



Lodz University
of Technology

Study programme

Faculty:	Faculty of Textiles and Design
Major:	Textronics
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:	Textronics
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:	2625
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:	105
Professional title awarded to graduates:	inżynier
ISCED code:	0719
Language of study:	polish

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

Discipline	Percentage share
Material Engineering	60%
Automation, electronics and electrical engineering	20%
Technical computing and telecommunications	20%

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	1TEX1	Has specialist knowledge in the area of textile technologies such as weaving, knitting, spinning and others, as well as the structures and properties of materials used in textronics.	P6U_W	P6S_WG
2	1TEX2	Has basic knowledge of electronics, including both electronic components and more advanced issues related to microcontrollers, digital circuits and wireless technologies.	P6U_W	P6S_WG
3	1TEX3	Has basic knowledge of computer science, selected programming languages and microcontroller programming.	P6U_W	P6S_WG
4	1TEX4	Has basic knowledge of management, marketing, running a business and intellectual property protection, and knows and understands the importance of honesty, ethics and responsibility, including environmental responsibility in professional activities.	P6U_W	P6S_WK
5	1TEX5	Is able to design textronic systems by integrating knowledge from textiles, electronics, and computer science, and by selecting engineering methods appropriate for addressing complex and non-standard problems within such systems.	P6U_U	P6S_UW
6	1TEX6	Is able to program microcontrollers and design and assemble electronic circuits and software for textronic systems, identifying and analysing technical problems while taking into account the principles of quality engineering and standardization.	P6U_U	P6S_UW
7	1TEX7	Is able to implement textronic projects in a team, taking into account the division of roles, time aspects in their implementation, and apply the acquired technical knowledge at every stage of the integrated product life cycle, solving engineering tasks and recognizing its importance for the functioning of modern society.	P6U_U	P6S_UW, P6S_UO, P6S_UU
8	1TEX8	Is able to use a foreign language to the extent necessary to communicate and analyze documents, especially in the areas of textiles, electronics and IT, in accordance with the requirements specified for level B2 of the Common European Framework of Reference for Languages.	P6U_U	P6S_UK
9	1TEX9	Is able to take a critical approach to the acquired knowledge and skills, demonstrating readiness to seek the opinions of experts and to supplement and improve the acquired knowledge and skills.	P6U_K	P6S_KK
10	1TEX10	Is ready to consciously fulfill his role as an engineer in society, in particular in terms of striving to improve the quality of life and competitiveness, searching for optimal management and marketing solutions that are socially acceptable and consistent with ethical principles especially in the field of textronics.	P6U_K	P6S_KO, P6S_KR

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

No.	Course name	Program content	1TEX1	1TEX2	1TEX3	1TEX4	1TEX5	1TEX6	1TEX7	1TEX8	1TEX9	1TEX10
1	Mathematics I	Elements of mathematical logic and set algebra. The concept of a function, composite function, inverse function, and properties of functions. Elementary functions: polynomials, rational functions, exponential and logarithmic functions, trigonometric and inverse trigonometric functions. Application of the laws of logic and set theory to solving equations and inequalities related to elementary functions. Limits of numerical sequences. Limits of functions. Derivative of a function of one real variable; application of differential calculus to the analysis of function behaviour and variability. Basic methods of integration. Definite and improper integrals and their applications.	x	x			x					
2	Introduction to Textronics	Fundamental issues in textronics, the history of textronics, and contemporary trends in textronics. Selected topics in general chemistry and the physical chemistry of polymers relevant to textronics. Engineering materials — their classification, structure, and properties in the context of applications in textronics.	x	x			x					
3	Basics of Computer Science	Students will be introduced to the fundamentals of programming, the operational principles of computer systems, their control mechanisms, and methods of data representation. Based on the underlying theoretical concepts, a methodology for algorithm specification will be presented, followed by their implementation using the C programming language.			x			x		x		
4	Physics I	Kinematics and dynamics; work, power, and energy; the principle of conservation of energy. Gravitational field. Wave motion, diffraction, and interference.	x	x			x					
5	Information Technologies I	Familiarisation with basic and advanced functions of Office 365. Introduction to and analysis of open-source software. Acquisition of fundamental skills in the field of data security on the Internet.			x			x	x			
6	Engineering Drawing	Acquisition of fundamental skills in the preparation of orthographic and axonometric drawings, as well as cross-sections of a selected object, in accordance with applicable technical drawing standards. Preparation of technical documentation for a selected spatial structure.	x				x					
7	Textiles in Textronics I	Familiarization with the fundamental principles of textile products. Presentation and discussion of the properties of fibres, yarns, threads, woven fabrics, knitted fabrics and nonwovens. Overview of the essential requirements necessary for the design of textronic textiles. Discussion of key metrological parameters used to determine functional performance requirements for textronic textiles.	x				x					

No.	Course name	Program content	1TEX1	1TEX2	1TEX3	1TEX4	1TEX5	1TEX6	1TEX7	1TEX8	1TEX9	1TEX10
8	Mathematics II	Differential calculus of functions of several variables – partial derivatives, local extrema of functions. Integral calculus of functions of several variables – double integrals and selected applications of double integrals. Matrix calculus. Determinants. Inverse matrices. Systems of linear equations: Cramer's theorem and the Gaussian elimination method. Operations in the set of complex numbers; quadratic equations in the complex domain; sets on the complex plane. Elements of probability theory: random variable (one-dimensional) – cumulative distribution function, basic numerical characteristics, normal distribution. Elements of descriptive statistics: description of a sample for a single measurable variable – classical and positional measures; graphical methods for ordering and presenting data. Elements of mathematical statistics: estimation (confidence intervals for the expected value); overview of selected statistical tests (significance tests for the expected value, chi-square goodness-of-fit test, Shapiro-Wilk test).			x			x				
9	Physics II	Electrostatics, magnetism, electrodynamics, electromagnetic waves, thermodynamics, and wave optics.	x				x	x				
10	English B2 module I	Use of linguistic tools and language resources for effective communication in the academic environment and in the engineer's workplace.										
11	English B2+ module I	Use of linguistic tools and language resources for effective communication in the academic environment and in the engineer's workplace.										
12	English C1 module I	Use of linguistic tools and language resources for effective communication in the academic environment and in the engineer's workplace.										
13	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		
14	Electrical Engineering	Fundamental issues in electrical engineering relevant to students of the Textronics program. The course provides a solid theoretical foundation and develops practical skills essential for the design, analysis, and implementation of electronic textronic systems.		x			x	x				
15	Algorithms and Object Programming	Students will be introduced to algorithms for solving typical data processing problems and to the data structures required for their implementation, as well as to the fundamentals of object-oriented software development. Students will also gain practical experience in independently designing object-oriented programs in relation to selected problems.			x			x		x		
16	Materials in Textronics I	Information on recent developments in the manufacturing of textronic materials. Conductive polymer composites. Conductive thin films. Interrelationships between the structure of materials used in textronics and their properties.	x				x					

No.	Course name	Program content	1TEX1	1TEX2	1TEX3	1TEX4	1TEX5	1TEX6	1TEX7	1TEX8	1TEX9	1TEX10
17	Textiles in Textronics II	Introduction to manufacturing technologies for textronic fiber-based materials, including the production of monofilaments, yarns, and nonwovens (electrospinning, melt-blown), as well as the fabrication of woven and knitted structures. The course covers the deposition of functional layers via dip-coating, magnetron and resistive sputtering, embroidery-based integration, digital printing, and thin-film formation. It also addresses the physical macrostructure of fiber-based materials used in textronic architectures, such as filaments, monofilaments, foils, yarns, nonwovens, woven and knitted fabrics.	x				x					
18	English B2 module II	Use of linguistic tools and language resources for effective communication in the academic environment and in the engineer's workplace.										
19	English B2+ module II	Use of linguistic tools and language resources for effective communication in the academic environment and in the engineer's workplace.										
20	English C1 module II	Use of linguistic tools and language resources for effective communication in the academic environment and in the engineer's workplace.										
21	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		
22	Computer Aided Design	Concept of CAD system organisation and the specificity of the user interface. Techniques for executing basic commands used to create three-dimensional objects in the part modelling module. Editing the geometry of spatial elements within the part modelling environment. Techniques for developing parametric object models. Methods for creating 2D and 3D technical drawings, including detail and assembly documentation, in the project technical documentation module.	x		x		x					
23	Information Technologies II	Introduction to the fundamentals of algorithmics, algorithm design, and flowchart development. Acquisition of programming skills in the high-level programming language Python. Development of competencies related to the implementation of a selected engineering problem using Python.			x			x	x			
24	Computer Oriented Mechanics	Introduction to force distributions in two-dimensional structures, with and without friction. Familiarisation with stress, strain, and displacement distributions in bodies subjected to tension (compression), torsion, and bending. Acquisition of fundamental skills in determining force and stress distributions in two-dimensional structures using AutoCAD software.			x				x	x		
25	Product Life Cycle and Circular Economy	Introduction to the standards PN-EN ISO 14040:2009, PN-EN ISO 14044:2009, and PKN-ISO/TR 14062:2004. Examples of Life Cycle Assessment (LCA) analyses for devices, products, or processes related to the specificity of the textronics industry. The concept of the circular economy and circular economy tools. Benefits resulting from the implementation of circular economy principles. The green industrial revolution.				x			x			x

No.	Course name	Program content	1TEX1	1TEX2	1TEX3	1TEX4	1TEX5	1TEX6	1TEX7	1TEX8	1TEX9	1TEX10
26	Materials in Textronics II	Introduction to issues related to the modification possibilities of fibres and textile materials used for textronic applications. Development and applications of next-generation fibres and textile materials: smart/intelligent fibres and high-functionality fibres. Issues related to the production and testing of specialised fibres and materials applied in textronics, as well as surface and bulk modification methods of textile products for textronic applications. Acquisition of skills in analysing scientific literature related to specialised and functional materials used in textronics.	x						x	x		
27	Fundamentals of Electronics	Introduction to issues in electronics that are essential for students of the Textronics degree programme. It provides a solid theoretical foundation and practical skills necessary for the design, analysis, and implementation of textronic electronic systems.		x			x	x				
28	English B2 module III	Use of linguistic tools and language resources for effective communication in the academic environment and in the engineer's workplace.										
29	English B2+ module III	Use of linguistic tools and language resources for effective communication in the academic environment and in the engineer's workplace.										
30	English C1 module III	Use of linguistic tools and language resources for effective communication in the academic environment and in the engineer's workplace.										
31	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		
32	Microprocessor Systems in Textronics	Structure and operating principles of microprocessor systems. Applications of microprocessor systems in textronics.		x			x	x				
33	Health and Safety and Ergonomics	Fundamental definitions, scope, and subject matter of ergonomics, along with its multidisciplinary nature. The human-product-environment system as the core domain of ergonomic research, including corrective, conceptual, and specialized ergonomics (for children, older adults, and individuals with disabilities). The importance of anthropometric adaptation of products and environments, as well as the consequences of insufficient adaptation. Anthropometric measures considered as random variables. Identification of user needs, deficiencies, and potential hazards in textronic products. Overview of standards and regulatory frameworks essential for designing products and user environments, including textronic and wearable textile systems.				x			x			
34	Project Management and Commercialization	Introduction to design methodologies for solving problem-based challenges, including Design Thinking, Project-/Problem-Based Learning, and Research-Based Learning. The distinction between innovation and invention. Empathy in problem solving. Problem definition methods. Creativity and techniques for its development. Tools for idea generation and solution refinement.				x			x			x
35	Selected Elements of Anatomy	Fundamentals of human anatomy and physiology. General structure of the human body. Cells, tissues, and organs. Basic knowledge of biochemistry. Functional anatomy. Overview of body systems – their structure and functions. Skin and its appendages.										

No.	Course name	Program content	1TEX1	1TEX2	1TEX3	1TEX4	1TEX5	1TEX6	1TEX7	1TEX8	1TEX9	1TEX10
36	Textronic Clothing	Overview of fundamental concepts related to the design and manufacturing of textronic garments, essential for students in the Textronics program. The scope includes a solid theoretical foundation and the development of practical competencies required for garment design, material analysis, and the implementation of electronic textronic systems.	x				x					
37	Sensors and Control in Textronics	A comprehensive overview of sensor technologies and control systems in the context of textronics, with an emphasis on developing practical design skills through projects involving the integration of sensors and control units in textile-based applications. These topics are relevant across multiple domains where textronics is gaining importance, including healthcare, fashion, and industrial environments.		x			x	x				
38	English B2 module IV	Use of linguistic tools and language resources for effective communication in the academic environment and in the engineer's workplace.										
39	English B2+ module IV	Use of linguistic tools and language resources for effective communication in the academic environment and in the engineer's workplace.										
40	English C1 module IV	Use of linguistic tools and language resources for effective communication in the academic environment and in the engineer's workplace.										
41	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		
42	Microcontroller Programming	Programming environments and programming languages. General principles of microcontroller programming.		x	x			x				
43	Integration of Textronics Systems	Design and fabrication of a sportswear element integrated with a textronic system. Students select a chosen garment component (e.g., with a heating module or physiological monitoring system), enabling the development of diverse design concepts. The scope includes system concept development, requirements analysis, selection of electronic components and textile materials, and the design of the control architecture. The practical component covers prototype fabrication, integration of electronic modules into the garment structure, and functional, operational, and durability testing.		x	x		x		x			
44	Design Documentation and Presentation Techniques	Familiarization with the requirements for developing technical and technological documentation for textronic products, as well as the criteria for their quality acceptance. Introduction of students to methods of scientific presentation based on English-language scholarly literature.	x							x		
45	Data Transmission, Visualization and Storage	Programming environments and programming languages. General principles of microcontroller programming.			x		x	x		x		

No.	Course name	Program content	1TEX1	1TEX2	1TEX3	1TEX4	1TEX5	1TEX6	1TEX7	1TEX8	1TEX9	1TEX10
46	Robotization in Textronics	Acquisition of fundamental skills in programming a workstation equipped with an industrial robot within a selected activity defined by the instructor, as well as programming and discussion of the operating principles of an industrial robot gripper performing the assigned task.	x	x	x		x	x				
47	Textronic Measurement Systems	Design of a textronic measurement system intended for individuals operating in hazardous environments, elderly persons, newborns, athletes, etc. Selection of an optimal measurement sensor. Selection of components for the data acquisition system. Influence of measurement system components on measurement accuracy.	x	x	x		x	x				
48	Numerical Methods in Textronics	Acquisition of the ability to formulate an independently selected simple engineering problem with regard to the application of specific numerical methods and computational issues. Development of the ability to solve this problem using self-developed numerical applications and to interpret the physical meaning of the obtained solution.	x	x	x		x	x				
49	Textronic Batteries and Supercapacitors	Introduction to batteries and supercapacitors. Overview of the main types of batteries and supercapacitors and their evolution in the context of textronic applications. Explanation of fundamental operating principles, such as capacity, voltage, energy density, and power density, as well as the differences between batteries and supercapacitors. Battery and supercapacitor technologies.	x	x	x		x	x				
50	Design Aspects in Textronics	Introduction to textronics and design aspects in textronics: definition and history of textronics – discussion of the evolution of textile technologies incorporating electronic elements and their role in art and design. Fundamental artistic concepts – introduction to key principles of art, such as composition, colour, structure, and form, and their application in design. Artistic design principles in textronics: composition and layout – principles of spatial organisation in textronic design projects.	x	x	x		x	x				
51	Basics of Programming in Autodesk Fusion 360	Acquisition of fundamental programming skills in the Autodesk Fusion 360 environment. Completion of an independently selected simple practical project using Autodesk Fusion 360.	x	x	x		x	x				
52	Linux in Textronics	Acquisition of fundamental programming skills in the Linux environment. Completion of an independently selected simple practical project using Linux-based tools.	x	x	x		x	x				
53	Electromagnetic Waves and the Human Body	Fundamentals of microwave measurement techniques. Measurement of impedance matching of microwave components. Measurement of microwave signal attenuation between transmitting and receiving antennas in the presence of various objects and obstacles. Computer simulation of radiation characteristics of antennas positioned on the human body. Computer simulation of microwave energy absorption by the human body. Measurement of radiation characteristics of on-body antennas.	x	x	x		x	x				
54	Summative Module	Introduction to the theoretical and practical competencies required for designing and developing fundamental applications in intelligent products and textronic systems, along with the ability to apply appropriate problem-solving methodologies essential for the formulation and execution of a design project.	x				x		x		x	

No.	Course name	Program content	1TEX1	1TEX2	1TEX3	1TEX4	1TEX5	1TEX6	1TEX7	1TEX8	1TEX9	1TEX10
55	Entrepreneurship and Case Study in Textronics	Analysis and development of case studies related to the field of textronics, aimed at enhancing students' entrepreneurial competencies. A key element of the course is the ability to independently select a case study—individually or in teams—from a variety of project-based, technological, or market-oriented challenges."				x			x			x
56	Heat Transport in Textronics	Acquisition of the ability to formulate an independently selected complex engineering problem with regard to the application of heat transfer phenomena in textronics. Development of the ability to solve this problem using self-developed numerical applications and to interpret the physical meaning of the obtained solution.	x	x	x		x	x				
57	Genetic Algorithms	Introduction to computational mechanisms inspired by biological evolutionary processes, employed for optimization and the exploration of higher-quality solutions within evolutionary algorithms and controlled evolution methodologies.	x	x	x		x	x				
58	Printed Textronics	Introduction to printed textronics. Definition and significance of printed electronics in the context of textronics. Overview of materials and technologies used in printed textronics, such as conductive inks, flexible substrates, and printing techniques. History of the development of printed electronics and its applications in smart textiles and technical clothing.	x	x	x		x	x				
59	Conductive Polymers Composites	Conductive polymer composites: structure, manufacturing methods, characteristics, properties, and application potential in textronics.	x	x	x		x	x				
60	Quality Engineering and Standardization	The scope of the course includes the analysis of implementation challenges in intelligent textile and electronic products, the identification of market barriers and opportunities, the assessment of innovation potential, and the development of solutions in the form of mini-projects. The diversity of selected case studies enables the learning process to be aligned with students' competency profiles and supports the development of entrepreneurial skills across various application models characteristic of the modern textile technology sector.	x				x					
61	Maintenance of Textronic Clothing	Introduction to maintenance and care processes of textile products, with particular emphasis on specialised and textronic products.	x						x	x		
62	Knitted Textronics Products	Types of CAD/CAM systems used in knitting technology.Computer-based graphical representation of the operating mechanisms of loop-forming elements.Development of textronic knitted fabric designs based on fundamental knit structures. Verification and evaluation of the developed knit design based on computer simulation of stitch appearance within the natural yarn path in the loop structure.Implementation of the textronic knitted product design, its assessment in terms of compliance with the adopted assumptions, and the introduction of modifications to achieve a satisfactory functional effect.	x	x	x		x	x				
63	Lo Fi Methods in User Interface Design	Acquisition of fundamental skills in the use of Lo-Fi methods and dedicated software for prototyping user interfaces of textronic applications.	x	x	x		x	x				

No.	Course name	Program content	1TEX1	1TEX2	1TEX3	1TEX4	1TEX5	1TEX6	1TEX7	1TEX8	1TEX9	1TEX10
64	Textronics in Healthcare	The human being is analysed as an object of measurement and a source of biological signals: electrical and non-electrical. Identifying multidimensional problems based on a proposed problem description. Examples, may include projects involving system design, software development, or garment construction.	x	x	x		x	x				
65	Data Acquisition and Visualization in Textronics	Programming environments for data visualisation. Development of custom data visualisation applications using LabVIEW. Design of graphical interfaces for data visualisation. Ergonomic principles in data visualisation.	x	x	x		x	x				
66	Surface Modifications for Textronics	Familiarisation with surface modification methods used in the development of textronic materials employing advanced techniques applied, among others, in products for uniformed services, the automotive industry, intelligent building systems, and healthcare.	x	x	x		x	x				
67	Power Supply for Textronic Systems	Definition and significance of power supply in textronic systems. Overview of the role of power supply in electronic textiles and the challenges associated with integrating power sources with textiles. Power supply technologies. Discussion of various types of batteries, such as lithium-ion, lithium-polymer, and nickel-metal hydride, and their applications in textile systems.	x	x	x		x	x				
68	Textronics in Fashion Textiles	The role of textronics in fashion and its impact on innovation in textiles. History and development – the evolution of textronic technologies in the context of fashion, from early applications to the latest trends. Textronic technologies in fashion: fundamental technologies used in fashion, such as electrochromic fabrics and fabrics with embedded sensors.	x	x	x		x	x				
69	Database Fundamentals	Students will be introduced to the fundamentals of relational databases, with particular emphasis on SQL, form creation, and the interaction between these components using a high-level programming language.	x	x	x		x	x				
70	Final Project	Implementing appropriate research methodology: reviewing the literature and formulating hypotheses or specific work objectives. Identifying specific tasks. Selecting methods and tools appropriate to solving the problem; for experimental work, conducting experiments. Analyzing the obtained results. Describing the results. Detailed content depends on the selected work topic.	x	x	x							
71	Internship	Acquisition of practical knowledge and new professional competencies in real workplace conditions.							x		x	x
72	Diploma Seminar	Rules and methodology of diploma thesis writing. Preparation for the presentation of diploma thesis results and for the competency examination verifying knowledge and integrated skills.	x	x	x		x					
73	Intellectual Property Protection	Introduction to the issues of intellectual property rights (definitions, classification of intellectual property, historical outline, and principles of intellectual property). The state of intellectual property protection in light of Polish, European Union, and WTO regulations.				x			x			

No.	Course name	Program content	1TEX1	1TEX2	1TEX3	1TEX4	1TEX5	1TEX6	1TEX7	1TEX8	1TEX9	1TEX10
74	Competence Project	Familiarisation with fundamental skills related to the conceptual design of new textronic products applied in various fields of life, including the development of their prototypes using appropriately selected methods, techniques, tools, and materials. Identification and formulation of engineering task specifications, as well as their solution using analytical, simulation, and experimental methods.	x				x				x	
75	Human-Artificial Intelligence Collaboration Systems	Familiarisation with theoretical and practical applications of textronic materials used in the protection of human health and life. Propagation and signal fundamentals of wireless data transmission. Interaction of electromagnetic waves with the human body - physical foundations and legal regulations.										

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	7				
2	Introduction to Textronics	7			7	
3	Basics of Computer Science	4				
4	Physics I	3				
5	Information Technologies I	3				
6	Engineering Drawing	2				
7	Textiles in Textronics I	4			4	
8	Mathematics II	7				
9	Physics II	2				
10	English B2 module I	2		2		
11	English B2+ module I	2		2		
12	English C1 module I	2		2		
13	German B2 module I	2		2		
14	Electrical Engineering	5			5	
15	Algorithms and Object Programming	6			6	
16	Materials in Textronics I	5			5	
17	Textiles in Textronics II	3			3	
18	English B2 module II	2		2		
19	English B2+ module II	2		2		
20	English C1 module II	2		2		
21	German B2 module II	2		2		

No.	Course name	ECTS	Subjects in the field of humanities and social sciences	Elective subjects	Profile items	Classes in a foreign language
22	Computer Aided Design	6				
23	Information Technologies II	3				
24	Computer Oriented Mechanics	5				
25	Product Life Cycle and Circular Economy	4				
26	Materials in Textronics II	5			5	
27	Fundamentals of Electronics	5			5	
28	English B2 module III	2		2		
29	English B2+ module III	2		2		
30	English C1 module III	2		2		
31	German B2 module III	2		2		
32	Microprocessor Systems in Textronics	5			5	
33	Health and Safety and Ergonomics	4				
34	Project Management and Commercialization	5	5			
35	Selected Elements of Anatomy	3				
36	Textronic Clothing	3			3	
37	Sensors and Control in Textronics	8			8	
38	English B2 module IV	3		3		
39	English B2+ module IV	3		3		
40	English C1 module IV	3		3		
41	German B2 module IV	3		3		
42	Microcontroller Programming	3			3	
43	Integration of Textronics Systems	7		7	7	

No.	Course name	ECTS	Subjects in the field of humanities and social sciences	Elective subjects	Profile items	Classes in a foreign language
44	Design Documentation and Presentation Techniques	5				
45	Data Transmission, Visualization and Storage	4			4	
46	Robotization in Textronics	4		4	4	
47	Textronic Measurement Systems	4		4	4	
48	Numerical Methods in Textronics	4		4	4	
49	Textronic Batteries and Supercapacitors	4		4	4	
50	Design Aspects in Textronics	4		4	4	
51	Basics of Programming in Autodesk Fusion 360	4		4	4	
52	Linux in Textronics	4		4	4	
53	Electromagnetic Waves and the Human Body	4		4	4	
54	Summative Module	9		9	9	
55	Entrepreneurship and Case Study in Textronics	4	4	4		
56	Heat Transport in Textronics	4		4	4	4
57	Genetic Algorithms	4		4	4	4
58	Printed Textronics	4		4	4	4
59	Conductive Polymers Composites	4		4	4	4
60	Quality Engineering and Standardization	2				
61	Maintenance of Textronic Clothing	3			3	
62	Knitted Textronics Products	4		4	4	
63	Lo Fi Methods in User Interface Design	4		4	4	
64	Textronics in Healthcare	4		4	4	
65	Data Acquisition and Visualization in Textronics	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
66	Surface Modifications for Textronics	4		4	4	
67	Power Supply for Textronic Systems	4		4	4	
68	Textronics in Fashion Textiles	4		4	4	
69	Database Fundamentals	4		4	4	
70	Final Project	15		15	15	
71	Internship	6			6	
72	Diploma Seminar	3			3	
73	Intellectual Property Protection	2				
74	Competence Project	2		2	2	
75	Human-Artificial Intelligence Collaboration Systems	2				

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	9
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	128/210 (60.95%)

Methods of verifying and assessing learning outcomes

Verification of achieved learning outcomes requires the use of diverse student assessment methods, appropriate to the categories of knowledge, skills, and social competences concerned. The selection of appropriate assessment tools also depends on the specific nature of the course and the form of classes conducted, and is described in detail in the course specifications for individual subjects.

Achievement of the required learning outcomes is verified through:

- written assignments and examinations (exams, tests, reports, essays, projects, posters, diploma thesis, etc.);
- oral assessments (oral examinations, public presentations such as papers, presentations, etc.);
- practical and/or project-based tasks (individual and group work);
- observation and assessment of students' activity during classes;
- self-assessment and peer assessment (especially in the case of team projects);
- competency examinations and the diploma examination.

Verification may take the form of formative assessment (partial assessment conducted multiple times during the course) and/or summative assessment (final evaluation). The final verification result is expressed according to the grading scale currently in force.

The course coordinator or lecturer is obliged, during the first class meeting, to discuss the course specification and to clearly formulate and officially communicate to students the assessment methods and the conditions for verifying the achievement of learning outcomes.

Professional internships

Internship duration: 6 weeks.

ECTS credits awarded: 4.

Internships are carried out in accordance with the study programme in a form adapted to the profile and specific nature of the degree programme, and according to the rules established by the Faculty and the University.

Characteristics of the course

Graduate profile

A graduate of the TEKSTRONICS degree programme possesses interdisciplinary knowledge in the field of materials used in textronics, their properties, manufacturing techniques, as well as computer science and electronics applied to the functionalization of these materials. This area includes, in particular, textile materials, passive and active flexible sensors, servomechanisms, programming of peripherals and microcontrollers, remote data transmission and recording, and the development of applications for the acquisition and presentation of measurement data.

The graduate has knowledge of the rational selection and material design processes, as well as production quality control. They are familiar with and capable of designing textronic systems and applying IT tools for communication with wearable electronic components in order to achieve the intended functional properties of the product. They are also able to apply modern information technology, electronics, and textile engineering methods and techniques to create intelligent systems integrated with textiles for the detection of environmental signals or for automation and control systems. Furthermore, the graduate is capable of testing and identifying the causes of degradation and wear of materials used in textronics and implementing methods to prevent such processes.

Graduates of the programme may find employment as specialists in the design and manufacturing of flexible and wearable electronic systems; in the application of IT solutions for programming detection, stimulation, and automation systems; in the development of applications for recording and presenting numerical data; and in the testing and shaping of the functional properties of materials. Employment opportunities exist in virtually every branch of industry, including large, medium-sized, and small enterprises in sectors such as medical, automotive, machinery, aerospace, military, nanotechnology, and others. Graduates may work in positions related to production management and control; the design and manufacture of IT tools, flexible electronic devices, and intelligent materials; materials trading; as well as research and development and quality control departments. Graduates may also continue their education in second-cycle (Master's degree) programmes.

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

The guiding principle of the Strategy of Lodz University of Technology 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 curriculum of the "Textronics" degree programme is aligned with the University's strategy in terms of educating students to meet the economic needs of local, regional, and national communities. In particular, the programme supports the strategic objective of preparing graduates for the dynamically changing demands of the socio-economic environment. The knowledge, skills, and competences acquired during the course of study ensure the education of highly qualified graduates suited to labour market needs.

The study programme includes numerous classes aimed at developing students' practical skills, such as laboratory classes, projects, and seminars, as well as social competences through teamwork-based assignments and collaborative problem solving.

One of the key elements of the University's strategy is the development and implementation of modern technologies in cooperation with the industrial sector. The Textronics programme fulfils this objective through student internships organised in companies operating in the fields of healthcare, sports, defence, and automotive industries. Internships will also be carried out in textile and clothing companies, as well as in manufacturing, design, and service enterprises and research institutes, thereby increasing graduates' employability.

The strategy of the Lodz University of Technology also places strong emphasis on digital transformation. The "Textronics" degree programme supports this objective by enabling students to design intelligent textiles incorporating wearable technologies and sensory systems. The skills acquired by students in programming microcontrollers and designing electronic systems will allow them to develop innovative solutions integrating electronics with functional textile materials.

The University's strategy also incorporates issues related to sustainable development, which is particularly important in the context of the clothing, automotive, and defence industries, recognised as sectors significantly contributing to environmental threats. The "Textronics" programme includes courses and subject areas that foster awareness of ethical and sustainability-related aspects of textronics, such as "Product Life Cycle and Circular Economy," Occupational Health and Safety and Ergonomics, and Intellectual Property Rights.

Educational objectives and employment and continuing education opportunities

The dynamic development of technologies in the fields of textiles, electronics, and information technology continuously increases the level of market competition. Under such conditions, companies specialising in these areas must adapt to operating in changing and often unstable environments. In the current market situation, one of the key factors ensuring success for such enterprises is increasing competitiveness through the development of high-tech products. Consequently, there is growing demand for creative and well-educated engineers who possess knowledge and skills in textile engineering, electronics, and information technology.

The main objective of the “Textronics” degree programme is to combine knowledge and practical skills from three scientific disciplines: Materials Engineering; Automation, Electronics, Electrical Engineering and Space Technologies; as well as Information and Communication Technologies.

Graduates acquire broad knowledge in the fundamentals of electronics and microcontrollers, including their programming, as well as textile material structures and textile technologies such as weaving, knitting, spinning, and others. They also gain basic knowledge in human physiology, enabling them to create user-oriented textronic solutions. Graduates possess the ability to rapidly prototype and test textronic products using modern analytical and research methods.

The curriculum includes design classes, laboratory courses, and industrial internships, allowing students to develop practical competences. During their studies, future graduates also develop soft skills, including interpersonal communication, logical thinking, creativity, and teamwork.

Graduates of the “Textronics” programme possess competences enabling them to undertake employment, particularly in specialised industrial sectors. They have broad qualifications required for the effective design of textronic products in various sectors of the economy, including healthcare, sports, fashion, automotive, and defence industries. Graduates may work in positions such as textronic clothing designer, textronic product designer, textile technologist, quality control specialist, software and electronic systems tester, microcontroller programmer, and designer of specialist protective clothing intended to safeguard human health and life in the working environment.

Graduates may also continue their education in second-cycle (Master’s degree) programmes, particularly in fields related to materials engineering at Lodz University of Technology. Recommended Master’s degree programmes include, among others, Textile Engineering, Biomedical Engineering, Materials and Technologies, and Design.

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

The Business Council positively evaluates the modified curriculum of the Textronics degree programme, recognising it as coherent, well-designed, and appropriately adapted to current labour market needs. The programme successfully integrates the fields of materials engineering, electronics, and information technology, responding to the dynamic development of intelligent textiles and wearable electronics technologies. The Council particularly appreciates the high proportion of laboratory and project-based classes, which develop the practical competences expected by employers.

In view of the above, the Business Council expresses an unequivocally positive opinion and recommends the adoption of the Textronics study programme.

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

in accordance with the admissions resolution

The unit organizing education

Faculty of Textiles and Design

Education program

Semester 1

Course	Number of hours	ECTS points	Form of verification	Obligatory
Mathematics I	Tutorials: 60 Lecture: 30	7	Exam	Obligatory
Introduction to Textronics	Laboratory classes: 45 Lecture: 45	7	Graded assignment	Obligatory
Basics of Computer Science	Laboratory classes: 45 Lecture: 15	4	Graded assignment	Obligatory
Physics I	Laboratory classes: 30 Lecture: 15	3	Graded assignment	Obligatory
Information Technologies I	Laboratory classes: 30 Lecture: 15	3	Graded assignment	Obligatory
Engineering Drawing	Laboratory classes: 30	2	Graded assignment	Obligatory
Textiles in Textronics I	Laboratory classes: 30 Lecture: 30	4	Graded assignment	Obligatory
Sum	420	30		

Semester 2

Course	Number of hours	ECTS points	Form of verification	Obligatory
Mathematics II	Tutorials: 60 Lecture: 30	7	Exam	Obligatory
Physics II	Laboratory classes: 15 Lecture: 15	2	Graded assignment	Obligatory
Physical Education 1	Tutorials: 30	0	Pass	Obligatory

Course	Number of hours	ECTS points	Form of verification	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
Electrical Engineering	Tutorials: 30 Laboratory classes: 15 Lecture: 15	5	Exam	Obligatory
Algorithms and Object Programming	Laboratory classes: 90	6	Graded assignment	Obligatory
Materials in Textronics I	Laboratory classes: 15 Project work: 30 Lecture: 15	5	Graded assignment	Obligatory
Textiles in Textronics II	Laboratory classes: 30 Lecture: 15	3	Graded assignment	Obligatory
Sum	435	30		

Semester 3

Course	Number of hours	ECTS points	Form of verification	Obligatory
Physical Education 2	Tutorials: 30	0	Pass	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

Course	Number of hours	ECTS points	Form of verification	Obligatory
German B2 module II	Tutorials: 30	2	Graded assignment	Optional
Computer Aided Design	Project work: 60 Lecture: 30	6	Graded assignment	Obligatory
Information Technologies II	Laboratory classes: 45	3	Graded assignment	Obligatory
Computer Oriented Mechanics	Laboratory classes: 45 Lecture: 15	5	Graded assignment	Obligatory
Product Life Cycle and Circular Economy	Project work: 30 Lecture: 15	4	Graded assignment	Obligatory
Materials in Textronics II	Seminar: 15 Laboratory classes: 30 Lecture: 15	5	Exam	Obligatory
Fundamentals of Electronics	Tutorials: 15 Laboratory classes: 30 Lecture: 30	5	Graded assignment	Obligatory
Sum	435	30		

Semester 4

Course	Number of hours	ECTS points	Form of verification	Obligatory
Physical Education 3	Tutorials: 30	0	Pass	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

Course	Number of hours	ECTS points	Form of verification	Obligatory
Microprocessor Systems in Textronics	Laboratory classes: 45 Lecture: 15	5	Exam	Obligatory
Health and Safety and Ergonomics	Project work: 30 Lecture: 30	4	Graded assignment	Obligatory
Project Management and Commercialization	Tutorials: 15 Project work: 30 Lecture: 15	5	Graded assignment	Obligatory
Selected Elements of Anatomy	Laboratory classes: 30 Lecture: 15	3	Graded assignment	Obligatory
Textronic Clothing	Laboratory classes: 30 Lecture: 15	3	Graded assignment	Obligatory
Sensors and Control in Textronics	Laboratory classes: 45 Project work: 45 Lecture: 30	8	Exam	Obligatory
Sum	450	30		

Semester 5

Course	Number of hours	ECTS points	Form of verification	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
Microcontroller Programming	Laboratory classes: 45	3	Graded assignment	Obligatory

Course	Number of hours	ECTS points	Form of verification	Obligatory
Integration of Textronics Systems	Project work: 120	7	Graded assignment	Obligatory subjects to choose from
Design Documentation and Presentation Techniques	Tutorials: 30 Project work: 30	5	Graded assignment	Obligatory
Data Transmission, Visualization and Storage	Laboratory classes: 45 Lecture: 15	4	Graded assignment	Obligatory
Elective Course 1		8	Graded assignment	Obligatory group
The student chooses 2 courses from the group.				
Robotization in Textronics	Project work: 45	4	Graded assignment	Optional
Textronic Measurement Systems	Project work: 45	4	Graded assignment	Optional
Numerical Methods in Textronics	Project work: 45	4	Graded assignment	Optional
Textronic Batteries and Supercapacitors	Project work: 45	4	Graded assignment	Optional
Design Aspects in Textronics	Project work: 45	4	Graded assignment	Optional
Basics of Programming in Autodesk Fusion 360	Project work: 45	4	Graded assignment	Optional
Linux in Textronics	Project work: 45	4	Graded assignment	Optional
Electromagnetic Waves and the Human Body	Project work: 45	4	Graded assignment	Optional
Sum	405	30		

Semester 6

Course	Number of hours	ECTS points	Form of verification	Obligatory
Summative Module	Project work: 105	9	Graded assignment	Obligatory subjects to choose from

Course	Number of hours	ECTS points	Form of verification	Obligatory
Entrepreneurship and Case Study in Textronics	Project work: 75	4	Graded assignment	Obligatory subjects to choose from
Elective Courses 2		4	Graded assignment	Obligatory group
The student chooses 1 course from the group.				
Heat Transport in Textronics	Project work: 30	4	Graded assignment	Optional
Genetic Algorithms	Project work: 30	4	Graded assignment	Optional
Printed Textronics	Project work: 30	4	Graded assignment	Optional
Conductive Polymers Composites	Project work: 30	4	Graded assignment	Optional
Quality Engineering and Standardization	Laboratory classes: 30 Lecture: 15	2	Graded assignment	Obligatory
Maintenance of Textronic Clothing	Laboratory classes: 30 Lecture: 15	3	Exam	Obligatory
Elective Course 1		8	Graded assignment	Obligatory group
The student chooses 2 courses from the group.				
Knitted Textronics Products	Project work: 30	4	Graded assignment	Optional
Lo Fi Methods in User Interface Design	Project work: 30	4	Graded assignment	Optional
Textronics in Healthcare	Project work: 30	4	Graded assignment	Optional
Data Acquisition and Visualization in Textronics	Project work: 30	4	Graded assignment	Optional
Surface Modifications for Textronics	Project work: 30	4	Graded assignment	Optional
Power Supply for Textronic Systems	Project work: 30	4	Graded assignment	Optional
Textronics in Fashion Textiles	Project work: 30	4	Graded assignment	Optional
Database Fundamentals	Project work: 30	4	Graded assignment	Optional
Sum	360	30		

Semester 7

Course	Number of hours	ECTS points	Form of verification	Obligatory
Final Project	Diploma Thesis: 0	15	Pass	Obligatory subjects to choose from
Internship	Internship: 0	6	Pass	Obligatory
Diploma Seminar	Seminar: 15	3	Graded assignment + exam	Obligatory
Intellectual Property Protection	Tutorials: 5 Lecture: 15	2	Graded assignment	Obligatory
Competence Project	Project work: 30	2	Graded assignment	Obligatory subjects to choose from
Human-Artificial Intelligence Collaboration Systems	Laboratory classes: 30	2	Graded assignment	Obligatory
Sum	95	30		