



Lodz University
of Technology

Study programme

Faculty: Faculty of Chemistry
Major: Chemical Technology
Level of study: first-cycle programme (inżynier)
Form of study: full-time studies
Academic year: 2026/27

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Basic information

Name of the field of study:	Chemical Technology
Level of study:	first-cycle programme (inżynier)
Study profile:	general academic
Form of studies:	full-time studies
Duration of studies (number of semesters):	7
The number of ECTS points required to complete studies:	210
Total number of hours of classes:	2725
The number of ECTS points a student obtains as part of classes conducted with the direct participation of academic teachers or other persons conducting classes:	109
Professional title awarded to graduates:	inżynier
ISCED code:	0711
Language of study:	polish

Assigning the course to the disciplines to which the learning outcomes relate

Discipline	Percentage share
Chemical science	100%

Learning outcomes (in relation to the PQF)

No.	Learning outcome code	Learning Outcome Content	Reference to the universal characteristics of the first level of PRK	Reference to the second-level characteristics of the PRK, taking into account the second-level characteristics enabling the acquisition of engineering competences
1	1TCH1	Possesses advanced knowledge explaining complex relationships that form the foundations of mathematics, physics, chemistry, electrical engineering, electronics, information technology, and selected specialized topics necessary for understanding and describing natural processes as well as those used in engineering and technology.	P6U_W	P6S_WG
2	1TCH2	Has advanced, structured, and theoretically grounded knowledge forming the basis of chemical technology, is familiar with development trends in modern technologies, and understands recycling processes.	P6U_W	P6S_WG, P6S_WG_inž
3	1TCH3	Has an advanced understanding of industrial processes carried out in the chemical industry, including their role in meeting production demands and serving the needs of various sectors of the economy. Additionally, they have knowledge enabling the characterization of key raw materials and product groups, their life cycles, waste generation, and waste processing technologies.	P6U_W	P6S_WG, P6S_WG_inž
4	1TCH4	Possesses advanced knowledge in chemistry and chemical technology, allowing for a comprehensive understanding of industrial chemical processes aimed at obtaining products with specified final parameters.	P6U_W	P6S_WG, P6S_WG_inž
5	1TCH5	Has advanced knowledge necessary for understanding the fundamental non-technical aspects of engineering activities and the principles of creating and developing various forms of entrepreneurship, including individual entrepreneurship.	P6U_W	P6S_WK, P6S_WK_inž
6	1TCH6	Is able to develop a technological concept of a process and, based on it, present the assumptions for a technological installation project.	P6U_U	P6S_UW, P6S_UW_inž
7	1TCH7	Can properly utilize selected methods and devices that enable the measurement of physico-chemical parameters characterizing technological processes.	P6U_U	P6S_UW, P6S_UW_inž
8	1TCH8	Is able to identify, formulate and solve complex engineering problems, including computational problems in the field of construction, operation and design of chemical equipment with the use of computer support; uses life cycle analysis issues, including devices, facilities and technological installations.	P6U_U	P6S_UW, P6S_UW_inž
9	1TCH9	Is able to work individually or in a group, obtain information from literature, databases and other appropriately selected sources, also in a foreign language, has language skills in accordance with the requirements specified for level B2 of the Common European Framework of Reference for Languages (CEFR).	P6U_U	P6S_UK, P6S_UO, P6S_UU, P6S_UW_inž
10	1TCH10	Is able to work both in a team and independently while adhering to ethical principles. They can critically evaluate their proposed solutions and remain flexible in adapting to existing conditions.	P6U_K	P6S_KK, P6S_KO, P6S_KR

Matrix of course modules in relation to learning outcomes and curriculum content

No.	Course name	Program content	1TCH1	1TCH2	1TCH3	1TCH4	1TCH5	1TCH6	1TCH7	1TCH8	1TCH9	1TCH10
1	General and Inorganic Chemistry	Fundamental laws and concepts of chemistry, the structure of matter (from atoms to solids), chemical bonds, and chemical reactions. Properties and applications of the most important inorganic compounds, and chemical processes important in chemical technology, such as reaction equilibria, industrial electrochemistry, and the synthesis of key raw materials and products.	x			x			x		x	
2	The Art and Colors of the World	A Brief History of Fluorescence and Phosphorescence; The History of Bioluminescence and Chemiluminescence, Natural Dyes Yesterday and Today; Natural Pigments in Different Cultures; Artists and Their Pigments. Dyes and Pigments from Prehistoric Times to the Middle Ages. Dyes and Pigments – from the Renaissance to the Second Half of the 19th Century. Dyes and Pigments – from Impressionists to the Present Day. The History of Fluorescent Dyes.			x						x	
3	The History of Plastics	The history of the development of polymer materials and their importance in the modern world.			x						x	
4	Mathematics I	Matrices and determinants. Systems of linear equations. Infinite number sequences, properties and limits. Differential calculus. Limits of functions. Derivative of functions. Indefinite integrals and methods of their calculation. Definite and improper integral. Theory of number sequences; systems of equations; limits of functions; derivatives of functions; applications of differential calculus in optimization problems and in the study of the course of variability of functions; calculation of indefinite, definite and improper integrals.	x							x		
5	Introduction to Chemical Technology	Possibilities of chemical technology. Chemical Technology at the interface of science and industry - issues implemented in cooperation with representatives of industry, basics of work in a technological laboratory. Main tasks and problems of modern chemical technology. Modern experimental tools in a technological laboratory.		x	x	x	x	x	x	x		x
6	Information Technology	Introduction to the programming, cyber security and artificial intelligence. Creating documents, presentations, performing calculations and data analysis.	x								x	
7	Physics	Concepts and laws: kinematics of a material point, dynamics, work, energy and power, dynamics of a rigid body, gravitational field, electrostatics, magnetism, electromagnetic induction, mechanical vibrations and waves, and physical optics and geometric optics.	x							x		
8	The Art of Studying	Higher education in Poland and around the world; Types of higher education institutions; Organizational structure of Lodz University of Technology and the Faculty of Chemistry; Organization and types of classes; Specificity of chemical studies; Interdisciplinary doctoral school. Study regulations; Conditions for passing classes; Individual course of studies and studies abroad. Effective methods of self-presentation and public speaking; Internship.					x					x
9	Mathematics 2	Differential calculus of functions of several variables. Ordinary differential equations. Linear differential equations of the second order. Integral calculus of functions of two variables. Number and function series. Expansion of functions into Taylor, Maclaurin and Fourier series.	x							x		

No.	Course name	Program content	1TCH1	1TCH2	1TCH3	1TCH4	1TCH5	1TCH6	1TCH7	1TCH8	1TCH9	1TCH10
10	English B2 module I	First part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.									x	
11	Organic Chemistry I	Chemical nomenclature, electronic structure of organic compounds. Alkanes, cycloalkanes, alkenes, alkynes: preparation and reactivity. Radical substitution, addition to multiple bonds. Structure and stability of radicals and carbocations, rearrangement of carbocations. Conjugated dienes, resonance. Electrophilic addition to alkynes. Stereochemistry. Conformational analysis. Aromatic compounds. Mechanism of nucleophilic substitution of aromatic compounds. Polycyclic aromatic hydrocarbons. Alcohols, phenols, ethers and epoxides. Reactions with alkyl halides, dehydration, reactions with metals, oxidation, acylation. Nucleophilic substitution. Elimination reactions: E1 and E2. Aldehydes and ketones. Nucleophilic addition. Aldol condensation, Cannizzaro reaction, Wittig reaction.	x		x	x		x				
12	English B2+ module I	First part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.									x	
13	Mechanics and Apparatus of the Chemical Industry	Mechanics, strength of materials and basics of machine design. Machine/device diagram, load determination, material and structure selection. Design and principles of operation of sample chemical industry equipment.			x			x	x	x	x	x
14	English C1 module I	First part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.									x	
15	German B2 module I	First part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.									x	
16	Introduction To Data Analysis	Statistical methods of experimental data analysis. Typical spreadsheets (MSExcel, Origin) in the analysis of experimental data. Operation with approximate numbers, interval estimation, correlation and regression, selected statistical tests.	x	x		x		x			x	
17	Engineering Graphics and CAD	Creating technical drawings and graphic design in 2D using modern computer tools. Principles of presenting objects in different projections, CAD software for designing, analyzing and optimizing engineering solutions.			x						x	
18	Metal and Ceramic Materials	Structural structure of metals and ceramics and its influence on functional properties - possibilities and limitations. Metallic and ceramic construction materials - types, production, modification, properties and application. Operation with elements of corrosion and recycling.	x	x	x	x		x	x	x	x	x
19	Physics - Laboratory	Laboratory classes in mechanics, optics, electricity and magnetism. Measurements of physicochemical quantities, determination of universal physical constants and material constants, analysis of results using standard methods of statistical analysis.							x		x	

No.	Course name	Program content	1TCH1	1TCH2	1TCH3	1TCH4	1TCH5	1TCH6	1TCH7	1TCH8	1TCH9	1TCH10
20	Chemical Technology	Chemical technology and its connections with related sciences. Technological principles. Raw materials and directions of their processing. Large-volume technological processes. Fine chemicals and special-purpose products.		x	x	x	x	x	x	x	x	x
21	English B2 module II	Second part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.									x	
22	Chemical Products Marketing	Planning, organizing and implementing marketing activities aimed at: (a) introducing to the market, or (b) increasing sales of a given chemical product. Understanding the needs and expectations of customers, i.e. buyers of the product, as well as market analysis and competition analysis in the industry under consideration. The specificity of the chemical products market, where marketing activities undertaken (especially in the sphere of distribution or promotion) are subject to restrictions due to applicable standards and legal regulations regarding the safety of transport and use of chemical products.			x		x				x	x
23	Legislation and Management in the Industry	Sources of law - legislative acts, regulations, standards (national law vs. international law). Standards and regulations concerning the chemical sector, legislation on environmental protection, public tenders and procurement, counteracting infringements of intellectual property rights. Theories and models of management in industry, challenges related to digitalization and new technologies.			x		x				x	x
24	Applied Thermodynamics	Basic concepts and functions of thermodynamics; I, II and III laws of thermodynamics, criteria for reversibility and spontaneity of processes, transformations and the law of ideal gases. Standard state, standard enthalpy of combustion and formation, heat of chemical reaction, principles of calorimetric measurement. Chemical equilibrium and phase equilibria.	x	x		x			x		x	
25	English B2+ module II	Second part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.									x	
26	Organic Chemistry II	Carboxylic acids and their derivatives. Synthesis of carboxylic acids and their reactivity. Esterification reactions, formation of acid halides, anhydrides, amides, etc. Substitution in the acyl group. Ketoenol tautomerism. Use of ethyl acetoacetate and diethyl malonate in organic synthesis. Condensation reactions. Amines, basicity, and nucleophilicity. Synthesis and reactions of amines. Heterocyclic compounds. Structure and nomenclature. Reactions with electrophilic and nucleophilic reagents, oxidation and reduction, acid-base properties.	x		x	x		x	x		x	
27	English C1 module II	Second part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.									x	

No.	Course name	Program content	1TCH1	1TCH2	1TCH3	1TCH4	1TCH5	1TCH6	1TCH7	1TCH8	1TCH9	1TCH10
28	Electrical Engineering with Elements of Electronics	Properties of components included in electrical and electronic circuits, direct current and alternating current circuits, basics of measurement of electrical quantities, elementary methods of analysis of linear electric circuits, principles of operation of selected types of electrical and electronic devices together with examples of their use in everyday life and industry.	x						x		x	
29	German B2 module II	Second part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.									x	
30	Industrial Analytics	Basic principles of industrial analytics and their importance in the proper implementation of technological processes. Composition studies of samples of industrial importance.	x			x			x	x	x	
31	Copyright and Patent Law	Intellectual property and the laws protecting it. Polish legislation and EU directives and international agreements. Copyright and related rights. Copyright at the university. Criminal liability for copyright infringement (the problem of plagiarism). Cyberrevolution of the 20th and 21st centuries and copyright. The idea of free culture (OpenSource, Creative Commons, Copyleft, Wiki, GNU). Database law, industrial property law.			x		x					
32	Cosmetic and Pharmaceutical Product Technologies	Synthesis and technology of pharmaceutical raw materials and modern methods of manufacturing pharmaceuticals. Substances used in technology and production of cosmetics - action and their influence on the properties of the final product. Syntheses of coordination compounds commonly used in pharmacotherapy and imaging diagnostics.		x	x	x	x	x	x	x	x	x
33	English B2 module III	Third part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.									x	
34	Polymer Construction Materials and Functional Additives	Structure, properties and methods of obtaining and modifying polymers used in chemical technology. Types of structural polymers, their applications and the influence of functional additives such as stabilizers, plasticizers or fillers on their properties. Analysis of processing, durability and recycling of polymer materials in the context of modern technologies.	x	x	x	x		x	x	x	x	x
35	Biomaterial, Biopolymer and Biodegradable Polymer Technologies	Definition, types, manufacturing and sterilization technologies, testing and applications of biomaterials and medical devices. Biopolymers, their origin, types, properties, applications, importance for sustainable development, processing technologies and products based on biopolymers. Biodegradation - its mechanisms and kinetics; biodegradable polymers, their acquisition, synthesis and processing and most important applications.		x	x	x	x	x	x	x	x	x
36	Chemical and Process Engineering	Basics of fluid statics and dynamics, mass and momentum balances, flow resistance in pipes and process devices, as well as characteristics of laminar and turbulent flows. Heat exchange processes including conduction, convection and radiation, heat balances and principles of design and selection of heat exchangers. In the field of mass transfer, the phenomena of mass diffusion and convection will be discussed, as well as basic unit operations such as distillation, absorption, extraction and drying.	x	x	x	x		x	x	x	x	x

No.	Course name	Program content	1TCH1	1TCH2	1TCH3	1TCH4	1TCH5	1TCH6	1TCH7	1TCH8	1TCH9	1TCH10
37	English B2+ module III	Third part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.									x	
38	Catalysis and Adsorption	Adsorption and catalysis, their role in chemical reactions. Key chemical processes used in environmental protection technology and in industry, with particular emphasis on catalytic transformations used in the synthesis of drugs and plant protection compounds. Selected issues related to homogeneous and heterogeneous catalysis, including methods of physicochemical studies of heterogeneous and homogeneous catalysts, methods of preparation of adsorbents and catalysts, and mechanisms of selected catalytic reactions.	x	x	x	x		x	x	x	x	
39	English C1 module III	Third part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.									x	
40	Technologie materiałów specjalnego przeznaczenia	Wybrane zagadnienia związane z materiałami o właściwościach użytkowych predestynujących je do zastosowań w obszarach wymagających specjalnych, unikatowych, właściwości. Technologie wytwarzania i przetwarzania oraz główne obszary zastosowań m.in. elastycznych materiałów o podwyższonej odporności termicznej i ograniczonej palności/ogniotrwałości, materiałów wykazujących samoorganizację (m.in. ciekłych kryształów), elastycznych materiałów elektroprowadzących, a także izotopów promieniotwórczych i sond elektro luminescencyjnych do zastosowań medycznych (m.in. diagnostyka medyczna).		x	x	x	x	x	x	x	x	x
41	German B2 module III	Third part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.									x	
42	Physical Chemistry	Chemical equilibrium in the liquid phase - equilibria in electrolyte solutions (activity, activity coefficients, ionic strength): solubility product, acid and base dissociation constant, pH concept and calculation of pH of solutions of acids, bases and salts undergoing hydrolysis and buffer solutions. Conductivity of electrolyte solutions. Electrochemical cells as chemical reactors. Kinetics of chemical reactions: reaction rate, reaction rate constant, reaction order. Effect of temperature on reaction rate.	x			x			x		x	
43	Wastewater and Water Treatment Technologies	Characteristics of surface and underground waters. Types of sewage and pollution indicators. Water treatment methods. Sewage treatment technologies. Methods of sewage sludge management. Energy management of sewage treatment plants. The future of sewage treatment technologies.										
44	Surface Modification Technologies and Anti-Corrosion Protection	Surface modification technologies of metallic materials, barrier materials used in electronics, polymeric materials (fillers and nano-fillers), through the use of various chemical compounds, flame retardants, antioxidants, light stabilizers, anti-slip agents and corrosion-preventing compounds. Surface properties of materials before and after modification. Methods of protecting surfaces against destruction caused by various types of corrosion, including atmospheric or microbiological corrosion.		x	x	x	x	x	x	x	x	x

No.	Course name	Program content	1TCH1	1TCH2	1TCH3	1TCH4	1TCH5	1TCH6	1TCH7	1TCH8	1TCH9	1TCH10
45	Quality Management	Fundamentals and importance of management systems, including ISO standards (e.g. ISO 9001, ISO 14001 and ISO 17025). Process management tools, including basic tools used at the four levels of management (control, steering, assurance and quality management). Documentation and certification requirements for management systems.			x		x	x	x	x	x	x
46	English B2 module IV	Fourth part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.									x	
47	Contemporary Challenges of Chemical Technology	Green chemical technology as a practical implementation of green chemistry principles. New intelligent agrochemicals, nanofertilizers and plant protection products. Distributed fertilizer production technologies using renewable energy. New hybrid catalysts using nanomaterials and organic carriers. New energy storage methods and related material problems. Technologies of explosives and special materials intended for military purposes. Innovative, hybrid chemical reactors and materials used for their production. Energy and hydrogen technologies and dedicated catalysts and electrochemical reactors. New catalysts for means of transport with particular emphasis on diesel engines. The future of the circular economy and related technologies. Obtaining new fuels and organic materials from carbon dioxide obtained from the atmosphere. A hybrid combination of chemistry and molecular biology for industrial plant cultivation and breeding of edible animal tissues.										
48	Chemical Products Management	Fundamentals of chemical product management in economic circulation, including definitions, principles of placing products on the market, as well as EU regulations (REACH, CLP) and the GHS system for classification and labeling. Analysis of the composition and properties of chemical products in relation to their technological application and safe use, assessment of compliance with REACH requirements and the possibility of placing products on the EU market, preparation of selected elements of product documentation.			x		x	x	x	x	x	x
49	Closed-Loop Economy	Circular Economy (CE) principles in the context of sustainable development - opportunities, threats and challenges, including: CE in legal regulations and European Union policy; economic aspects of CE and eco-innovation; CE in a holistic approach - at the level of a modern enterprise, on a local and global scale; CE areas: product design, production, consumption, waste management; life cycle of products and processes used in circular technologies, impact on the environment, society and economy - LCA analyses in the context of ESG reporting and more. Practical determination of numerical parameters and analysis used to characterize aspects of the circular economy.		x	x			x		x	x	x
50	English B2+ module IV	Fourth part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.									x	

No.	Course name	Program content	1TCH1	1TCH2	1TCH3	1TCH4	1TCH5	1TCH6	1TCH7	1TCH8	1TCH9	1TCH10
51	Fundamentals of Automation and Control	Typical automation systems and their block diagrams, basic control objects and regulators, stability of automatic control systems, mathematical tools for the analysis of control systems, first and second order responses and frequency and time characteristics for automation elements, Laplace transforms and block diagram algebra, principles of operation of PID controllers, quality of control using manual settings and using the auto-adaptation function of the PID controller, creating block diagrams in a graphical environment representing linear and non-linear automation elements and conducting time and frequency simulations of these systems using CAE (Computer Aided Engineering) software.	x					x	x		x	
52	English C1 module IV	Fourth part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.									x	
53	Instrumental Methods	Theoretical foundations and practical application of analytical methods. Review of instrumental methods: chromatographic methods, spectroscopic methods (UV-VIS, IR, Raman spectroscopy, mass spectrometry, NMR), electrochemical methods, thermal analysis techniques. Principles of selecting the appropriate analytical method. Interpretation and validation of results.	x			x			x	x	x	
54	German B2 module IV	Fourth part of a business language course with elements of industry-specific terminology; development of all language skills; development and improvement of soft skills oriented around the future working environment of the university graduate.									x	
55	Design, Scaling and Modeling of Technological Processes	Problems of scaling reactors and chemical processes. Modeling methods and modern digital technologies in process design. Practical scaling of processes on the example of organic electronics, drugs, medical devices or cosmetics. Design of production technology for polymer products taking into account raw material supply chains. Technology optimization, miniature model installation, semi-technical installation and scaling, industrial installation. Analysis of technology or product development. Selected elements of technical documentation.		x	x	x	x	x	x	x	x	x
56	Electronic Sources of Scientific and Technical Information	Key scientific journal services such as ACS, Wiley, RSC and Elsevier. Structure of a scientific publication, different types of articles and their role in the research process. Databases including Reaxys, Scopus and Web of Science. Creating your own database and bibliography appendices for future publications and theses.			x						x	
57	Summative Module	The student carries out project tasks in a group that require the use of knowledge and skills acquired at earlier stages of study.	x	x	x	x	x	x	x	x	x	x
58	Environmental Protection Technologies	Contemporary ecological problems. Protection of air, water and soil and waste management, modern technologies for reducing pollution, environmental monitoring systems, circular economy, renewable energy sources and environmental management with regard to legal and strategic aspects.										

No.	Course name	Program content	1TCH1	1TCH2	1TCH3	1TCH4	1TCH5	1TCH6	1TCH7	1TCH8	1TCH9	1TCH10
59	Environmental Biotechnology	Bioremediation - the use of microorganisms in the utilization of soil and water pollutants (especially petroleum compounds) and vascular plants to remove pollutants from the soil (especially heavy metals). Biological methods of purifying municipal and industrial sewage from toxic and harmful chemical compounds. Biosensors - construction and application. Protection and restoration of environmental quality by means of biological processes, especially recycling processes involving microorganisms.	x	x	x			x	x			x
60	Polymer Recycling and Renewable Raw Materials	Methods of processing polymer waste and renewable raw materials, with an emphasis on technologies for the recovery and reuse of these materials in industrial processes. Various recycling technologies, their impact on the environment and their role in sustainable development and the circular economy.	x	x	x	x	x	x	x	x	x	x
61	Environmental Radiation Technologies	Introduction to radiation chemistry and technology. The most important radiation technologies used in environmental protection (purification of waste and combustion gases, purification of water, sewage and sediments, elimination of particularly dangerous pollutants from the environment, including radioactive isotopes, recycling and upcycling of plastics). Advantages of using radiation technologies in environmental protection compared to conventional technologies.	x	x	x	x	x	x	x	x	x	x
62	Renewable Energy Technologies	Conventional energy in relation to renewable energy sources. The difference between renewable and non-renewable sources. The use of renewable energy sources and the method of obtaining energy: Wind energy, Water energy, Biomass energy, Geothermal energy, Biomass combustion, Biogas as a renewable energy source. Solar energy, Low-temperature thermal energy of seas and oceans, Energy self-sufficiency in the aspect of renewable energy sources. Energy conversion efficiency. Energy parity. Directions in the development of renewable energy sources.	x		x			x			x	x
63	English Chemical Terminology in Ecological Technologies	Basic vocabulary used in English-language scientific literature. A method of translating texts from English into Polish in the field of chemical technology, chemistry, environmental protection, and related sciences. Introduction of general principles of English-language chemical vocabulary based on selected texts from chemical and technical literature. Nomenclature of complex inorganic and organic chemical compounds. Advanced scientific and technical terminology.	x								x	x
64	Internship	Acquiring practical knowledge and new professional competences in natural workplace conditions.						x	x	x	x	x
65	Entrepreneurship Basics	Types of business activity and methods of its registration. Types of taxes applicable in Poland. Methodology for preparing a credible and realistic business plan. Improving people's living conditions by shaping the natural environment while respecting its value for human needs, health, social and individual development. Consequences of engineering activities together with threats to the safety, life, health and well-being of people as well as threats to the environment. Public good and principles of professional and personal ethics.			x		x				x	x
66	Law for Engineers	The functioning of law in Poland and sources of universally binding law. Labor law, civil law and administrative law. Improving people's living conditions by shaping the natural environment while respecting its value for human needs, health, social and individual development. Consequences of engineering activities together with threats to the safety, life, health and well-being of people as well as threats to the environment. Public good and principles of professional and personal ethics.			x		x				x	x

No.	Course name	Program content	1TCH1	1TCH2	1TCH3	1TCH4	1TCH5	1TCH6	1TCH7	1TCH8	1TCH9	1TCH10
67	Interdisciplinary Project	Development of a concept for the technology of manufacturing a selected chemical product based on the application of technological principles resulting from the basic laws of physics and chemistry, as well as economics and rational organization of work in the company.										
68	Engineering Laboratory	Preparation of individual presentations on the main issues related to the diploma thesis. Discussion of the presented presentations. The subject also includes a competency exam. The student conducts experiments related to the topic of the diploma thesis and analyzes and develops the obtained results.										
69	Final Project	Familiarization with available literature on the issues provided by the promotor. Selection, justification and development of a research method (experimental or theoretical). Conducting experimental research, computer calculations or preparing a technological project. Development of research results. Drawing conclusions from the obtained results. Preparation of a multimedia presentation illustrating the work performed. Publication of the work.										
70	Ergonomics and Occupational Safety	Information on the basics of ergonomics as interdisciplinary knowledge and an element of engineering art, including conceptual and corrective ergonomics and the humanization of technology. The legal system of labor protection in Poland, the obligations and rights of the employer and employees, the occupational health and safety service in workplaces, personal protective equipment and work clothing and footwear. Accidents at work - the causes of their occurrence and statistics from the last few years. Occupational diseases with statistics from the last years. Chemical substances and work in conditions harmful to health, threats from hazardous factors in the work environment, mechanical, electrical, noise, vibration, electromagnetic field and radiation threats. Principles of providing first aid.			x		x	x	x	x	x	x
71	Inorganic Materials	Ceramic, glass-ceramic, metallic and composite materials, semiconductors and refractory materials. Structure, physicochemical properties, applications in technology and the latest trends in materials engineering. Modeling and calculations of the structure, thermodynamics and conductivity of inorganic materials.	x	x	x	x	x	x	x	x	x	x
72	Synthesis and Analysis of Plastic Additives	Classification of additives and auxiliaries used in the processing of polymers and polymer materials: processing auxiliaries (thermal, lubricants, blowing agents, etc.), property stabilizing agents (plasticizers, flame retardants, antioxidants, etc.), surface-active agents (emulsifiers, detergents, etc.) and dyes.	x	x		x		x	x	x	x	x
73	Technology of Plastics, Elastomer and Dyes	Technology of manufacturing and processing of plastics and elastomeric materials, as well as types and methods of manufacturing coloring agents. Various groups of polymers and additives to polymer composites, which allow to give them properties required for specific applications. Principles of selection and technological applications of dyes and pigments.	x	x		x		x	x			x
74	Radiation Techniques in Polymer Technology	Basic issues in the field of radiation chemistry of polymers, including information on radiation sources, interaction of radiation with matter, processes occurring in polymers under the influence of radiation, radiation synthesis of polymers, degradation and cross-linking. Applications of radiation technology to the modification of polymers on an industrial scale.	x			x	x		x		x	x

No.	Course name	Program content	1TCH1	1TCH2	1TCH3	1TCH4	1TCH5	1TCH6	1TCH7	1TCH8	1TCH9	1TCH10
75	Properties of Polymer Materials	The influence of the structure of polymers on their physical properties (mechanical, dielectric, thermal and optical). Phase transitions and physical phenomena observed in polymer materials - their essence and influence on the functional properties of materials. Methods of testing the properties of polymer materials.	x			x			x		x	x
76	English Chemical Terminology in Polymer Technologies	English technical terminology in the field of chemistry, chemical technology and polymer processing. Reading, translating and interpreting English literature based on selected scientific publications in the field of chemistry with particular emphasis on topics related to chemical technology. Translating and understanding English equivalents of chemical and technical terms and elementary phrases used in English publications, typical for the literature in the field of polymer technology.									x	
77	Modern Energy Storage Technologies	Modern and prospective energy storage technologies in various forms. Electrical energy storage, mechanical energy storage, thermal energy storage, chemical energy storage and hydrogen storage and transport methods.	x	x	x	x	x	x	x	x	x	x
78	Biomass Processing and Recycling of Organic Compounds	Biomass composition, groups of organic compounds found in biomass, their structure. Obtaining organic compounds from biomass and waste products. Using organic reactions in recycling organic compounds. Using differences in the chemical structure of biomass components for their separation. Developing the best methods for separating sugars, proteins and lipids from biomass. Methods of their conversion into compounds important for various industries. Isolation of groups of organic compounds from biomass. Using hydrolysis reactions in recycling organic compounds.		x	x			x			x	x
79	Polymer Materials in Energy Technologies	Application of polymer and composite materials as components of devices used to obtain energy from renewable sources (sun, water, wind). Photovoltaic technology, application of polymer materials in the construction of photovoltaic cells, wind technology, application of composite materials in the construction of wind turbines. Application of hybrid and functional polymer materials for energy storage (batteries, electric car batteries). Issues related to recycling of polymer and composite materials used in energy technologies.		x					x		x	x
80	Nuclear Energy	The role and importance of nuclear energy in the era of changes in energy sources in Poland. Advantages and disadvantages of technological solutions of currently used energy sources. Modern solutions in the field of radiation detection, source rationing, waste management and fuel cycle.	x	x	x	x	x	x	x	x	x	x
81	Modern Photovoltaics	Photovoltaic effect and types of semiconductors. First, second and third generation photovoltaic technologies, Current-voltage characteristics and electrical parameters of cells, Photovoltaic modules, Parallel and series connections of photovoltaic cells and PV modules, Photovoltaic installation and radiation concentrators, hybrid photovoltaic systems, connections of several sources of electrical energy, Active solar energy conversion systems, Recycling of photovoltaic modules, Prospects for the development of photovoltaics in Poland.	x		x			x			x	x
82	English Chemical Terminology in Radiation Technologies	Basic technical vocabulary and subject terminology, including that used in own texts. Translations from English into Polish of scientific articles and technical texts covering substantive issues of nuclear energy and radiation technologies.									x	x

No.	Course name	Program content	1TCH1	1TCH2	1TCH3	1TCH4	1TCH5	1TCH6	1TCH7	1TCH8	1TCH9	1TCH10
83	Laboratory Data Management Systems	LIMS (Laboratory Information Management System). The most important software modules, i.e. order handling, customer management, quality control, supervision of measuring devices and warehouse stocks, supplier and personnel management. Practical aspects of functioning and implementation of LIMS class software in the laboratory.		x	x	x					x	x
84	Design and Synthesis of Biologically Active Compounds	Design and synthesis of biologically active compounds. Methods of carbon-carbon and carbon-heteroatom bond formation, principles of retrosynthetic analysis: disconnection, synthons, synthetic equivalents, target molecules and basic processes of functional group transformations with regard to chemo-regio- and stereoselective reactions. Main classes of natural organic compounds (peptides and proteins, lipids, carbohydrates, steroids, terpenoids).	x	x	x	x		x	x	x	x	x
85	Fluorescent Labels for Biologically Active Compounds	Methods of synthesis of selected groups of fluorescent dyes, with particular emphasis on methods leading to modification of their structure in order to detect selected groups of biologically active compounds. The influence of selected chemical modifications of fluorescent dyes on their emission properties and the ability to selectively stain selected cell organelles and detect biologically active compounds present in them. Factors influencing the chemical and photochemical stability of fluorescent markers.	x	x	x	x	x	x	x	x	x	x
86	Basics of Pharmacokinetics and Pharmacodynamics	Pharmacokinetics and pharmacodynamics, drug fate in the body (LADME): absorption, distribution, elimination of the drug from the body: excretion and metabolism. Pharmacokinetics of a single intravenous administration. Calculation of pharmacokinetic parameters based on the single-compartment and two-compartment models. Pharmacokinetics of a single extravascular administration. Intravenous infusion. Pharmacokinetics of repeated intravenous and repeated extravascular administration. Determination of bioavailability. Basics of pharmacodynamics and basic pharmacokinetic-pharmacodynamic relationships.	x	x	x	x	x	x	x	x	x	x
87	Sensors	Concepts of chemical sensor and molecular recognition. Mechanisms of molecular interactions, specific and non-specific, Electronic, organic semiconductor devices as sensors. Fiber optic sensors, immobilization of sensor materials, Optical fiber biosensors, optical signaling. Fluorescence spectroscopy, stationary and time-dependent, Polymer biosensors using molecular printing technology, Bio-optrodes based on sensor immobilization on optical fiber.	x			x			x		x	x
88	English Chemical Terminology in Pharmaceutical Technologies	Working with English-language scientific literature and communicating effectively in an international academic environment. Basic English terminology used in chemistry and medicine. Laboratory terminology, including experimental procedures, apparatus, glassware, and safety precautions. Useful abbreviations and symbols, as well as vocabulary related to measurement methods used in medicinal chemistry. Translations of specialist texts from English, including the nomenclature of inorganic and organic chemical compounds, and selected pharmaceuticals.	x	x		x	x				x	

ECTS - subjects

No.	Course name	ECTS	Subjects in the field of humanities and social sciences	Elective subjects	Profile items	Classes in a foreign language
1	General and Inorganic Chemistry	9			9	
2	The Art and Colors of the World	2	2	2		
3	The History of Plastics	2	2	2		
4	Mathematics I	7				
5	Introduction to Chemical Technology	2			2	
6	Information Technology	4				
7	Physics	5				
8	The Art of Studying	1	1			
9	Mathematics 2	7				
10	English B2 module I	2		2		
11	Organic Chemistry I	5			5	
12	English B2+ module I	2		2		
13	Mechanics and Apparatus of the Chemical Industry	4			4	
14	English C1 module I	2		2		
15	German B2 module I	2		2		
16	Introduction To Data Analysis	4				
17	Engineering Graphics and CAD	2				
18	Metal and Ceramic Materials	3			3	
19	Physics - Laboratory	3				
20	Chemical Technology	5			5	

No.	Course name	ECTS	Subjects in the field of humanities and social sciences	Elective subjects	Profile items	Classes in a foreign language
21	English B2 module II	2		2		
22	Chemical Products Marketing	2		2		
23	Legislation and Management in the Industry	2		2		
24	Applied Thermodynamics	6			6	
25	English B2+ module II	2		2		
26	Organic Chemistry II	9			9	
27	English C1 module II	2		2		
28	Electrical Engineering with Elements of Electronics	3				
29	German B2 module II	2		2		
30	Industrial Analytics	2			2	
31	Copyright and Patent Law	1				
32	Cosmetic and Pharmaceutical Product Technologies	3		3	3	
33	English B2 module III	2		2		
34	Polymer Construction Materials and Functional Additives	4			4	
35	Biomaterial, Biopolymer and Biodegradable Polymer Technologies	3		3	3	
36	Chemical and Process Engineering	4			4	
37	English B2+ module III	2		2		
38	Catalysis and Adsorption	4			4	
39	English C1 module III	2		2		
40	Technologie materiałów specjalnego przeznaczenia	3		3	3	
41	German B2 module III	2		2		

No.	Course name	ECTS	Subjects in the field of humanities and social sciences	Elective subjects	Profile items	Classes in a foreign language
42	Physical Chemistry	7			7	
43	Wastewater and Water Treatment Technologies	3		3	3	
44	Surface Modification Technologies and Anti-Corrosion Protection	3		3	3	
45	Quality Management	2		2		
46	English B2 module IV	3		3		
47	Contemporary Challenges of Chemical Technology	7			7	
48	Chemical Products Management	2		2		
49	Closed-Loop Economy	2			2	
50	English B2+ module IV	3		3		
51	Fundamentals of Automation and Control	3				
52	English C1 module IV	3		3		
53	Instrumental Methods	5			5	
54	German B2 module IV	3		3		
55	Design, Scaling and Modeling of Technological Processes	7			7	
56	Electronic Sources of Scientific and Technical Information	1				
57	Summative Module	7		7	7	
58	Environmental Protection Technologies	8		8	8	
59	Environmental Biotechnology	3		3	3	
60	Polymer Recycling and Renewable Raw Materials	3		3	3	
61	Environmental Radiation Technologies	3		3	3	
62	Renewable Energy Technologies	3		3	3	

No.	Course name	ECTS	Subjects in the field of humanities and social sciences	Elective subjects	Profile items	Classes in a foreign language
63	English Chemical Terminology in Ecological Technologies	3		3	3	3
64	Internship	6				
65	Entrepreneurship Basics	2	2	2		
66	Law for Engineers	2	2	2		
67	Interdisciplinary Project	2		2	2	
68	Engineering Laboratory	4			4	
69	Final Project	15		15	15	
70	Ergonomics and Occupational Safety	1				
71	Inorganic Materials	3		3	3	
72	Synthesis and Analysis of Plastic Additives	3		3	3	
73	Technology of Plastics, Elastomer and Dyes	8		8	8	
74	Radiation Techniques in Polymer Technology	3		3	3	
75	Properties of Polymer Materials	3		3	3	
76	English Chemical Terminology in Polymer Technologies	3		3	3	3
77	Modern Energy Storage Technologies	3		3	3	
78	Biomass Processing and Recycling of Organic Compounds	3		3	3	
79	Polymer Materials in Energy Technologies	3		3	3	
80	Nuclear Energy	6		6	6	
81	Modern Photovoltaics	5		5	5	
82	English Chemical Terminology in Radiation Technologies	3		3	3	3
83	Laboratory Data Management Systems	3		3	3	

No.	Course name	ECTS	Subjects in the field of humanities and social sciences	Elective subjects	Profile items	Classes in a foreign language
84	Design and Synthesis of Biologically Active Compounds	8		8	8	
85	Fluorescent Labels for Biologically Active Compounds	3		3	3	
86	Basics of Pharmacokinetics and Pharmacodynamics	3		3	3	
87	Sensors	3		3	3	
88	English Chemical Terminology in Pharmaceutical Technologies	3		3	3	3

ECTS indicators

Name	Diploma Path: Environmental Technologies	Diploma Path: Polymer Technologies	Diploma Path: Nuclear Energy and Photovoltaics	Diploma Path: Drug Technologies
The total number of ECTS credits that a student must obtain through elective courses (amounting to no less than 30% of the total ECTS credits required to obtain the qualification corresponding to the given level of study)	73/210 (34.76%)	73/210 (34.76%)	73/210 (34.76%)	73/210 (34.76%)
The total number of ECTS credits to be earned by a student through courses in the fields of humanities or social sciences	5	5	5	5
The total number of ECTS credits that a student must obtain from courses related to research conducted at the university, amounting to more than 50% of the total ECTS credits required to graduate from a given level of study	145/210 (69.05%)	145/210 (69.05%)	145/210 (69.05%)	145/210 (69.05%)

Methods of verifying and assessing learning outcomes

Verification of the achieved learning outcomes requires the application of diverse forms of student assessment, appropriate to the categories of knowledge, skills, and social competences to which these outcomes relate. The selection of appropriate tools also depends on the specifics of the course and the form of instruction, and is specified in the syllabi of individual courses. The achievement of the required learning outcomes is verified through:

1. written assignments (exams, quizzes, reports, essays, projects, posters, thesis, etc.);
2. oral responses (oral knowledge tests, public speaking assignments such as delivering a paper, presentation, etc.);
3. practical and/or project-based tasks (team-based or individual);
4. observation and assessment of student activity during classes;
5. self-assessment and peer assessment (especially in the case of group projects);
6. a competency exam and a diploma examination.

Verification may be formative (conducted partially and repeatedly during the course) and/or summative (final assessment). The final result of the verification is expressed using the currently applicable grading scale.

The course coordinator or instructor is obliged, during the first class, to discuss the course syllabus and to define and formally communicate to students the methods of verification and the conditions under which learning outcomes will be assessed.

Professional internships

Duration: 6 weeks

ECTS credits awarded: 6

The internship is carried out in accordance with the study program, in a form adapted to the profile and specific nature of the field of study, and in line with the regulations established by the faculty and the University.

Specializations/degree paths offered within the study program

Diploma Path: Environmental Technologies

Diploma Path: Polymer Technologies

Diploma Path: Nuclear Energy and Photovoltaics

Diploma Path: Drug Technologies

Characteristics of the course

Graduate profile

A graduate acquires advanced knowledge in the fields of chemistry, mathematics, physics, thermodynamics, and materials science, as well as engineering skills related to mechanical engineering and technical drawing, chemical and process engineering, automation, electronics and electrical engineering, industrial analytics, and the modeling and design of technological processes.

They are able to work with technical documentation (using CAD systems), apply statistical methods, and artificial intelligence (AI) tools to monitor technological processes and product parameters using modern instrumental and computer-based methods. In their professional activities, they are guided by the principles of the circular economy and sustainable development, remaining aware of risks to human health and the environment.

The graduate can analyze the impact of selected technological process parameters on its efficiency, as well as carry out techno-economic and techno-ecological evaluations. When identifying risks associated with technological processes, they can assess related hazards and propose methods for their elimination or minimization.

A graduate of the Chemical Technology program is prepared to work both independently and in teams, and can communicate efficiently on technological topics with both specialists and non-specialists in the field of chemical technology. They are capable of studying professional literature, including in a foreign language, and of analyzing databases using modern AI tools. They also possess knowledge of intellectual property and copyright protection, the application of standards and legal regulations, occupational health and safety, and the basics of entrepreneurship.

The Chemical Technology program prepares graduates to work across all sectors of the chemical industry and related branches, including companies that manufacture materials and products or represent their end-users. Graduates are also well-prepared to continue their education at the second-cycle (Master's) level or in postgraduate studies within the discipline of chemical sciences.

The relationship between the field of study and the university's strategy

The overarching theme of the Strategy of Lodz University of Technology (TUL) is COOPERATION, with EDUCATION being one of its key pillars (<https://p.lodz.pl/sites/default/files/2025-01/strategia-politechniki-lodzkiej-2025-2030.pdf>).

The Chemical Technology study program aligns with the University's main strategic objective in the field of education, namely: *Developing a model of education for students and doctoral candidates, which prepares graduates for the dynamically changing needs of the socio-economic environment.*

It also supports the specific strategic goals of TUL, which include:

1. Continuously improving the competencies of academic staff in modern teaching methods, up-to-date knowledge, technological development, and scientific trends;
2. Enhancing the educational offering, including complementary forms of education, in response to challenges of the socio-economic environment;
3. Strengthening talent management through the individualization of students' and doctoral candidates' learning paths;
4. Supporting the scientific development of students and doctoral candidates, with a focus on interdisciplinarity and internationalization;
5. Increasing student involvement in university-led research and intensifying opportunities for gaining practical experience outside the university.

The Chemical Technology program prepares graduates to meet the rapidly changing needs of the socio-economic environment by integrating knowledge across various areas of technology, including: pharmaceutical technology, green technologies, polymer technology, nuclear energy technologies, and photovoltaics.

Graduates will acquire advanced knowledge in chemical technology, general and inorganic chemistry, organic chemistry, thermodynamics, physical chemistry, analytical chemistry, mathematics, physics, and chemical engineering. The curriculum also includes process design, scaling, and modeling.

In addition to lectures, the program includes a significant number of laboratory classes, seminars, and projects, which help develop students' independence, creativity, analytical thinking, problem-solving skills, responsibility (both individual and team), and consistency. Students gain experience in both experimental work and the use of specialist software. The program fully utilizes the potential of the Faculty of Chemistry, especially its specialist scientific and teaching laboratories.

The program also includes topics such as programming, cybersecurity, artificial intelligence, occupational health and safety, basics of entrepreneurship, labor law, patent law, and intellectual property protection, equipping graduates with the competencies to start and run their own businesses.

Modern teaching methods will be employed in the program, such as project-based learning, challenge-based learning, and flipped education.

A wide selection of elective courses will allow students to shape their own individual educational paths freely.

In several subjects, collaboration with industry professionals is planned, enriching students' experiences. These professionals, by sharing their insights and success stories, can serve as a source of inspiration and motivation. Contact with professionals will also help students develop communication, interpersonal, and presentation skills, which are essential in any professional setting. Moreover, networking with industry experts will help students better understand labor market expectations and requirements, thereby preparing them more effectively for future career challenges.

The program has been consulted with socio-economic stakeholders, including enterprises operating in the field of chemical technology, and has received their approval.

Educational objectives and employment and continuing education opportunities

The aim of educating students in the Chemical Technology program is to prepare graduates for the profession of chemical technologist.

Graduates of the Chemical Technology program will possess the ability to apply advanced knowledge in chemical technology and chemistry, based on a solid foundation in mathematics, natural sciences, and engineering disciplines, and to use this knowledge in their professional work—particularly in the context of producing and safely applying chemical products, characterizing the properties of chemical substances, managing used goods and waste, promoting sustainable development, actively participating in teamwork, leading teams performing assigned tasks, and studying professional literature, including legal regulations related to running a business.

Graduates will be familiar with technological processes, especially environmentally friendly processes, and will possess the skills to interpret and quantitatively describe basic physico-chemical phenomena, as well as conduct laboratory work.

They will be prepared to develop technologies in chemical industry plants and supervise processes in areas such as organic synthesis, polymer technology, or chemical analysis, while adhering to economic, legal, and ethical principles, and to organize safe and efficient work environments.

Graduates will be equipped to work in chemical and related industries and will also be prepared to start and run their own businesses. Furthermore, they will have the opportunity to continue their education at the second-cycle (Master's) level or during postgraduate studies.

Description of the process and outcome of consultations on the proposed study program with the socio-economic environment

The program has been consulted with socio-economic stakeholders, including enterprises operating in the field of chemical technology, and has received their approval.

Description of competencies expected from a candidate applying for admission to studies

Not applicable.

The unit organizing education

Faculty of Chemistry

Education program

Semester 1

Course	Number of hours	ECTS points	Form of verification	Obligatory
General and Inorganic Chemistry	Tutorials: 60 Laboratory classes: 60 Lecture: 60	9	Exam	Obligatory
Mathematics I	Tutorials: 45 Lecture: 45	7	Exam	Obligatory
Introduction to Chemical Technology	Laboratory classes: 28	2	Graded assignment	Obligatory
Information Technology	Laboratory classes: 30 E-learning: 30	4	Graded assignment	Obligatory
Physics	Tutorials: 30 Lecture: 30	5	Exam	Obligatory
The Art of Studying	Lecture: 15	1	Graded assignment	Obligatory
Elective Course 1		2	Graded assignment	Obligatory group
The student chooses 1 subject.				
The Art and Colors of the World	Seminar: 15	2	Graded assignment	Optional
The History of Plastics	Seminar: 15	2	Graded assignment	Optional
Sum	448	30		

Semester 2

Course	Number of hours	ECTS points	Form of verification	Obligatory
Mathematics 2	Tutorials: 45 Lecture: 45	7	Exam	Obligatory

Course	Number of hours	ECTS points	Form of verification	Obligatory
Organic Chemistry I	Tutorials: 30 Lecture: 30	5	Exam	Obligatory
Mechanics and Apparatus of the Chemical Industry	Seminar: 10 Project work: 15 Lecture: 20	4	Exam	Obligatory
Introduction To Data Analysis	Laboratory classes: 45 Lecture: 15	4	Graded assignment	Obligatory
Engineering Graphics and CAD	Laboratory classes: 30	2	Graded assignment	Obligatory
Metal and Ceramic Materials	Laboratory classes: 15 Project work: 15 Lecture: 15	3	Graded assignment	Obligatory
Foreign Language Module 1		2	Graded assignment	Obligatory group
The student chooses one module from the group.				
English B2 module I	Tutorials: 30	2	Graded assignment	Optional
English B2+ module I	Tutorials: 30	2	Graded assignment	Optional
English C1 module I	Tutorials: 30	2	Graded assignment	Optional
German B2 module I	Tutorials: 30	2	Graded assignment	Optional
Physics - Laboratory	Laboratory classes: 45	3	Graded assignment	Obligatory
Physical Education 1	Tutorials: 30	0	Pass	Obligatory
Sum	435	30		

Semester 3

Course	Number of hours	ECTS points	Form of verification	Obligatory
Chemical Technology	Laboratory classes: 25 Project work: 15 Lecture: 30	5	Exam	Obligatory

Course	Number of hours	ECTS points	Form of verification	Obligatory
Applied Thermodynamics	Tutorials: 30 Laboratory classes: 30 Lecture: 30	6	Graded assignment	Obligatory
Organic Chemistry II	Tutorials: 30 Laboratory classes: 60 Lecture: 30	9	Exam	Obligatory
Electrical Engineering with Elements of Electronics	Laboratory classes: 30 Lecture: 15	3	Graded assignment	Obligatory
Industrial Analytics	Laboratory classes: 25 Lecture: 10	2	Graded assignment	Obligatory
Copyright and Patent Law	Lecture: 15	1	Graded assignment	Obligatory
Foreign Language Module 2		2	Graded assignment	Obligatory group
The student chooses one module from the group.				
English B2 module II	Tutorials: 30	2	Graded assignment	Optional
English B2+ module II	Tutorials: 30	2	Graded assignment	Optional
English C1 module II	Tutorials: 30	2	Graded assignment	Optional
German B2 module II	Tutorials: 30	2	Graded assignment	Optional
Elective Course 2		2	Graded assignment	Obligatory group
The student chooses 1 subject.				
Chemical Products Marketing	Project work: 10 Lecture: 5	2	Graded assignment	Optional
Legislation and Management in the Industry	Project work: 5 Lecture: 10	2	Graded assignment	Optional
Physical Education 2	Tutorials: 30	0	Pass	Obligatory
Sum	450	30		

Semester 4

Course	Number of hours	ECTS points	Form of verification	Obligatory
Polymer Construction Materials and Functional Additives	Laboratory classes: 30 Lecture: 30	4	Graded assignment	Obligatory
Chemical and Process Engineering	Laboratory classes: 30 Lecture: 30	4	Exam	Obligatory
Catalysis and Adsorption	Laboratory classes: 15 Project work: 15 Lecture: 30	4	Exam	Obligatory
Physical Chemistry	Tutorials: 30 Laboratory classes: 30 Lecture: 30	7	Exam	Obligatory
Foreign Language Module 3		2	Graded assignment	Obligatory group
The student chooses one module from the group.				
English B2 module III	Tutorials: 30	2	Graded assignment	Optional
English B2+ module III	Tutorials: 30	2	Graded assignment	Optional
English C1 module III	Tutorials: 30	2	Graded assignment	Optional
German B2 module III	Tutorials: 30	2	Graded assignment	Optional
Elective Course 3		9	Graded assignment	Obligatory group
The student chooses 3 subjects.				
Cosmetic and Pharmaceutical Product Technologies	Laboratory classes: 15 Lecture: 15	3	Graded assignment	Optional
Biomaterial, Biopolymer and Biodegradable Polymer Technologies	Laboratory classes: 12 Lecture: 18	3	Graded assignment	Optional
Technologie materiałów specjalnego przeznaczenia	Laboratory classes: 18 Lecture: 12	3	Graded assignment	Optional
Wastewater and Water Treatment Technologies	Laboratory classes: 15 Lecture: 15	3	Graded assignment	Optional

Course	Number of hours	ECTS points	Form of verification	Obligatory
Surface Modification Technologies and Anti-Corrosion Protection	Laboratory classes: 15 Lecture: 15	3	Graded assignment	Optional
Physical Education 3	Tutorials: 30	0	Pass	Obligatory
Sum	420	30		

Semester 5

Course	Number of hours	ECTS points	Form of verification	Obligatory
Contemporary Challenges of Chemical Technology	Project work: 60 Lecture: 25	7	Graded assignment	Obligatory
Closed-Loop Economy	Project work: 15 Lecture: 15	2	Graded assignment	Obligatory
Fundamentals of Automation and Control	Laboratory classes: 15 Project work: 15 Lecture: 15	3	Graded assignment	Obligatory
Instrumental Methods	Laboratory classes: 90 Lecture: 30	5	Exam	Obligatory
Design, Scaling and Modeling of Technological Processes	Seminar: 5 Project work: 45 Lecture: 30	7	Exam	Obligatory
Foreign Language Module 4		3	Exam	Obligatory group
The student chooses one module from the group.				
English B2 module IV	Tutorials: 30	3	Exam	Optional
English B2+ module IV	Tutorials: 30	3	Exam	Optional
English C1 module IV	Tutorials: 30	3	Exam	Optional
German B2 module IV	Tutorials: 30	3	Exam	Optional
Electronic Sources of Scientific and Technical Information	Laboratory classes: 15	1	Graded assignment	Obligatory

Course	Number of hours	ECTS points	Form of verification	Obligatory
Elective Course 4		2	Graded assignment	Obligatory group
The student chooses 1 subject.				
Quality Management	Project work: 15 Lecture: 15	2	Graded assignment	Optional
Chemical Products Management	Project work: 15 Lecture: 15	2	Graded assignment	Optional
Sum	435	30		

Semester 6

Course	Number of hours	ECTS points	Form of verification	Obligatory
Summative Module	Project work: 60	7	Graded assignment	Obligatory subjects to choose from
Sum	60	7		

Diploma Path: Drug Technologies

Course	Number of hours	ECTS points	Form of verification	Obligatory
Laboratory Data Management Systems	Laboratory classes: 30	3	Graded assignment	Obligatory specialization courses
Design and Synthesis of Biologically Active Compounds	Laboratory classes: 15 Tutorials: 30 Project work: 30 Lecture: 75	8	Exam	Obligatory specialization courses
Fluorescent Labels for Biologically Active Compounds	Laboratory classes: 15 Lecture: 15	3	Graded assignment	Obligatory specialization courses

Course	Number of hours	ECTS points	Form of verification	Obligatory
Basics of Pharmacokinetics and Pharmacodynamics	Laboratory classes: 26 Lecture: 4	3	Graded assignment	Obligatory specialization courses
Sensors	Laboratory classes: 15 Lecture: 15	3	Graded assignment	Obligatory specialization courses
English Chemical Terminology in Pharmaceutical Technologies	Tutorials: 30	3	Graded assignment	Obligatory specialization courses
Sum	300	23		

Diploma Path: Environmental Technologies

Course	Number of hours	ECTS points	Form of verification	Obligatory
Environmental Protection Technologies	Seminar: 15 Laboratory classes: 60 Project work: 45 Lecture: 30	8	Exam	Obligatory specialization courses
Environmental Biotechnology	Laboratory classes: 15 Lecture: 15	3	Graded assignment	Obligatory specialization courses
Polymer Recycling and Renewable Raw Materials	Laboratory classes: 15 Lecture: 15	3	Graded assignment	Obligatory specialization courses
Environmental Radiation Technologies	Laboratory classes: 15 Project work: 15	3	Graded assignment	Obligatory specialization courses
Renewable Energy Technologies	Project work: 20 Lecture: 10	3	Graded assignment	Obligatory specialization courses
English Chemical Terminology in Ecological Technologies	Tutorials: 30	3	Graded assignment	Obligatory specialization courses
Sum	300	23		

Diploma Path: Polymer Technologies

Course	Number of hours	ECTS points	Form of verification	Obligatory
Inorganic Materials	Project work: 15 Lecture: 15	3	Graded assignment	Obligatory specialization courses
Synthesis and Analysis of Plastic Additives	Laboratory classes: 10 Project work: 10 Lecture: 10	3	Graded assignment	Obligatory specialization courses
Technology of Plastics, Elastomer and Dyes	Laboratory classes: 90 Lecture: 60	8	Exam	Obligatory specialization courses
Radiation Techniques in Polymer Technology	Laboratory classes: 15 Project work: 15	3	Graded assignment	Obligatory specialization courses
Properties of Polymer Materials	Laboratory classes: 15 Lecture: 15	3	Graded assignment	Obligatory specialization courses
English Chemical Terminology in Polymer Technologies	Tutorials: 30	3	Graded assignment	Obligatory specialization courses
Sum	300	23		

Diploma Path: Nuclear Energy and Photovoltaics

Course	Number of hours	ECTS points	Form of verification	Obligatory
Modern Energy Storage Technologies	Laboratory classes: 8 Project work: 7 Lecture: 15	3	Graded assignment	Obligatory specialization courses
Biomass Processing and Recycling of Organic Compounds	Laboratory classes: 12 Project work: 8 Lecture: 10	3	Graded assignment	Obligatory specialization courses

Course	Number of hours	ECTS points	Form of verification	Obligatory
Polymer Materials in Energy Technologies	Laboratory classes: 15 Lecture: 15	3	Graded assignment	Obligatory specialization courses
Nuclear Energy	Tutorials: 15 Seminar: 15 Laboratory classes: 15 Project work: 15 Lecture: 30	6	Exam	Obligatory specialization courses
Modern Photovoltaics	Laboratory classes: 15 Project work: 45 Lecture: 30	5	Graded assignment	Obligatory specialization courses
English Chemical Terminology in Radiation Technologies	Tutorials: 30	3	Graded assignment	Obligatory specialization courses
Sum	300	23		

Semester 7

Course	Number of hours	ECTS points	Form of verification	Obligatory
Internship	Internship: 0	6	Pass	Obligatory
Interdisciplinary Project	Project work: 30	2	Graded assignment	Obligatory subjects to choose from
Engineering Laboratory	Seminar: 15 Laboratory classes: 63	4	Exam	Obligatory
Final Project	Seminar: 10	15	Pass	Obligatory subjects to choose from
Ergonomics and Occupational Safety	Seminar: 5 Lecture: 10	1	Graded assignment	Obligatory
Elective Course 5		2	Graded assignment	Obligatory group

Course	Number of hours	ECTS points	Form of verification	Obligatory
The student chooses 1 subject.				
Entrepreneurship Basics	Project work: 15 Lecture: 15	2	Graded assignment	Optional
Law for Engineers	Project work: 15 Lecture: 15	2	Graded assignment	Optional
Sum	163	30		