaterials, knows the current development trends of chemical technology and can identify their application potential in selected areas of science and technology including the studied models of quality management
TCH_2A_U04	The graduate can speak a foreign language (English) at B2 level according to The Common European Framework of Reference for Languages at the level of basic communication and specialist terminology
TCH_2A_U05	The graduate can use their extended knowledge of environmental protection, waste management and threats linked to chemical production processes, including the threats in the area of studied specialization.
TCH_2A_U06	Based on the right literature sources, the graduate can solve complex and unusual problems in the area of selected problems of materials and nanomaterials.
TCH_2A_U07	The graduate can communicate using specialist terminology and known IT-communication Methods in the area of materials/nanomaterials technology and can have a discussion about science – present and assess different opinions and standpoints.
TCH_2A_U08	The graduate can plan and organize individual and team work
TCH_2A_U09	The graduate can on their own plan and execute their own life-long learning goals and guide others
TCH_2A_U10	The graduate can use reference material and use it in a creative way to interpret and present selected information.
TCH_2A_U11	The graduate can apply the rules of work safety and hygiene in laboratory environment.
Social competences	
TCH_2A_K01	The graduate is ready to critically assess their own knowledge and information they get, the graduate is ready to constantly deepen their knowledge as well as to do it on their own.
TCH_2A_K02	The graduate acknowledges the importance of science in solving cognitive and practical problems, can ask an expert for an opinion if they have trouble to solve their problems themselves
TCH_2A_K03	The graduate is willing to meet their social obligations by working for their social environment, by initiating actions for commonly shared goals, by showing respect for diversity of opinions and cultures, by caring about the natural environment
TCH_2A_K04	The graduate is ready to responsibly play their professional roles, including the changing social needs, by keeping up the professional ethos, observing the ethical rules of the profession and requiring others to respect the rules too, respecting the heritage and traditions of the profession, by showing entrepreneurial spirit

Programme of studies: *materials and nanomaterials engineering*

Level of qualification: first cycle studies

Educational profile: general academic

Fields of science: Engineering and technology

Discipline of science: materials engineering (100%)

Name of qualification (Title conferred): inżynier

Description of the planned educational effects

Code	Learning outcomes for programme of studies nanotechnology
Knowledge	
IMiN_1A_W01	The graduate knows and understands at an advanced level selected topics in the area of mathematical analysis as well as elements of logics, algebra, linear algebra, mathematical statistics that can be used to understand, describe and model physico-chemical phenomena that occur in materials/biomaterials and in technical processes
IMiN_1A_W02	The graduate knows and understands at an advanced level selected topics in the area of physical, inorganic, organic, analytical chemistry and physics necessary to describe the properties of materials and nanomaterials and processes that accompany their production and processing
IMiN_1A_W03	The graduate knows and understands at an advanced level selected topics regarding materials and biomaterials: structure, synthesis, processing, analysis of structure and properties
IMiN_1A_W04	The graduate knows and understands the application potential of materials and biomaterials
IMiN_1A_W05	The graduate knows the rules of design, modeling and simulation and understands the rules of methods, research tools, imaging techniques and diagnostics (including IT techniques) used to solve problems in the engineering of materials and biomaterials
IMiN_1A_W06	The graduate knows and understands at an advanced level the characterization methods of structure and properties of materials and nanomaterials
IMiN_1A_W07	The graduate knows and understands the rules of functioning and exploitation of systems and equipment used in the medical industry and processes used to produced materials and nanomaterials
IMiN_1A_W08	The graduate knows and understands the basic notions regarding quality management
IMiN_1A_W09	The graduate knows and understands the basic problems of the modern world, economic, legal and other determinants of various types of occupational activity related to the engineering of materials and nanomaterials, including the basic notions and rules of protection of industrial property, copy rights and scientific information
IMiN_1A_W10	The graduate knows the general rules of developing different forms of individual entrepreneurship
IMiN_1A_W11	The graduate knows the rules of safety and work hygiene, technical safety, rational application of chemical substances

Code	Learning outcomes for programme of studies nanotechnology
IMiN_1A_W12	The graduate knows and understands at an advanced level selected problems of electrical engineering, automation that enable to solve basic engineering problems
Skills	
IMiN_1A_U01	The graduate can use their knowledge of engineering in medicine, can formulate and solve complex and unusual engineering challenges through: – the right selection of source materials and information from them, assessment, critical analysis and synthesis of relevant data – the selection and application of appropriate methods and tools, including advanced IT communication techniques
IMiN_1A_U02	The graduate can use the mathematical apparatus that they studied to describe and analyze empirical data, basic engineering and technical problems
IMiN_1A_U03	The graduate can use the learned rules and methods of chemistry and physics to plan, conduct and describe experiments, can interpret obtained results and draw conclusions
IMiN_1A_U04	The graduate can speak a foreign language (English) at B2 level according to The Common European Framework of Reference for Languages
IMiN_1A_U05	The graduate can use specialist computer software to design, model and simulate selected problems typical for the course.
IMiN_1A_U06	The graduate can understand the significance of systemic, non-technical, environmental, economic and ethical aspects of implementing some concrete technical solutions. The graduate knows the safety and hygiene rules at work environment
IMiN_1A_U07	The graduate can isolate, characterize materials/nanomaterials and determine their basic properties
IMiN_1A_U08	The graduate can plan and carry out production processes of selected materials and nanomaterials
IMiN_1A_U09	The graduate can communicate using specialist terminology in the area of engineering of materials and nanomaterials, can take part in a debate – can present and assess different points of view and is able to discuss them.
IMiN_1A_U10	The graduate can plan and organize individual and team work, cooperate with other members of the team (including interdisciplinary tasks).
IMiN_1A_U11	The graduate can on their own plan and execute their own life-long learning goals
IMiN_1A_U12	The graduate can critically analyze the way current technical solutions function and assess such solutions in the area of engineering of materials and nanomaterials
IMiN_1A_U13	The graduate can design production technologies for materials and nanomaterials
IMiN_1A_U14	The graduate can use reference sources, including scientific data bases, such as Scopus, Web of Science, Reaxys, SciFinder (Chemical Abstract) and others
Social competences	
IMiN_1A_K01	The graduate can critically assess the knowledge they have and data they get
IMiN_1A_K02	The graduate acknowledges the importance of science in solving cognitive and practical problems, can ask an expert for an opinion if they have trouble to solve their problems themselves
IMiN_1A_K03	The graduate is willing to meet their social obligations by working for their social environment, by initiating actions for commonly shared goals and by showing entrepreneurial spirit
IMiN_1A_K04	The graduate is willing to work in a responsible way, including: – observe the ethical rules of the profession and require others to respect the rules too – respect the heritage and traditions of the profession

Programme of studies: *materials and nanomaterials engineering*

Level of qualification: second cycle studies

Educational profile: general academic

Fields of science: Engineering and technology

Discipline of science: materials engineering (100%)

Name of qualification (Title conferred): magister inżynier

Description of the planned educational effects

Code	Learning outcomes for programme of studies nanotechnology
Knowledge	
IMiN_2A_W01	The graduate has extended knowledge of technological processes, including the right selection of materials raw materials, methods, techniques, equipment used to conduct production, and characterization methods raw materials and obtained materials.
IMiN_2A_W02	The graduate has extended knowledge of IT tools necessary to model, plan, design and optimize technological industrial processes, analysis methods and ways to process empirical data.
IMiN_2A_W03	The graduate has structured and extended knowledge of kinetics, catalysis, surface phenomena, bioprocesses and advanced methods of materials production.
IMiN_2A_W04	The graduate has extended knowledge of the most recent chemical and material technologies, knows the current trends of the development of chemical materials technologies and the possibilities of application in selected areas of science and technology
IMiN_2A_W05	The graduate has extended knowledge of environmental protection, threats/dilemmas linked to the use of materials/nanomaterials, work safety and hygiene.
IMiN_2A_W06	The graduate has extended knowledge of entrepreneurship, management, including production management.
IMiN_2A_W07	The graduate has extended knowledge of legal and ethical rules, including the legislation about the protection of industrial copyrights
Skills	
IMiN_2A_U01	The graduate can use their extended knowledge of production of materials/nanomaterials, the right selection of raw materials, methods, techniques, equipment and can apply characterization methods of raw materials and obtained products.
IMiN_2A_U02	The graduate can use their extended knowledge of IT tools necessary to model, plan, design and optimize technological processes of production of materials and nanomaterials and knows analysis methods and ways to processes empirical data.
IMiN_2A_U03	The graduate can use their extended knowledge of the most recent technologies of materials and nanomaterials, knows the current development trends and can identify their application potential in selected areas of science and technology.

Code	Learning outcomes for programme of studies nanotechnology
IMiN_2A_U04	The graduate can speak a foreign language (English) at B2 level according to The Common European Framework of Reference for Languages at the level of basic communication and specialist terminology
IMiN_2A_U05	The graduate can use their extended knowledge of environmental protection, waste management and threats linked to production processes of materials /nanomaterials, including the threats in the area of studied specialization.
IMiN_2A_U06	Based on the right literature sources, the graduate can solve complex and unusual problems in the area of selected problems of materials and nanomaterials.
IMiN_2A_U07	The graduate can communicate using specialist terminology and known IT-communication Methods in the area of materials/nanomaterials technology and can have a discussion about science – present and assess different opinions and standpoints.
IMiN_2A_U08	The graduate can plan and organize individual and team work
IMiN_2A_U09	The graduate can on their own plan and execute their own life-long learning goals and guide others
IMiN_2A_U10	The graduate can use reference material and use it in a creative way to interpret and present selected information.
Social competences	
IMiN_2A_K01	The graduate is ready to critically assess their own knowledge and information they got, the graduate is ready to constantly deepen their knowledge as well as to do it on their own
IMiN_2A_K02	The graduate acknowledges the importance of science in solving cognitive and practical problems, can ask an expert for an opinion if they have trouble to solve their problems themselves
IMiN_2A_K03	The graduate is willing to meet their social obligations by working for their social environment, by initiating actions for commonly shared goals, by showing respect for diversity of opinions and cultures, by caring about the natural environment
IMiN_2A_K04	The graduate is ready to responsibly play their professional roles, including the changing social needs, by keeping up the professional ethos, observing the ethical rules of the profession and requiring others to respect the rules too, respecting the heritage and traditions of the profession, by showing entrepreneurial spirit

Programme of studies: *engineering in medicine*

Level of qualification: first cycle studies

Educational profile: general academic

Fields of science: Engineering and technology

Discipline of science: materials engineering (100%)

Name of qualification (Title conferred): inżynier

Description of the planned educational effects

Code	Learning outcomes for programme of studies nanotechnology
Knowledge	
lwM_1A_W01	The graduate knows and understands at an advanced level selected topics in the area of mathematical analysis as well as elements of logics, algebra, linear algebra, mathematical statistics that can be used to understand, describe and model physico-chemical phenomena that occur in materials/biomaterials and in technical processes
lwM_1A_W02	The graduate knows and understands at an advanced level selected topics in the area of general, bioinorganic, organic, bioorganic, physical, medical chemistry as well as the chemistry of medication and physics/biophysics
lwM_1A_W03	The graduate knows and understands at an advanced level selected topics regarding materials and biomaterials: structure, synthesis, processing, analysis of structure and properties
lwM_1A_W04	The graduate knows and understands the application potential of materials and biomaterials in medicine through their knowledge of analytical methods used in medical analysis and diagnostics, micro- and spectroscopic methods used to determine characteristics of materials/biomaterials and processes that accompany their production and processing
lwM_1A_W05	The graduate knows the rules of design, modeling and simulation and understands the rules of methods, research tools, imaging techniques and diagnostics (including IT techniques) used to solve engineering problems in medical engineering
lwM_1A_W06	The graduate knows and understands at an advanced level the properties of raw resources, materials and biomaterials used in the medical industry
lwM_1A_W07	The graduate knows and understands the rules of functioning and exploitation of systems and equipment used in the medical industry and processes used to produce materials and biomaterials
lwM_1A_W08	The graduate knows and understands the basic notions regarding quality management and certification of medical products
lwM_1A_W09	The graduate knows and understands the basic problems of the modern world, economic, legal and other determinants of various types of occupational activity related to medical engineering, including the basic notions and rules of protection of industrial property, copy rights and scientific information
lwM_1A_W10	The graduate knows the general rules of developing different forms of individual entrepreneurship.
lwM_1A_W11	The graduate knows the rules of safety and work hygiene, technical safety, rational application of chemical substances and raw materials in the medical industry

Code	Learning outcomes for programme of studies nanotechnology
lwM_1A_W12	The graduate knows and understands the problems of electrical engineering and automation that are used to solve basic engineering problems
lwM_1A_W13	The graduate knows and understands at an advanced level selected problems of biology, molecular biology, microbiology and biochemistry
Skills	
lwM_1A_U01	The graduate can use their knowledge of engineering in medicine, can formulate and solve complex and unusual engineering challenges through: <ul style="list-style-type: none"> – the right selection of source materials and information from them, assessment, critical analysis and synthesis of relevant data – the selection and application of appropriate methods and tools, including advanced IT communication techniques
lwM_1A_U02	The graduate can use the mathematical apparatus that they studied to describe and analyze empirical data, basic engineering and technical problems
lwM_1A_U03	The graduate can use the learned rules and methods of chemistry and physics to plan, conduct and describe experiments, can interpret obtained results and draw conclusions
lwM_1A_U04	The graduate can speak a foreign language (English or German) at B2 level according to The Common European Framework of Reference for Languages
lwM_1A_U05	The graduate can use specialist computer software to design, model and simulate selected problems typical for the course.
lwM_1A_U06	The graduate can understand the significance of systemic, non-technical, environmental, economic and ethical aspects of implementing some concrete technical solutions. The graduate knows the safety and hygiene rules at work environment
lwM_1A_U07	The graduate can isolate, characterize materials/biomaterials and determine their basic properties
lwM_1A_U08	The graduate and plan and carry out production processes of selected materials and biomaterials.
lwM_1A_U09	The graduate can communicate using specialist terminology in the area of engineering in medicine and can take part in a debate – can present and assess different points of view and is able to discuss them.
lwM_1A_U10	The graduate can plan and organize individual and team work, cooperate with other members of the team (including interdisciplinary tasks).
lwM_1A_U11	The graduate can on their own plan and execute their own life-long learning goals
lwM_1A_U12	The graduate can critically analyze the way current technical solutions function and assess such solutions in the area of engineering in medicine.
lwM_1A_U13	The graduate can design production technologies for materials and biomaterials with application in medical engineering.
lwM_1A_U14	The graduate can use reference sources, including scientific data bases, such as Scopus, Web of Science, Reaxys, SciFinder (Chemical Abstract) and others
Social competences	
lwM_1A_K01	The graduate can critically assess the knowledge they have and data they get
lwM_1A_K02	The graduate acknowledges the importance of science in solving cognitive and practical problems, can ask an expert for an opinion if they have trouble to solve their problems themselves.
lwM_1A_K03	The graduate is willing to meet their social obligations by working for their social environment, by initiating actions for commonly shared goals and by showing entrepreneurial spirit.
lwM_1A_K04	The graduate is willing to work in a responsible way, including: <ul style="list-style-type: none"> – observe the ethical rules of the profession and require others to respect the rules too – respect the heritage and traditions of the profession.