



Lodz University
of Technology

Study programme

Faculty:	Faculty of Biotechnology and Food Sciences
Major:	Food Technology and Human Nutrition
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:	Food Technology and Human Nutrition
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:	0721
Language of study:	polish

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

Discipline	Percentage share
Food technology and nutrition	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	1TZZ1	Has advanced and structured knowledge in the field of mathematics, physics, chemistry, biochemistry and microbiology as well as selected issues of food technology and analysis, enabling the understanding and evaluation of technological processes, raw materials, food products and basic processes occurring in the life cycle of devices and technical systems used in food processing.	P6U_W	P6S_WG, P6S_WG_inż
2	1TZZ10	Is ready to critically evaluate his/her knowledge, seek expert opinions, continuously improve professional competences, supplement knowledge and skills, and take on new professional challenges in accordance with the principles of ethics, social responsibility and sustainable development.	P6U_K	P6S_KK, P6S_KR
3	1TZZ2	Knows and understands the key challenges and dilemmas of modern civilization related to the production, preservation, storage and distribution of food, including issues of food safety, health quality, rational human nutrition and the impact of food technology on consumer health and the environment.	P6U_W	P6S_WK
4	1TZZ3	Knows and understands the basic economic, legal, ethical and environmental conditions of professional activity in the field of food technology and human nutrition, including the principles of food law, intellectual property protection and the basis for creation, organization and development of various forms of entrepreneurship, basics of entrepreneurship, important for the functioning of the food sector and food trade.	P6U_W	P6S_WK, P6S_WK_inż
5	1TZZ4	Is able to use his/her knowledge to identify and solve typical and unusual technological and quality problems occurring in food production and human nutrition, selecting appropriate sources of information, analytical methods and IT tools to support analysis and decision-making.	P6U_U	P6S_UW
6	1TZZ5	Is able to plan and carry out basic laboratory tests and experiments related to the assessment of food quality and safety, including measurements, analyses and simple computer simulations, as well as interpret the obtained results, formulate conclusions for the purposes of technological documentation and quality control, and present opinions and discussions.	P6U_U	P6S_UW, P6S_UW_inż
7	1TZZ6	Is able to participate in the design and improvement of technological processes and procedures in the food production and distribution chain, based on a critical analysis of existing technological solutions and in accordance with specific specifications, taking into account legal, economic and environmental requirements.	P6U_U	P6S_UW, P6S_UW_inż

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
8	1TZZ7	Is able to work in a team, including an interdisciplinary one, plan and carry out assigned tasks and communicate with the professional environment, as well as present opinions and discuss using specialist terminology in the field of food technology and nutrition, also in a foreign language at level B2 of the Common European Framework of Reference for Languages.	P6U_U	P6S_UK, P6S_UO
9	1TZZ8	Is able to independently plan and implement the lifelong learning process in order to improve professional competences and adapt to the changing requirements of the food sector labour market.	P6U_U	P6S_UU
10	1TZZ9	Is ready to initiate and responsibly participate in team and social activities and projects related to food technology and human nutrition, respecting the principles of professional ethics, achievements and traditions of the profession, demonstrating an entrepreneurial attitude in thinking and acting.	P6U_K	P6S_KO, P6S_KR

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

No.	Course name	Program content	1TZZ1	1TZZ10	1TZZ2	1TZZ3	1TZZ4	1TZZ5	1TZZ6	1TZZ7	1TZZ8	1TZZ9
1	Mathematics I	Elementary functions. Number sequences: properties and limits. Differential calculus of functions of one variable. Integral calculus of functions of one variable (indefinite and definite integrals, basic methods of integration.	x				x				x	
2	Physics I	Elements of classical mechanics: Newton's laws of motion, the dynamics of rigid body motion, and the fundamentals of vibration theory. Electrostatic and magnetic fields, their properties, and their influence on electric charge motion. Magnetic properties of matter. Solving simple engineering problems based on the phenomena and physical laws discussed, using appropriate mathematical frameworks.	x				x				x	
3	General and Inorganic Chemistry	Basic concepts and laws of chemistry, nomenclature. Types of chemical reactions, reaction rates and factors affecting them, reversible reactions, and chemical equilibrium. Solutions: concentration, solubility, dissociation, hydrolysis, buffers. Acid-base relations, electrolyte solubility. Quantitative and instrumental analysis.	x					x				
4	Digital Technologies for Engineers	Text editing, group collaboration, and content publishing – MS Office. Spreadsheets – data visualization, engineering calculations, statistical data processing. Networking and data security. Artificial intelligence as an engineering tool. Programming basics.					x	x				
5	Economics and Business Management	Fundamentals of business operation: economics, market mechanisms, and decision-making in competitive environments. Key management areas: planning, organization, human resources management, and control. Cost analysis, operational efficiency assessment, and the foundations of entrepreneurship and innovation.				x			x			
6	Basics of Dietetics and Human Nutrition	Nutrients and digestive system function. Principles of proper nutrition, energy standards and requirements. Nutritional value of food, dietary errors. Nutrition in various age groups, the role of diet in disease prevention. Characteristics of diets, nutritional assessment, and recommendations.		x	x		x					
7	Development of Future Competencies	Current trends shaping the competencies of the future and methods for their development. Social and personal competencies: communication, creativity, critical thinking, collaboration, mental resilience, and lifelong learning. Group coaching, self-reflection, self-diagnosis, career and development planning. Teamwork, conflict resolution, creative thinking, and strategies for coping with stress and building resilience.		x						x	x	x
8	Academic Personal Skills Development	Supporting first-year students' adaptation to university. Developing personal and social skills: self-organization, communication, goal-setting, time management, and coping with academic stress. Building motivation, awareness of one's own resources, and a responsible and reflective approach to education and professional development planning.		x						x	x	x
9	Physics II	The phenomenon of electromagnetic induction. Electromagnetic waves and their wave-particle nature. Phenomena affecting waves - elements of geometrical and quantum optics. Heat and energy, thermoelectric and photoelectric phenomena. Semiconductors. Elements of nuclear physics - properties of β and γ radiation.	x				x				x	

No.	Course name	Program content	1TZZ1	1TZZ10	1TZZ2	1TZZ3	1TZZ4	1TZZ5	1TZZ6	1TZZ7	1TZZ8	1TZZ9
10	Organic Chemistry in Food Technology	Fundamentals of organic chemistry in relation to the composition and transformation of food components. The structure, properties, and reactivity of organic compounds important in food technology and their impact on quality and nutritional value. Structural analysis, nomenclature, chemical reactions, and techniques for isolating, purifying, synthesizing, and analysing compounds. Assessment of chemical processes occurring during food processing and storage.	x				x	x				
11	Technical Documentation with Elements of Mechanical Engineering in the Food Industry	Elements of engineering graphics. Orthogonal projections, views, sections, layers, coordinate systems, and object dimensioning. Creating templates and drawings. Manufacturing drawings of machine components. Reading technical documentation and detailing parts based on assembly drawings. AutoCAD tools for creating documentation of machine and equipment components.						x	x			
12	Equipment and Unit Processes in Food Production	Unit processes and equipment in food production: preparation of raw materials, transport, mechanical operations (grinding, mixing, separation) and heat and mass transfer processes (heating, cooling, concentration, drying, extraction, crystallization). Measurements, processing of results, calculations, selection of parameters and assessment of the impact of the process on product quality and shelf life. Analysis of measurement results taking into account the principles of metrology.	x				x		x			
13	Nutrition Education	The concept of health and health education, the role of nutrition education in public health, and educator competencies. Determinants of nutritional behaviour. Application of rational nutrition principles, nutritional norms, and models. Nutrition education methods, communication and motivation to change habits, and an evidence-based approach. Education in various population groups and ethical and legal aspects.		x	x					x		x
14	Food Raw Materials from Different World Regions	The influence of climatic conditions, agricultural traditions, and the level of economic development on food raw materials in various regions of the world. The influence of climate zones on bioactive substances in selected fruits and vegetables, oilseeds, and tubers, and their nutritional properties. The technological suitability of selected fruits and vegetables, oilseeds, and tubers. The therapeutic properties of exotic plants and legal regulations in trade.	x		x							
15	Food and Beverages of the World	Global food and beverages in the context of civilizational development, culture, migration, and globalization. Microbiological and chemical characteristics of fermented and unfermented foods from various regions. Global beverage production technologies (wine, mead, beer, spirits), fermentation microbiota, and analysis, comparison, and assessment of the microbiological, chemical, and sensory quality of traditional and commercial products.	x		x							
16	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 interpersonal skills oriented around the future working environment of the university graduate.		x						x		
17	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 interpersonal skills oriented around the future working environment of the university graduate.		x						x		

No.	Course name	Program content	1TZZ1	1TZZ10	1TZZ2	1TZZ3	1TZZ4	1TZZ5	1TZZ6	1TZZ7	1TZZ8	1TZZ9
18	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 interpersonal skills oriented around the future working environment of the university graduate.		x						x		
19	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 interpersonal skills oriented around the future working environment of the university graduate.		x						x		
20	Mathematics II	Improper integrals. Applications of integrals. Elements of probability calculus. Ordinary differential equations. Elements of differential and integral calculus of functions of two variables.	x				x				x	
21	Biochemistry	Structure, properties, and functions of amino acids, proteins, carbohydrates, lipids, and nucleic acids. Basic metabolic processes and nutrient transformations and their importance for food value. Enzymes: structure, classification, and applications in food technology. Analysis of biomolecules and determination of enzyme activity in technological processes and quality control.	x					x				
22	Food Microbiology	Structure, physiology, metabolism, and classification of microorganisms. The occurrence and importance of microorganisms in raw materials and food products, as well as their involvement in technological processes. Basic issues related to microbiological food contamination and methods for its control.	x		x		x	x				
23	Technology of Foods of Animal Origin	Characteristics of slaughter animals. The structure and chemical composition of muscle tissue and factors affecting meat quality, post-slaughter processes, and meat defects. Meat processing technologies. The composition and nutritional value of eggs, milk, and fish. Production methods, preservation, and functional additives in the processing of animal products, and analysis of product composition and quality.	x				x	x	x			
24	Process Engineering	Modelling, design, and balancing processes in the food industry. Mechanical, thermal, and mass transfer processes, raw material rheology, and system flows. Food processing and preservation methods and their impact on quality, safety, and environmental footprint. Applications of hydromechanics, heat and mass transfer, engineering calculations, design of system components, energy consumption analysis, and optimization options.	x				x		x	x		
25	Science Communication in Dietetics	The concept and importance of science communication in dietetics. Evidence-based communication, information sources, and critical literature analysis. Differences between science, popular, and media communication. Principles of ethical communication, communicating risk and uncertainty, and data visualization. Professional responsibility of dietitians and countering disinformation and pseudoscience.					x			x	x	x
26	Facts and Myths in Human Nutrition	Characteristics of the scientific process in evidence-based dietetics. Selected logical fallacies. Strength of scientific evidence in the human nutrition sciences. Popular diets. Everyday dietary choices (milk, meat, vegetables, sugar). Organic food. Dietary supplements. Carcinogenic and anticarcinogenic effects of selected substances. Nutrition in selected diseases. Allergies and intolerances, nutritional prevention.					x			x	x	x

No.	Course name	Program content	1TZZ1	1TZZ10	1TZZ2	1TZZ3	1TZZ4	1TZZ5	1TZZ6	1TZZ7	1TZZ8	1TZZ9
27	Natural Food Stabilizers	Use of plant extracts, essential oils, and microbial metabolites as natural preservatives in food matrices. Methods for assessing the antimicrobial activity of selected natural stabilizers. Determining the minimum inhibitory concentration for natural substances that inhibit the growth of typical food microbiota.	x		x			x	x			
28	Food as a Nutraceutical	Concepts of drug and nutraceutical; dietary supplement and medicinal product. Natural medicinal substances in foods and diets of various cultures. Oxidative stress, inflammatory biomarkers, and the role of antioxidants: bioavailability, metabolism, and methods for assessing activity. The use of food in prevention and therapy, maintaining bioactivity after processing. Verification of health-promoting properties and the design and legislation of functional foods.	x		x			x	x			
29	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 interpersonal skills oriented around the future working environment of the university graduate.		x						x		
30	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 interpersonal skills oriented around the future working environment of the university graduate.		x						x		
31	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 interpersonal skills oriented around the future working environment of the university graduate.		x						x		
32	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 interpersonal skills oriented around the future working environment of the university graduate.		x						x		
33	Introduction to Data Analysis	Descriptive statistics and visualization of experimental data. Estimation of population parameters. Testing statistical hypotheses regarding population parameters and distribution shapes. Correlation and regression analysis. Basics of experimental design. Using specialized computer software to support statistical analysis.	x				x	x				
34	Technology of Foods of Plant Origin	Properties of plant raw materials (potatoes, cereals, sugar beets, fruits, vegetables, and oilseeds) and their key technological processing processes, cereal products, refined potato products, sugar, fruit and vegetable products, and vegetable fats. Modern techniques for obtaining and modifying starch, methods for preserving and thickening fruit and vegetable products, and methods for obtaining and refining vegetable fats. Assessment of the quality and technological suitability of raw materials and final products.	x				x	x	x			
35	Automation and Electrical Engineering in the Food Industry	Fundamentals of automation in the food industry: measurement equipment, sensors and transducers, computer systems for data acquisition and visualization. Process control and regulation: object models, control quality, PI/PID controllers, microprocessor systems, and automation schemes. Measurements, tests of static and dynamic characteristics, and analysis of control loops for process variables (level, flow, pH, temperature).	x					x	x			

No.	Course name	Program content	1TZZ1	1TZZ10	1TZZ2	1TZZ3	1TZZ4	1TZZ5	1TZZ6	1TZZ7	1TZZ8	1TZZ9
36	Thermodynamics and Energy Management	Energy transformations in food industry processes and plants. Laws of thermodynamics, phase transitions, and diagrams applied to heating, cooling, freezing, and drying. Energy efficiency, thermal integration, energy recovery, renewable energy sources, and low-emission technologies. Refrigeration systems, heat pumps, process steam, and energy storage. Analysis of energy transformations, thermodynamic calculations, and energy system efficiency assessment.	x				x		x			
37	Food Analysis	Classical and instrumental methods in food analysis. Classification and characteristics of instrumental methods. Principles of sampling and preparation of samples for analysis. Food quality. Components of food quality. Scope of food analysis and evaluation. Standardization of food analysis methods. Criteria for evaluating selected food products. Interpretation of results. Sources of errors in food analysis.	x			x	x	x				
38	Water and Wastewater Management	Classification and characterization of wastewater and its environmental impact. Technologies for water treatment and food wastewater treatment using physical, chemical, and biological methods. Modern directions for the development of these technologies, focusing on increasing efficiency, energy recovery, and adapting these processes to the specific needs of the food industry.			x	x			x			
39	Environmental Aspects of Food Production	The impact of food production on the natural environment. Methods for reducing the negative impact of food production on the environment. Fundamentals and development of organic farming. Organic food – development, production, labelling. By-products and waste in the food industry: definitions, legal regulations. Waste management methods. Directions for the use of by-products. Innovative methods for processing by-products to obtain preparations with functional and bioactive properties.			x	x			x			
40	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 interpersonal skills oriented around the future working environment of the university graduate.		x						x		
41	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 interpersonal skills oriented around the future working environment of the university graduate.		x						x		
42	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 interpersonal skills oriented around the future working environment of the university graduate.		x						x		
43	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 interpersonal skills oriented around the future working environment of the university graduate.		x						x		
44	Shaping the Sensory Properties of Food	Sensory analysis of food and the role of additives in shaping colour, flavour, aroma, and texture. Principles of sensory function, organization of sensory studies, sample preparation, panellist training, research methods, and results analysis. Instrumental methods and the role of food additives in modelling food characteristics, and the classification and properties of additives.	x				x	x	x			

No.	Course name	Program content	1TZZ1	1TZZ10	1TZZ2	1TZZ3	1TZZ4	1TZZ5	1TZZ6	1TZZ7	1TZZ8	1TZZ9
45	Food Law	Issues related to legal regulations related to food production, trade, and control. National and EU legal acts regulating food safety, quality, and labelling requirements. Obligations of food market operators and principles of official food control.		x		x	x		x			
46	Antinutritional and Toxic Substances	Groups of antinutritional and toxic substances of natural origin, chemical contaminants. Characterization of selected substances and their physicochemical properties determining biological activity, including mutagenicity, cytotoxicity, and carcinogenicity. Current legal regulations in this area. Analytical methods in toxicological studies with sample determinations.		x	x			x				
47	Technology of Fermented Products	Technologies for the production of fermented milk beverages, fermented vegetables, fermented meat products, bread, beer, wine, ethanol, and selected spirit drinks. Understanding individual technological stages and performing microbiological and/or physicochemical evaluation of the obtained products.	x				x	x	x			
48	Food Safety Management	GMP/GHP requirements in food production and distribution. The HACCP system in the EU and Poland, terminology and requirements according to Codex Alimentarius and ISO 22000. Hazard identification, risk assessment, CCP, monitoring, and corrective actions. Documentation, supervision, effectiveness assessment, and HACCP certification, as well as sources of microbiological hazards.			x	x	x	x				
49	Quality in the Food Supply Chain	Factors influencing quality at the storage, transport, and distribution stages, with particular emphasis on the cold chain. The role of packaging in maintaining quality and reducing losses. Methods for monitoring and assessing quality parameters, traceability, and quality documentation. Analysis of product quality changes under logistical conditions, risk assessment, and case studies of supply chain disruptions. Design and verification of quality management systems in selected food supply chains.			x	x	x		x			
50	Food Production in Sustainable Development	Fundamentals and history of sustainable development, environmental issues, and biodiversity. Sustainable agriculture, food production, and processing. Management in the food industry, the "Farm to Fork" strategy, zero waste, and the circular economy. Assessment of the environmental footprint of food (carbon footprint, water footprint, LCA), resource efficiency, and emission reduction. Innovative technological solutions consistent with the principles of sustainable development.		x	x				x			
51	ESG Strategies in Sustainable Production	ESG principles in the operations of manufacturing companies. Designing and optimizing processes with environmental performance, social responsibility, and organizational governance in mind. ESG reporting regulations and standards, product life cycle assessment (LCA), and tools for sustainable industrial transformation. Analyzing ESG strategies and their impact on competitiveness, innovation, and long-term company development.		x	x				x			
52	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 interpersonal skills oriented around the future working environment of the university graduate.		x						x		
53	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 interpersonal skills oriented around the future working environment of the university graduate.		x						x		

No.	Course name	Program content	1TZZ1	1TZZ10	1TZZ2	1TZZ3	1TZZ4	1TZZ5	1TZZ6	1TZZ7	1TZZ8	1TZZ9
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 interpersonal skills oriented around the future working environment of the university graduate.		x						x		
55	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 interpersonal skills oriented around the future working environment of the university graduate.		x						x		
56	Summative Module	Interdisciplinary engineering project in the field of food technology and human nutrition. The project requires the use of knowledge and skills acquired in earlier stages of engineering studies. Solving the project requires knowledge of project management principles, the basics of life-cycle analysis and standardization, technology transfer, and the commercialization of research results. Implementation of the project allows for verification of the achievement of the learning outcomes specified for the given study program.	x		x		x	x		x		x
57	Internship in scientific and research institutions	Internships in laboratories, food supervision and official control units, and institutions related to human nutrition. Familiarization with the unit's activities and structure, research scope, analytical procedures, and methods. Improvement in work organization and planning skills, as well as team and inter-unit collaboration.		x						x	x	x
58	Internship in industrial plants	Internships in food production plants, catering organizations, or related sectors of the food industry. Familiarization with the unit's operations, organizational structure, and technological processes. Familiarization with the responsibilities, procedures, and work methods of the positions, as well as development of work organization, planning, and teamwork skills.		x						x	x	x
59	Shaping the Durability and Digestibility of Health-Promoting Ingredients in Modern Dietary Catering	Selection and functional stability of raw materials and bioactive ingredients in catering: processing, cooling, transport, storage, and heating of meals. Packaging, including biodegradable packaging, and minimal processing technologies. Bioavailability and bioavailability of health-promoting ingredients, analysis methods, and microencapsulation in dietary catering. Recipe balancing, taking into account processing and digestibility, and diet personalization.	x		x			x	x			
60	Next Generation Convenience Food	Consumer preferences and trends in convenience food – from fast food to functional foods. Convenience categories with varying nutritional value. Convenience food production technologies for various logistics chains and ready-to-cook, ready-to-eat, and ready-to-reheat systems. Stability of nutritional and functional ingredients, and product design for health needs and sensory preferences.	x		x			x	x			
61	Effective Technologies in the Sugar Industry	Analysis of technological solutions in the sugar industry, taking into account individual processes and their potential for improvement. Assessment of the impact of raw material quality variability on process stability and efficiency, as well as process risk. Analytical assessment of raw material and semi-finished product quality as a basis for technological decisions. Case studies on the impact of raw material quality on process flow and preventive and corrective actions.			x	x		x	x			

No.	Course name	Program content	1TZZ1	1TZZ10	1TZZ2	1TZZ3	1TZZ4	1TZZ5	1TZZ6	1TZZ7	1TZZ8	1TZZ9
62	Sugar Industry As An Example of Responsible Use of Natural Resources	Transforming the sugar industry from traditional production to a modern bioeconomy. Efficient resource utilization, emission reduction, and waste management. Decision-making based on environmental and social data. The concept of process-embedded quality, inline/online sensors (e.g., NIR), and a PAT approach to ongoing parameter control and reducing raw material and energy losses.			x	x		x	x			
63	Modern Technologies and Production Systems in the Confectionery and Bakery Industry	Modern technologies, equipment, and production systems in the confectionery and bakery industries. Current state-of-the-art production techniques and technologies, principles for selecting raw materials, machinery, and equipment to obtain products with the desired properties and quality.	x					x	x			
64	Designing Functional Confectionery and Bakery Products	Design, production and quality assessment of functional bakery and confectionery products with documented health-promoting effects, increased nutritional value or reduced content of undesirable ingredients.	x					x	x			
65	Separation Methods in Food Analysis	Classification of separation methods; chromatographic methods (HPLC, GC, TLC); components of a chromatographic system and types of detection. Membrane methods, electrophoretic methods, extraction techniques. Preparation of food samples for analysis. Practical applications of separation methods in food analysis. Current trends and modern separation techniques, e.g. LC-MS and GC-MS. Qualitative and quantitative analysis in chromatography.	x				x	x	x			
66	Quality Assurance in Food Analysis	Quality assurance in food analysis at all stages of the analytical process, good laboratory practice. Assessment of the quality and reliability of results. Analysis of errors and sources of uncertainty in classical and instrumental methods. Interpretation of analytical data, documentation of results. Practical elements of method validation and verification in laboratory conditions.	x				x	x	x			
67	Diploma Seminar	Formal requirements for preparing an engineering thesis. Presentation of the thesis assumptions and concepts, literature review, experimental results, and conclusions. Critical analysis of the obtained research results. Active and substantive participation in the discussion. Case study - assumptions, solutions. Verification of the degree of achievement of key learning outcomes during a competency examination based on a case study.		x			x	x			x	
68	Final Project	Synthetic presentation in the form of a scientific dissertation of the knowledge, skills and competences acquired throughout the entire study program, describing an independent, comprehensive solution to a given engineering problem.	x	x			x	x			x	
69	Elective Project PBL	Interdisciplinary project that develops the knowledge and skills acquired in the summative module of semester VI. The project enables the acquisition of new engineering competencies in food technology, human nutrition, and related sciences. The course is conducted using the PBL method, with topics tailored to identified needs.		x			x		x	x		x
70	Legal and Organizational Aspects in Engineering Practice	Fundamentals of intellectual property protection: its origins, validity, sources of law, the subjectivity of authors, and copyright and industrial property, taking into account national and international protection procedures. Legal systems of occupational health and safety management concepts, risk assessment, and standardization. Fundamentals of ergonomics: its scope, nature of activities, and principles of workstation design. Technological strategies and technology transfer.				x		x				

No.	Course name	Program content	1TZZ1	1TZZ10	1TZZ2	1TZZ3	1TZZ4	1TZZ5	1TZZ6	1TZZ7	1TZZ8	1TZZ9
71	Graduates on the Job Market	Preparing to enter the job market: analysing competencies and employment trends, and career support systems. Creating application documents, building a professional image, and utilizing AI tools in recruitment. Networking, alternative career paths, mental resilience, and change management. Developing an individual development strategy, graduate portfolio, and competency plan in a workshop format.		x		x				x	x	
72	Ethical Aspects of Food Production	Fundamentals of food ethics. Ethics in the food industry and marketing, workers' rights. Food production, animal welfare, and the environment. GMOs, pesticides, and biotechnology – ethical dilemmas. Consumer choices, ethical purchasing, and the future of food.		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	Mathematics I	8				
2	Physics I	2				
3	General and Inorganic Chemistry	7			7	
4	Digital Technologies for Engineers	3				
5	Economics and Business Management	2	2			
6	Basics of Dietetics and Human Nutrition	6			6	
7	Development of Future Competencies	2	2	2		
8	Academic Personal Skills Development	2	2	2		
9	Physics II	2				
10	Organic Chemistry in Food Technology	7			7	
11	Technical Documentation with Elements of Mechanical Engineering in the Food Industry	3			3	
12	Equipment and Unit Processes in Food Production	6			6	
13	Nutrition Education	2			2	
14	Food Raw Materials from Different World Regions	2		2	2	
15	Food and Beverages of the World	2		2	2	
16	English B2 module I	2		2		
17	English B2+ module I	2		2		
18	German B2 module I	2		2		
19	English C1 module I	2		2		
20	Mathematics II	6				

No.	Course name	ECTS	Subjects in the field of humanities and social sciences	Elective subjects	Profile items	Classes in a foreign language
21	Biochemistry	4			4	
22	Food Microbiology	7			7	
23	Technology of Foods of Animal Origin	7			7	
24	Process Engineering	4				
25	Science Communication in Dietetics	3		3	3	3
26	Facts and Myths in Human Nutrition	3		3	3	3
27	Natural Food Stabilizers	3		3	3	
28	Food as a Nutraceutical	3		3	3	
29	English B2 module II	2		2		
30	English B2+ module II	2		2		
31	German B2 module II	2		2		
32	English C1 module II	2		2		
33	Introduction to Data Analysis	2			2	
34	Technology of Foods of Plant Origin	8			8	
35	Automation and Electrical Engineering in the Food Industry	4				
36	Thermodynamics and Energy Management	4				
37	Food Analysis	7			7	
38	Water and Wastewater Management	3		3	3	
39	Environmental Aspects of Food Production	3		3	3	
40	English B2 module III	2		2		
41	English 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	German B2 module III	2		2		
43	English C1 module III	2		2		
44	Shaping the Sensory Properties of Food	6			6	
45	Food Law	4			4	
46	Antinutritional and Toxic Substances	4			4	
47	Technology of Fermented Products	3			3	
48	Food Safety Management	3			3	
49	Quality in the Food Supply Chain	4			4	
50	Food Production in Sustainable Development	3		3		
51	ESG Strategies in Sustainable Production	3		3		
52	English B2 module IV	3		3		
53	English B2+ module IV	3		3		
54	German B2 module IV	3		3		
55	English C1 module IV	3		3		
56	Summative Module	8			8	
57	Internship in scientific and research institutions	6		6		
58	Internship in industrial plants	6		6		
59	Shaping the Durability and Digestibility of Health-Promoting Ingredients in Modern Dietary Catering	4		4	4	
60	Next Generation Convenience Food	4		4	4	
61	Effective Technologies in the Sugar Industry	4		4	4	
62	Sugar Industry As An Example of Responsible Use of Natural Resources	4		4	4	

No.	Course name	ECTS	Subjects in the field of humanities and social sciences	Elective subjects	Profile items	Classes in a foreign language
63	Modern Technologies and Production Systems in the Confectionery and Bakery Industry	4		4	4	
64	Designing Functional Confectionery and Bakery Products	4		4	4	
65	Separation Methods in Food Analysis	4		4	4	
66	Quality Assurance in Food Analysis	4		4	4	
67	Diploma Seminar	3			3	
68	Final Project	15		15	15	
69	Elective Project PBL	4		4	4	
70	Legal and Organizational Aspects in Engineering Practice	3				
71	Graduates on the Job Market	2				
72	Ethical Aspects of Food Production	3	3		3	

ECTS indicators

Name	Value
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)	66/210 (31.43%)
The total number of ECTS credits to be earned by a student through courses in the fields of humanities or social sciences	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	150/210 (71.43%)

Methods of verifying and assessing learning outcomes

The verification of achieved learning outcomes requires the use of diverse assessment methods appropriate to the categories of knowledge, skills, and social competencies to which these outcomes pertain. The selection of suitable tools also depends on the specific nature of the subject and the format of the classes and is described in detail in the course syllabi. The achievement of the required learning outcomes is assessed through:

1. Written assignments (exams, quizzes, reports, essays, projects, posters, thesis, etc.);
2. Oral assessments (oral exams, public speaking, e.g., delivering a paper, presentation, etc.);
3. Practical and/or project-based tasks (both individual and group work);
4. Observation and evaluation of students' participation and activity during classes;
5. Self-assessment and peer evaluation (especially in the case of group projects);
6. Competency exams and final diploma examinations.

Verification can be formative (partial, conducted multiple times during the course) and/or summative (final grade assessment). The final verification result is given according to the currently applicable grading scale.

\The course coordinator or instructor is required to present the course syllabus during the first class and to clearly define and formally communicate the assessment methods and conditions for verifying learning outcomes.

Professional internships

Duration: 6 weeks

ECTS credits: 6

Internships are carried out in accordance with the study program in a format adapted to the profile and specifics of the field of study, following the regulations set by the faculty and the university.

Characteristics of the course

Graduate profile

Graduates of the first-cycle program in Food Technology and Human Nutrition obtain an engineering degree and possess the knowledge and skills to perform engineering tasks in the field of food technology and human nutrition. They are prepared to work in food industry enterprises, entities involved in the production, preservation, storage, and distribution of food, as well as in institutions involved in the assessment of food quality and safety. Graduates possess structured knowledge covering mathematics, physics, and chemistry, which constitute the basis for understanding technological processes, as well as knowledge of food technology, process engineering, biochemistry, food microbiology, food analysis, principles of human nutrition, and the basics of economics and management. They understand the properties of food raw materials and the principles of selecting and applying technological processes in the production of food of plant and animal origin, including fermented products.

Graduates are able to plan and carry out basic tasks related to the management and control of technological processes, apply analytical, biochemical, microbiological, and statistical methods in the assessment of food quality and safety, as well as interpret research results and maintain technological documentation. They are prepared to implement and apply quality and food safety assurance systems and to comply with food law regulations.

Graduates incorporate the principles of ethics, environmental protection, and sustainable development into their professional activities. They possess the ability to work in a team, communicate in a professional environment, and utilize information technology to support technological and analytical processes. They have sufficient foreign language skills to utilize professional literature and technical documentation. They are prepared to undertake professional work and continue their education in second-cycle and postgraduate studies.

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

The Food Technology and Human Nutrition curriculum, based on extensive knowledge, practical skills, and social competencies, aligns with the mission of Lodz University of Technology, as formulated in the university's strategy for 2025-2030. The guiding principle is collaboration that engages both staff and students, as well as representatives of the business community. This program aligns with TUL's mission to build a sustainable research university that develops innovations for the benefit of society, the economy, and the world, promoting the concept of lifelong learning.

Ensuring high-quality education in the Food Technology and Human Nutrition program is one of the Faculty's priorities and is achieved through, among other things:

- a personnel policy focused on teaching by academic teachers with the highest competences, conducting top-level research;
- improving teaching skills and staff competencies through training in modern teaching methods, current knowledge, technological developments, and scientific trends;
- continuous improvement of the educational offering in response to the needs and challenges of the socio-economic environment;
- developing a student-friendly educational, housing, and support infrastructure.

The study program, responding to the current needs of the dynamically changing labor market, has high application potential. For outstanding students, the program also provides the opportunity to individualize their learning path and pursue a thesis topic proposed by the student, which fosters the development of research and professional potential. Modern forms of education, including active collaboration with businesses, enable students to acquire valuable practical skills and prepare them for work in highly specialized sectors of the knowledge-based economy.

Educational objectives and employment and continuing education opportunities

The Food Technology and Human Nutrition program at Lodz University of Technology aims to educate graduates who combine knowledge of basic subjects (mathematics, physics, chemistry) with knowledge of technical, technological, nutritional, economic, and management sciences, enabling them to identify and solve problems related to nutrition, production, preservation, storage, and distribution of food, as well as its analysis and quality assessment. Knowledge and skills in food analysis, biochemistry, microbiology, and information technology enable them to conduct analytical work. The education is engineering-based and focuses on providing a solid theoretical foundation and practical skills necessary for functioning in a professional environment. The aim of the education is for graduates to acquire engineering competencies that will allow them to design, manage, and modify existing food production

technologies, taking into account the principles of sustainable development. The curriculum prepares specialists for work in engineering positions in food industry enterprises involved in food production, trade, control, and human nutrition. Thanks to flexible and interdisciplinary preparation, graduates are sought-after specialists in the job market and are also able to adapt to the demands of work in other related fields. At the same time, first-cycle studies provide a solid foundation for further education – graduates have the opportunity to continue their studies at second-cycle level and participate in postgraduate studies and specialized courses, allowing for the further development of professional and scientific competencies.

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

The direction of changes in the Food Technology and Human Nutrition curriculum was determined by the expectations of the socio-economic environment and the needs of the labor market. The program changes were preceded by consultations with food industry entrepreneurs who participated in the Faculty's Business Council. These consultations were conducted through a survey and face-to-face discussions during Council meetings. Furthermore, based on job offers, a review of the competencies employers expect from Food Technology and Human Nutrition graduates was conducted. The entrepreneur reviewed the curriculum by completing a survey. According to the entrepreneur, the curriculum meets the current needs of the food industry labor market. A key advantage of the program is its significant practical component. Learning outcomes are clearly defined and relevant to the course content. The proposed curriculum ensures that graduates are well-prepared for work in the food sector.

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

In accordance with the recruitment resolution for a given academic year.

The unit organizing education

Faculty of Biotechnology and Food Sciences

Education program

Semester 1

Course	Number of hours	ECTS points	Form of verification	Obligatory
Mathematics I	Tutorials: 75 Lecture: 30	8	Exam	Obligatory
Physics I	Tutorials: 15 Lecture: 15	2	Graded assignment	Obligatory
General and Inorganic Chemistry	Tutorials: 30 Laboratory classes: 45 Lecture: 30	7	Graded assignment	Obligatory
Digital Technologies for Engineers	Laboratory classes: 45	3	Graded assignment	Obligatory
Economics and Business Management	Tutorials: 15 Lecture: 10	2	Graded assignment	Obligatory
Basics of Dietetics and Human Nutrition	Tutorials: 30 Project work: 15 Lecture: 30	6	Exam	Obligatory
Elective Courses 1		2	Graded assignment	Obligatory group
The student chooses 1 subject				
Development of Future Competencies	Tutorials: 30	2	Graded assignment	Optional
Academic Personal Skills Development	Tutorials: 30	2	Graded assignment	Optional
Sum	415	30		

Semester 2

Course	Number of hours	ECTS points	Form of verification	Obligatory
Physics II	Laboratory classes: 30	2	Graded assignment	Obligatory

Course	Number of hours	ECTS points	Form of verification	Obligatory
Organic Chemistry in Food Technology	Tutorials: 30 Laboratory classes: 45 Lecture: 30	7	Graded assignment	Obligatory
Technical Documentation with Elements of Mechanical Engineering in the Food Industry	Tutorials: 10 Project work: 20	3	Graded assignment	Obligatory
Equipment and Unit Processes in Food Production	Tutorials: 15 Laboratory classes: 30 Lecture: 30	6	Exam	Obligatory
Nutrition Education	Project work: 25	2	Graded assignment	Obligatory
Elective Courses 2		2	Graded assignment	Obligatory group
Food Raw Materials from Different World Regions	Lecture: 30	2	Graded assignment	Optional
Food and Beverages of the World	Lecture: 30	2	Graded assignment	Optional
Foreign Language Module 1		2	Graded assignment	Obligatory group
The student chooses 1 module				
English B2 module I	Tutorials: 30	2	Graded assignment	Optional
English B2+ module I	Tutorials: 30	2	Graded assignment	Optional
German B2 module I	Tutorials: 30	2	Graded assignment	Optional
English C1 module I	Tutorials: 30	2	Graded assignment	Optional
Physical Education 1	Tutorials: 30	0	Pass	Obligatory
Mathematics II	Tutorials: 45 Lecture: 30	6	Exam	Obligatory
Sum	430	30		

Semester 3

Course	Number of hours	ECTS points	Form of verification	Obligatory
Biochemistry	Laboratory classes: 30 Lecture: 30	4	Graded assignment	Obligatory
Food Microbiology	Laboratory classes: 45 Lecture: 30 E-learning: 10	7	Exam	Obligatory
Technology of Foods of Animal Origin	Laboratory classes: 45 Lecture: 30	7	Exam	Obligatory
Process Engineering	Tutorials: 15 Project work: 15 Lecture: 30	4	Graded assignment	Obligatory
Elective Courses 3		3	Graded assignment	Obligatory group
The student chooses 1 subject				
Science Communication in Dietetics	Project work: 20	3	Graded assignment	Optional
Facts and Myths in Human Nutrition	Project work: 20	3	Graded assignment	Optional
Elective Courses 4		3	Graded assignment	Obligatory group
The student chooses 1 subject				
Natural Food Stabilizers	Laboratory classes: 15 Lecture: 15	3	Graded assignment	Optional
Food as a Nutraceutical	Laboratory classes: 15 Lecture: 15	3	Graded assignment	Optional
Foreign Language Module 2		2	Graded assignment	Obligatory group
The student chooses 1 module				
English B2 module II	Tutorials: 30	2	Graded assignment	Optional
English B2+ module II	Tutorials: 30	2	Graded assignment	Optional
German B2 module II	Tutorials: 30	2	Graded assignment	Optional
English C1 module II	Tutorials: 30	2	Graded assignment	Optional
Physical Education 2	Tutorials: 30	0	Pass	Obligatory
Sum	390	30		

Semester 4

Course	Number of hours	ECTS points	Form of verification	Obligatory
Introduction to Data Analysis	Tutorials: 30	2	Graded assignment	Obligatory
Technology of Foods of Plant Origin	Laboratory classes: 75 Lecture: 20	8	Exam	Obligatory
Automation and Electrical Engineering in the Food Industry	Laboratory classes: 30 Lecture: 20	4	Graded assignment	Obligatory
Thermodynamics and Energy Management	Tutorials: 20 Lecture: 20	4	Exam	Obligatory
Food Analysis	Laboratory classes: 70 Lecture: 20	7	Graded assignment	Obligatory
Elective Course 5		3	Graded assignment	Obligatory group
The student chooses 1 subject				
Water and Wastewater Management	Laboratory classes: 25 Lecture: 15	3	Graded assignment	Optional
Environmental Aspects of Food Production	Laboratory classes: 25 Lecture: 15	3	Graded assignment	Optional
Foreign Language Module 3		2	Graded assignment	Obligatory group
The student chooses 1 module				
English B2 module III	Tutorials: 30	2	Graded assignment	Optional
English B2+ module III	Tutorials: 30	2	Graded assignment	Optional
German B2 module III	Tutorials: 30	2	Graded assignment	Optional
English C1 module III	Tutorials: 30	2	Graded assignment	Optional
Physical Education 3	Tutorials: 30	0	Pass	Obligatory
Sum	405	30		

Semester 5

Course	Number of hours	ECTS points	Form of verification	Obligatory
Shaping the Sensory Properties of Food	Laboratory classes: 45 Project work: 15 Lecture: 20	6	Exam	Obligatory
Food Law	Tutorials: 30 Lecture: 15	4	Exam	Obligatory
Antinutritional and Toxic Substances	Laboratory classes: 45 Lecture: 20	4	Graded assignment	Obligatory
Technology of Fermented Products	Laboratory classes: 30 Lecture: 20	3	Graded assignment	Obligatory
Food Safety Management	Laboratory classes: 15 Project work: 20 Lecture: 20	3	Graded assignment	Obligatory
Quality in the Food Supply Chain	Laboratory classes: 20 Project work: 20 Lecture: 20	4	Graded assignment	Obligatory
Elective Courses 6		3	Graded assignment	Obligatory group
The student chooses 1 subject				
Food Production in Sustainable Development	Tutorials: 20 Project work: 20 Lecture: 15	3	Graded assignment	Optional
ESG Strategies in Sustainable Production	Tutorials: 20 Project work: 20 Lecture: 15	3	Graded assignment	Optional
Foreign Language Module 4		3	Exam	Obligatory group
The student chooses 1 module				
English B2 module IV	Tutorials: 30	3	Exam	Optional
English B2+ module IV	Tutorials: 30	3	Exam	Optional
German B2 module IV	Tutorials: 30	3	Exam	Optional

Course	Number of hours	ECTS points	Form of verification	Obligatory
English C1 module IV	Tutorials: 30	3	Exam	Optional
Sum	440	30		

Semester 6

Course	Number of hours	ECTS points	Form of verification	Obligatory
Summative Module	Project work: 140	8	Graded assignment	Obligatory
Elective Student Internships		6	Pass	Obligatory group
The student chooses 1 subject				
Internship in scientific and research institutions	Internship: 0	6	Pass	Optional
Internship in industrial plants	Internship: 0	6	Pass	Optional
Elective Courses 7		4	Graded assignment	Obligatory group
The student chooses 1 subject				
Shaping the Durability and Digestibility of Health-Promoting Ingredients in Modern Dietary Catering	Laboratory classes: 40 Project work: 20 Lecture: 10	4	Graded assignment	Optional
Next Generation Convenience Food	Laboratory classes: 40 Project work: 20 Lecture: 10	4	Graded assignment	Optional
Elective Courses 8		4	Graded assignment	Obligatory group
The student chooses 1 subject				
Effective Technologies in the Sugar Industry	Laboratory classes: 25 Project work: 35 Lecture: 10	4	Graded assignment	Optional
Sugar Industry As An Example of Responsible Use of Natural Resources	Laboratory classes: 25 Project work: 35 Lecture: 10	4	Graded assignment	Optional

Course	Number of hours	ECTS points	Form of verification	Obligatory
Elective Courses 9		4	Graded assignment	Obligatory group
The student chooses 1 subject				
Modern Technologies and Production Systems in the Confectionery and Bakery Industry	Laboratory classes: 40 Project work: 10 Lecture: 20	4	Graded assignment	Optional
Designing Functional Confectionery and Bakery Products	Laboratory classes: 40 Project work: 10 Lecture: 20	4	Graded assignment	Optional
Elective Courses 10		4	Graded assignment	Obligatory group
The student chooses 1 subject				
Separation Methods in Food Analysis	Laboratory classes: 55 Lecture: 15	4	Graded assignment	Optional
Quality Assurance in Food Analysis	Laboratory classes: 55 Lecture: 15	4	Graded assignment	Optional
Sum	420	30		

Semester 7

Course	Number of hours	ECTS points	Form of verification	Obligatory
Diploma Seminar	Seminar: 30	3	Graded assignment + exam	Obligatory
Final Project	Diploma Thesis: 0	15	Pass	Obligatory subjects to choose from
Elective Project PBL	Project work: 45	4	Graded assignment	Obligatory subjects to choose from
Legal and Organizational Aspects in Engineering Practice	Project work: 10 Lecture: 20	3	Graded assignment	Obligatory

Course	Number of hours	ECTS points	Form of verification	Obligatory
Graduates on the Job Market	Tutorials: 20	2	Graded assignment	Obligatory
Ethical Aspects of Food Production	Project work: 20	3	Graded assignment	Obligatory
Sum	145	30		