



Lodz University
of Technology

Study programme

Faculty:	Faculty of Electrical, Electronic, Computer and Control Engineering
Major:	Electronic and Telecommunication Engineering
Level of study:	first-cycle programme (inżynier)
Form of study:	full-time studies
Academic year:	2025/26

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Basic information

Name of the field of study:	Electronic and Telecommunication Engineering
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:	2640
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:	106
Professional title awarded to graduates:	inżynier
ISCED code:	0714
Language of study:	English

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

Discipline	Percentage share
Automation, electronics and electrical engineering	70%
Technical computing and telecommunications	30%

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	1ETE1	Knows and understands, at advanced level, STEM methods and tools necessary for the analysis and synthesis of complex electronic and telecommunication systems.	P6U_W	P6S_WG
2	1ETE2	Knows and understands the operation and design of complex electronic and telecommunication systems at a professional level including environmental, economical, legal, ethical and other external factors that impact or are related to such systems.	P6U_W, P6U_K	P6S_WG, P6S_WK, P6S_KO, P6S_WG_inž, P6S_WK_inž
3	1ETE3	Is able to acquire and evaluate information to take responsible engineering decisions, especially in the area of electronics and telecommunications.	P6U_U	P6S_UW, P6S_UW_inž
4	1ETE4	Is able to plan and execute experiments, interpret their results and on their basis evaluate the operation and design of electronic and/or telecommunication systems.	P6U_U	P6S_UW, P6S_UW_inž
5	1ETE5	Is able to identify and solve non-standard problems considering technical and non-technical requirements, especially applying knowledge and skills from electronics and telecommunications field of study.	P6U_U	P6S_UW, P6S_UW_inž
6	1ETE6	Applying proper methods and tools, is able to design, improve, build, test and implement electronic systems in response to defined user and environmental needs.	P6U_U	P6S_UW, P6S_UW_inž
7	1ETE7	Is able to communicate effectively, also with the use of English language at the B2 level or higher; to formulate arguments supported by knowledge related to electronics and telecommunications, and to present, evaluate and discuss various opinions and statements.	P6U_U	P6S_UK
8	1ETE8	Is able to function and collaborate in a team, leveraging a combination of soft skills.	P6U_U	P6S_UO, P6S_UU
9	1ETE9	Is ready to participate in engineering projects in the field of electronics and telecommunications as well as social initiatives, also in an international environment, bringing knowledge and skills also in non-technical areas.	P6U_U, P6U_K	P6S_UO, P6S_KK, P6S_KO
10	1ETE10	Is ready to apply professional ethics and responsibility for performed tasks.	P6U_K	P6S_KR

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

No.	Course name	Program content	1ETE1	1ETE2	1ETE3	1ETE4	1ETE5	1ETE6	1ETE7	1ETE8	1ETE9	1ETE10
1	C1 Business Communication for Engineers 1	Selected lexical and grammatical structures; topics relevant to the academic and professional environments of university graduates; improving receptive and productive language skills; developing essential soft skills required in the workplace.							x			
2	Mathematics 1	Fundamentals of mathematical logic, complex numbers, elementary functions, complex function, inverse function, number sequences, differential calculus, integral calculus, linear algebra, analytic geometry, number series in real domain, function series.	x									
3	C2 Business Communication for Engineers 1	Selected lexical and grammatical structures; topics relevant to the academic and professional environments of university graduates; improving receptive and productive language skills; developing essential soft skills required in the workplace.							x			
4	Physics	Kinematics, particle dynamics, rigid body dynamics, gravitational field, vibrations, wave motion, electrostatics, electrical and magnetic properties of matter, magnetic field, electromagnetic field, Maxwell's equations, electromagnetic waves.	x									
5	Engineering Drawing	Elements of universal design, sketching principles, preparation of drawings in isometric projection, oblique projection, European and American rectangular projection, section drawing, dimensioning principles and the concept of tolerances and fits.	x						x			
6	Study Skills for University	To prepare students for informed and effective learning. To familiarise them with the basic tools and techniques necessary for the learning process and the principles of academic culture. To present the general educational concept and the structure of the programme in the field of study and the research and educational infrastructure used in the learning process.		x						x		
7	Electrical Circuits	Electrical circuit elements, Kirchhoff's laws, superposition principle, Thevenin-Norton theorem, star/delta transfiguration, node voltage method of circuit analysis, power and energy, resonant circuits.		x		x						
8	Measurements and Statistics	Measurement of electrical quantities, digital multimeters, digital oscilloscopes, processing of measurement results, error and uncertainty analysis of measurement results, elements of descriptive and mathematical statistics, hypothesis testing, use of spreadsheets.	x			x						
9	Information Technologies	Programming in the language of choice, elements of language and data structures, graphics programming and peripheral operation using a simple graphics library, programming logic for simple games, modern information technology including issues in digitisation, algorithmisation, artificial intelligence tools, cyber security.	x					x				
10	C1 Business Communication for Engineers 2	Selected lexical and grammatical structures; topics relevant to the academic and professional environments of university graduates; improving receptive and productive language skills; developing essential soft skills required in the workplace.							x			

No.	Course name	Program content	1ETE1	1ETE2	1ETE3	1ETE4	1ETE5	1ETE6	1ETE7	1ETE8	1ETE9	1ETE10
11	Computer Aided Design	Parametric solid modelling, sketched and complex features. Multi-part assembly mode, definition of mechanisms and storage of motion sequences. Generation of technical documentation. 3D printing.	x					x				
12	Modern Physics	Structure of solids, fundamentals of band theory, electrical conductivity; thermal properties; classification of properties and applications of electrotechnical and electronic materials (conductors, superconductors, semiconductors, dielectrics, magnetics), radiation sources and detectors, nanomaterials.	x		x	x						
13	C2 Business Communication for Engineers 2	Selected lexical and grammatical structures; topics relevant to the academic and professional environments of university graduates; improving receptive and productive language skills; developing essential soft skills required in the workplace.							x			
14	Mathematics 2	Differential calculus of multivariable functions, entangled function, integral calculus of multivariable functions, elements of field theory, ordinary differential equations of the first and second order, Laplace transform.	x									
15	Civic Knowledge and Engagement I	The development of social competences that go beyond the extra-curricular learning outcomes necessary for an informed and educated citizen of Poland, Europe and the world. To carry out various activities for the development of themselves and the University.									x	
16	Introduction to Electronics	Principles of semiconductor device operations: BJT, JFET, MOSFET transistors, diodes. Principle of operation of selected basic electronic circuits, selection of transistor, selection and importance of reactive components, effect of component tolerances. Power dissipated in a transistor. Analysis, simulation, practical implementation using a contact board and universal board. Circuit testing using multimeters, oscilloscopes, power supplies and signal generators.		x		x		x				
17	Digital Systems	Digital circuit design and analysis - Boolean algebra, logic gates, combinational circuits (decoders, multiplexers, iterative, ALU, custom circuits), synchronous sequential circuits (flip-flops, registers, counters, controllers, iterative, custom circuits).		x			x	x				
18	Introduction to Programming	Data types and their representation in a selected programming language. Dynamic memory allocation. Basic data structures (stack, list). Basic algorithms (sorting, searching). Support tools (debugger, valgrind, gcc boundschecking). Static and dynamic libraries.	x					x				
19	German A2 block I	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
20	Interdisciplinary Problem-Based Learning Project	Implementation of a team project on an interdisciplinary and socially engaging topic, integrating the competences of students from different fields of study. Development of soft skills (communication, teamwork, creativity), as well as the ability to work with problem-based learning methods (PBL) with the use of tools supporting project work.					x		x	x	x	

No.	Course name	Program content	1ETE1	1ETE2	1ETE3	1ETE4	1ETE5	1ETE6	1ETE7	1ETE8	1ETE9	1ETE10
21	Civic Knowledge and Engagement II	The development of social competences that go beyond the extra-curricular learning outcomes necessary for an informed and educated citizen of Poland, Europe and the world. To carry out various activities for the development of themselves and the University.									x	
22	German B1 block I	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
23	German B2 block I	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
24	Measurement Systems	A/D and D/A converters, DIO, computer-based measurement systems, hardware platforms, communication interfaces, testing of non-electrical quantity sensors and measurement transducers, measurement system architecture.	x		x	x						
25	Spanish A2 block I	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
26	Microelectronic Technologies	CMOS gates (pull-down, pull-up network). Technology: diffusion, ion implantation, etching, lithography, mask set for CMOS technology, CMOS gates and metastables: characteristics, transistor width selection, delay by Logical Effort method, Setup time & hold time, pseudo-NMOS, pass-transistor. IC design methodology. Basic analogue circuits operating: in voltage mode, in current mode. Passive elements in integrated circuits. Dynamic memories, eeprom, flash.	x	x		x		x				
27	Spanish B1 block I	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
28	Numerical Methods	Floating point arithmetic, errors in numerical calculations. Interpolation and approximation, Richardson extrapolation. Numerical integration and differentiation, solution of systems of linear and non-linear equations, solution of initial problems, description of topology of electronic systems, nodal potential method (matrix description).	x			x						
29	Spanish B2 block I	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
30	Microprocessor Systems	Architecture: CPU, memory, periphery. Bit operations, register access. Access to peripheral circuits. Communication interfaces. Baremetal applications: peripheral operation, menu-driven system. Low power consumption systems. Assembler.		x	x			x				

No.	Course name	Program content	1ETE1	1ETE2	1ETE3	1ETE4	1ETE5	1ETE6	1ETE7	1ETE8	1ETE9	1ETE10
31	Signal Processing	Signals with continuous and discrete time. Elementary signals. Non-linear and linear systems. Linear splicing. Sampling of signals. Laplace transform and its applications. Z transform and its applications. Frequency analysis of signals and systems. Statistical analysis of signals. Examples of signal analysis applications. Digital filter structures. Selected methods of digital filter design.	x			x						
32	French A2 block I	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
33	French B1 block I	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
34	French B2 block I	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
35	Italian A1 block I	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
36	Italian A2 block I	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
37	Polish A1 block I	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
38	Polish A2 block I	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
39	German A1 block I	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
40	Spanish A1 block I	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			

No.	Course name	Program content	1ETE1	1ETE2	1ETE3	1ETE4	1ETE5	1ETE6	1ETE7	1ETE8	1ETE9	1ETE10
41	French A1 block I	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
42	German A2 block II	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
43	Team Project	Directional team project carried out using the PBL method. Stages: problem analysis, problem definition, solution development, prototype construction, testing, evaluation. Project documentation, including schedules, project meeting agendas and minutes. Presentation.			x		x	x	x	x		x
44	German B1 block II	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
45	Civic Knowledge and Engagement III	The development of social competences that go beyond the extra-curricular learning outcomes necessary for an informed and educated citizen of Poland, Europe and the world. To carry out various activities for the development of themselves and the University.									x	
46	German B2 block II	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
47	Electronic Circuits	Amplifiers: a behavioural description. Negative and positive feedback. Circuits with operational amplifiers. Integrated circuits: operational amplifiers, hexadecimal and pulse amplifiers, continuous and discrete time filters, power amplifiers, analogue-to-digital and digital-to-analogue converters. Noise in active systems. Amplitude, frequency and phase detectors. Phase-coupled systems.		x	x	x		x				
48	Spanish A2 block II	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
49	Electronic Equipment Design	Electronic equipment design: environmental factors, reliability issues, thermal management, selection of cooling systems. Printed circuits: substrates, manufacturing technologies, design, surface mount and through-hole assembly, testing.		x	x			x				
50	Reprogrammable Digital Systems			x				x				

No.	Course name	Program content	1ETE1	1ETE2	1ETE3	1ETE4	1ETE5	1ETE6	1ETE7	1ETE8	1ETE9	1ETE10
51	Spanish B1 block II	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
52	Optoelectronics	Fibre optoelectronics, optical systems in FTTH and DC applications, optical path elements, light sources, radiation detectors, control elements, optical fibres, optoelectronic circuit design, selected optical measurement techniques, photonics.	x	x		x						
53	Spanish B2 block II	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
54	Digital Communications	Fundamentals of digital communication. Transmission channels and interference. Analogue and digital modulation techniques. Information theory and coding. Error detection and correction. Communication protocols and standards: OSI and TCP/IP models. Telecommunications network technologies: Wired, wireless and fibre optic networks. Examples of telecommunications network standards. Telecommunications development trends.		x		x						
55	French A2 block II	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
56	French B1 block II	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
57	French B2 block II	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
58	Italian A1 block II	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
59	Italian A2 block II	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
60	Polish A1 block II	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			

No.	Course name	Program content	1ETE1	1ETE2	1ETE3	1ETE4	1ETE5	1ETE6	1ETE7	1ETE8	1ETE9	1ETE10
61	Polish A2 block II	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
62	German A1 block II	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
63	Spanish A1 block II	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
64	French A1 block II	Selected lexical and grammatical structures at different levels; topics relevant to academic mobility within the Erasmus+ programme; improvement of all language skills; development of the necessary interpersonal competences required in an international environment.							x			
65	Technology Transfer Project	Team project direction: identifying users/stakeholders, researching possible solutions, selecting the best solutions taking into account the product life cycle, prototyping, testing/evaluation, finding a market/consumers; choosing the best method to commercialise the results.		x		x	x	x	x	x		x
66	Automotive Electronics											
67	Renewable Energy Sources for Sustainable Power Generation			x		x		x				
68	Power Electronic Supplies	Conversion of electrical energy. Continuous and switching operation of semiconductor devices. Series linear voltage stabiliser, DC voltage interrupter, pulse stabiliser with voltage reduction topology, feedback control, fill factor modulators and others, digital pulse signal generation, regulators, stability, compensation, integrated circuits and modules. Diode bridge rectifier. Design of power modules, especially pulsed power modules.		x			x	x				
69	Diagnostics of Electronic Circuits	Fault detection techniques. Diagnostics of analogue systems. Signal tracing and analysis. Diagnostics of digital circuits. Safety and best practice. Implementation based on practical case studies.		x		x	x					
70	Object Oriented Programming	The concept of object-oriented programming. Concept of class and object. Hermetisation. Constituent variables and constituent functions. Access control. Constructor, destructor. Operators. Overloading of operators. Friend classes and functions. Inheritance. Virtual functions. Polymorphism. Abstract classes. Interface versus implementation. Conversions. Exceptions. Templates (parameterizable classes). Standard Template Library.	x					x				

No.	Course name	Program content	1ETE1	1ETE2	1ETE3	1ETE4	1ETE5	1ETE6	1ETE7	1ETE8	1ETE9	1ETE10
71	Wireless Systems and Networks	Basic diagram of the telecommunications system. Access and transport networks. Examples of telecommunications system standards. Legal considerations for the design, construction and operation of telecommunications infrastructure. Fundamentals of radio wave propagation in wireless communication systems. Antennas. Power balance of a radio link. Telecommunications traffic and network capacity. Principles of planning mobile systems. Basic transmission and reception techniques. Evolution of wireless communication systems. Impact of electromagnetic waves on people and the environment. Directions of development of wireless systems and techniques, including 6G cellular systems.	x	x			x					
72	Energy Storage and Battery Management Systems			x				x				
73	Diploma Seminar	Research methodology, rules for thesis writing and presentation and discussion of thesis results. Preparation for the competency examination to check the aggregated learning outcomes.		x	x				x		x	
74	Control and Autonomy of Drive Systems			x				x				
75	Final Project	Preparation of an bachelor thesis in accordance with defined standards.			x	x	x					x
76	Electric Drives			x				x				
77	Internship	Gain practical knowledge and new professional skills in the natural conditions of the workplace.					x		x		x	x
78	Diagnostics of Electronic Automotive Systems			x			x					
79	Smart Grid			x		x						
80	Fundamentals of AI for Electronics		x			x						
81	Advanced Diagnostics			x			x					
82	High Frequency Electronics			x		x						
83	Advanced Embedded Systems			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	C1 Business Communication for Engineers 1	3		3		3
2	Mathematics 1	7				7
3	C2 Business Communication for Engineers 1	3		3		3
4	Physics	3				3
5	Engineering Drawing	2				2
6	Study Skills for University	1	1			1
7	Electrical Circuits	6			6	6
8	Measurements and Statistics	5				5
9	Information Technologies	3				3
10	C1 Business Communication for Engineers 2	2		2		2
11	Computer Aided Design	3			3	3
12	Modern Physics	3			3	3
13	C2 Business Communication for Engineers 2	2		2		2
14	Mathematics 2	7				7
15	Civic Knowledge and Engagement I	1	1			1
16	Introduction to Electronics	6			6	6
17	Digital Systems	5			5	5
18	Introduction to Programming	3			3	3
19	German A2 block I	3		3		3
20	Interdisciplinary Problem-Based Learning Project	5	5			5

No.	Course name	ECTS	Subjects in the field of humanities and social sciences	Elective subjects	Profile items	Classes in a foreign language
21	Civic Knowledge and Engagement II	1	1			1
22	German B1 block I	3		3		3
23	German B2 block I	3		3		3
24	Measurement Systems	3			3	3
25	Spanish A2 block I	3		3		3
26	Microelectronic Technologies	5			5	5
27	Spanish B1 block I	3		3		3
28	Numerical Methods	3			3	3
29	Spanish B2 block I	3		3		3
30	Microprocessor Systems	4			4	4
31	Signal Processing	6			6	6
32	French A2 block I	3		3		3
33	French B1 block I	3		3		3
34	French B2 block I	3		3		3
35	Italian A1 block I	3		3		3
36	Italian A2 block I	3		3		3
37	Polish A1 block I	3		3		3
38	Polish A2 block I	3		3		3
39	German A1 block I	3		3		3
40	Spanish A1 block I	3		3		3
41	French A1 block I	3		3		3

No.	Course name	ECTS	Subjects in the field of humanities and social sciences	Elective subjects	Profile items	Classes in a foreign language
42	German A2 block II	3		3		3
43	Team Project	6			6	6
44	German B1 block II	3		3		3
45	Civic Knowledge and Engagement III	1	1			1
46	German B2 block II	3		3		3
47	Electronic Circuits	4			4	4
48	Spanish A2 block II	3		3		3
49	Electronic Equipment Design	4			4	4
50	Reprogrammable Digital Systems	4			4	4
51	Spanish B1 block II	3		3		3
52	Optoelectronics	4			4	4
53	Spanish B2 block II	3		3		3
54	Digital Communications	4			4	4
55	French A2 block II	3		3		3
56	French B1 block II	3		3		3
57	French B2 block II	3		3		3
58	Italian A1 block II	3		3		3
59	Italian A2 block II	3		3		3
60	Polish A1 block II	3		3		3
61	Polish A2 block II	3		3		3
62	German A1 block II	3		3		3

No.	Course name	ECTS	Subjects in the field of humanities and social sciences	Elective subjects	Profile items	Classes in a foreign language
63	Spanish A1 block II	3		3		3
64	French A1 block II	3		3		3
65	Technology Transfer Project	7		7	7	7
66	Automotive Electronics	6		6	6	6
67	Renewable Energy Sources for Sustainable Power Generation	6		6	6	6
68	Power Electronic Supplies	5			5	5
69	Diagnostics of Electronic Circuits	4			4	4
70	Object Oriented Programming	3			3	3
71	Wireless Systems and Networks	5			5	5
72	Energy Storage and Battery Management Systems	6		6	6	6
73	Diploma Seminar	3				3
74	Control and Autonomy of Drive Systems	6		6	6	6
75	Final Project	15		15	15	15
76	Electric Drives	6		6	6	6
77	Internship	6				6
78	Diagnostics of Electronic Automotive Systems	6		6	6	6
79	Smart Grid	6		6	6	6
80	Fundamentals of AI for Electronics	6		6	6	6
81	Advanced Diagnostics	6		6	6	6
82	High Frequency Electronics	6		6	6	6
83	Advanced Embedded Systems	6		6	6	6

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).	75/210 (35.71%)
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	124/210 (59.05%)

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:

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

A graduate of the first-cycle (Bachelor's) degree program in Electronic and Telecommunication Engineering possesses knowledge, skills, and engineering competencies in the fields of electronics, telecommunications, and selected areas of computer science. Particular emphasis is placed on the analysis, design, and diagnostics of analog and digital electronic circuits, microprocessor and optoelectronic systems, as well as modern telecommunication systems. The graduate also has selected competencies focused on the application of electronics and telecommunications in the context of the "green transition". Moreover, due to the implementation of the program in English, the requirement to undertake international mobility, and the use of modern teaching methods in the educational process, the graduate is especially well-prepared to work in international, multicultural, and interdisciplinary teams. A graduate of Electronic and Telecommunication Engineering is prepared to take on various roles in companies operating in the fields of electronics, telecommunications, and IT—for example, as an engineer of consumer electronics devices and systems, industrial/automotive electronics and energy processing systems, as well as telecommunication and IT systems. The graduate is also prepared for lifelong learning and may continue their education at the second-cycle (Master's) level in electronics and telecommunications or other fields, particularly those related to the scientific disciplines of automation, electronics, electrical engineering and space technologies, and/or information and communication technology.

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

With reference to the Strategy of Lodz University of Technology for the years 2025–2030 (Resolution No. 39/2024 of the Senate of Lodz University of Technology dated June 26, 2024), the developed study program is aligned with the following strategic goals:

a. Area: INTERNATIONALIZATION, Specific Goal 4:

Development of internationalization in the field of education.

The program is implemented in cooperation with the International Faculty of Engineering (IFE), conducted in English, with partial participation of international students. The 6th semester is entirely dedicated to mandatory international mobility — in the form of courses at foreign universities and/or internships in foreign companies/institutions.

b. Area: SUSTAINABILITY, Specific Goal 1:

Incorporating sustainable development goals into the activities of Lodz University of Technology.

The program has been expanded with elective modules aimed at developing competencies in areas such as sustainable generation, storage and transmission of electrical energy, as well as electromobility.

c. Area: EDUCATION, Specific Goal 2:

Improving the educational offer, including supplementary forms of education, in response to the challenges of the socio-economic environment.

The program's concept and content were extensively consulted with stakeholders from the socio-economic environment. A Business Council established for the program will play an advisory and consultative role during its implementation. Regular meetings of the Council are planned, at least once every six months.

d. Area: EDUCATION, Specific Goal 3:

Strengthening the talent management process through the individualization of students' and doctoral candidates' learning paths.

Elective courses make up more than 33% of the curriculum (with a minimum required threshold of 30%). The final semesters (6 and 7) are almost entirely elective in structure, allowing students to fully individualize their learning paths.

e. Area: EDUCATION, Specific Goal 5:

Increasing student participation in university-led research and intensifying the acquisition of practical experience outside the university. A significant portion of the courses is taught by actively research-engaged faculty members, including supervisors of student research clubs. Especially within project-based subjects, students are offered topics directly related to ongoing research activities at Lodz University of Technology. In many cases, students continue their work on these topics through direct cooperation with university units delivering the program. Additionally, the program includes a six-week student internship.

f. Area: STUDENTS, Specific Goal 1:

Supporting students in acquiring key competencies in line with labor market expectations.

Thanks to well-established cooperation with external stakeholders, the program has been optimized to support the development of such key competencies. Moreover, it includes a six-week student internship, often offered by verified business partners, which ensures the additional development of skills and attitudes valued by the labor market.

Educational objectives and employment and continuing education opportunities

The main educational objectives of the Electronic and Telecommunication Engineering program are:

a. To develop knowledge, engineering skills, and competencies in the fields of electronics, telecommunications, and selected aspects of computer science, with particular emphasis on the analysis, design, and diagnostics of analog and digital electronic circuits, microprocessor and optoelectronic systems, as well as modern telecommunication systems.

b. To develop selected competencies focused on the application of electronics and telecommunications in the context of the "green transition".

c. To prepare students for work in international, multicultural, and interdisciplinary teams.

Graduates of the Electronic and Telecommunication Engineering program will be able to find employment in companies specializing in electronics, telecommunications, and IT — for example, as engineers of consumer electronics devices and systems, industrial/automotive electronics and energy processing systems, as well as telecommunication and information systems.

Graduates are also well-prepared to continue their education at the second-cycle (Master's) level in Electronics and Telecommunications or in other fields, particularly those related to the scientific disciplines of automation, electronics, electrical engineering and space technologies, and/or information and communication technology.

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

As part of the preparations for updating the study program, an online meeting with representatives of six socio-economic stakeholders was held on April 14, 2023. The consultation process was supplemented by a survey completed by nine organizations. In September 2024, a Business Council was established under the Study Program Board for Electronics and Telecommunications and Electronic and Telecommunication Engineering. The council consists of six members — representatives of companies operating in industries closely related to the program's focus (Liki Mobile Solutions, RATEART, ZF, Solinerg, Corning, Ericsson). The inaugural meeting of the Council was held at Lodz University of Technology on October 29, 2024. Additionally, a dedicated online meeting focusing entirely on consultation of the new Electronic and Telecommunication Engineering study program took place on December 6, 2024.

As a result of consultations with industry partners, the key competencies expected of graduates of the program were identified as follows:

a. Hardware-related skills:

- Reading electrical schematics: Graduates should be able to read and interpret schematics, with an emphasis on digital systems.
- Troubleshooting and fault detection: The ability to identify and locate faults in electronic systems, essential for solving technical issues.
- Knowledge of embedded systems and power electronics: Skills in designing and analyzing embedded systems, and understanding issues related to power supply.
- Practical use of measurement tools: Proficiency in using multimeters, oscilloscopes, and other diagnostic instruments.

b. Programming and software-related competencies:

- Basic programming and scripting: Mastery of fundamental programming concepts, including scripting abilities.
- Low-level programming: Proficiency in C and C++ languages, including memory management and performance-oriented code optimization.
- Working in a Linux environment: Familiarity with Linux both at the user and developer level.
- System maintenance and development: The ability to maintain and expand existing systems, even without having been involved in their original development.

c. Telecommunications and signal processing skills:

- Knowledge of telecommunications standards: Understanding of communication standards ranging from 2G to 6G, enabling graduates to work on modern communication systems.
- Signal processing: Ability to analyze and process audio signals in both time and frequency domains, essential for audio signal processing projects.

d. Organizational and soft skills:

- Teamwork and project management: Familiarity with Agile methodologies and the ability to collaborate effectively within

interdisciplinary teams.

- Readiness to work on large-scale projects: Capability to engage in extensive systems development, including the creation of new components and the maintenance or expansion of existing ones.
- Orientation toward Life Long Learning: The ability to quickly acquire new technologies and adapt to changing market conditions — a quality highly valued in startup environments, where practical skills must be acquired independently and efficiently from the outset.

The analysis of statements provided by company representatives indicates that graduates of the Electronic and Telecommunication Engineering program should possess interdisciplinary knowledge and skills that combine strong technical foundations with a flexible approach to solving complex problems. In the hardware area, mastering schematic reading and fault diagnostics — particularly in digital technology and embedded systems — is essential, along with a solid understanding of analog technologies. In the field of software, competencies in C and C++, along with code optimization, memory management, and efficient use of the Linux environment, form the foundation for working with complex systems. A strong knowledge of modern wireless communication standards (2G–6G) and audio signal processing is required by companies operating in the telecommunications sector. Soft skills such as teamwork, project management in agile frameworks, and a strong motivation for continuous professional development are also crucial to ensure adaptability in the rapidly evolving technology market.

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

Not applicable.

The unit organizing education

Faculty of Electrical, Electronic, Computer and Control Engineering/CKM

Education program

Semester 1

Course	Number of hours	ECTS points	Form of verification	Obligatory
Mathematics 1	Tutorials: 70 Lecture: 20	7	Graded assignment	Obligatory
Physics	Tutorials: 15 Lecture: 30	3	Exam	Obligatory
Engineering Drawing	Tutorials: 20 Lecture: 10	2	Graded assignment	Obligatory
Study Skills for University	Tutorials: 30	1	Pass	Obligatory
Electrical Circuits	Tutorials: 15 Laboratory classes: 30 Lecture: 30	6	Graded assignment	Obligatory
Measurements and Statistics	Tutorials: 15 Laboratory classes: 15 Lecture: 30	5	Graded assignment	Obligatory
Information Technologies	Laboratory classes: 45	3	Graded assignment	Obligatory
Business Communication for Engineers 1		3	Graded assignment	Obligatory group
The student chooses one module from the group.				
C1 Business Communication for Engineers 1	Tutorials: 60	3	Graded assignment	Optional
C2 Business Communication for Engineers 1	Tutorials: 60	3	Graded assignment	Optional
Sum	435	30		

Semester 2

Course	Number of hours	ECTS points	Form of verification	Obligatory
Computer Aided Design	Laboratory classes: 45	3	Graded assignment	Obligatory
Modern Physics	Laboratory classes: 20 Lecture: 20	3	Graded assignment	Obligatory
Mathematics 2	Tutorials: 70 Lecture: 20	7	Exam	Obligatory
Civic Knowledge and Engagement I	Seminar: 3 Lecture: 3	1	Graded assignment	Obligatory
Introduction to Electronics	Laboratory classes: 60 Lecture: 30	6	Graded assignment	Obligatory
Digital Systems	Laboratory classes: 15 Tutorials: 10 Lecture: 30	5	Graded assignment	Obligatory
Introduction to Programming	Laboratory classes: 30 Lecture: 15	3	Graded assignment	Obligatory
Business Communication for Engineers 2		2	Exam	Obligatory group
The student chooses one module from the group.				
C1 Business Communication for Engineers 2	Tutorials: 30	2	Exam	Optional
C2 Business Communication for Engineers 2	Tutorials: 30	2	Exam	Optional
Physical Education 1	Tutorials: 30	0	Pass	Obligatory
Sum	431	30		

Semester 3

Course	Number of hours	ECTS points	Form of verification	Obligatory
Interdisciplinary Problem-Based Learning Project	Project work: 30	5	Graded assignment	Obligatory
Civic Knowledge and Engagement II	Seminar: 3 Lecture: 3	1	Graded assignment	Obligatory

Course	Number of hours	ECTS points	Form of verification	Obligatory
Measurement Systems	Laboratory classes: 24 Project work: 6 Lecture: 15	3	Graded assignment	Obligatory
Microelectronic Technologies	Laboratory classes: 45 Lecture: 15	5	Graded assignment	Obligatory
Numerical Methods	Laboratory classes: 30 Lecture: 15	3	Graded assignment	Obligatory
Microprocessor Systems	Laboratory classes: 30 Lecture: 30	4	Graded assignment	Obligatory
Signal Processing	Laboratory classes: 45 Lecture: 30	6	Exam	Obligatory
Foreign Language Block I		3	Graded assignment	Obligatory group
The student chooses one module from the group.				
German A2 block I	Tutorials: 60	3	Graded assignment	Optional
German B1 block I	Tutorials: 60	3	Graded assignment	Optional
German B2 block I	Tutorials: 60	3	Graded assignment	Optional
Spanish A2 block I	Tutorials: 60	3	Graded assignment	Optional
Spanish B1 block I	Tutorials: 60	3	Graded assignment	Optional
Spanish B2 block I	Tutorials: 60	3	Graded assignment	Optional
French A2 block I	Tutorials: 60	3	Graded assignment	Optional
French B1 block I	Tutorials: 60	3	Graded assignment	Optional
French B2 block I	Tutorials: 60	3	Graded assignment	Optional
Italian A1 block I	Tutorials: 60	3	Graded assignment	Optional
Italian A2 block I	Tutorials: 60	3	Graded assignment	Optional
Polish A1 block I	Tutorials: 60	3	Graded assignment	Optional
Polish A2 block I	Tutorials: 60	3	Graded assignment	Optional

Course	Number of hours	ECTS points	Form of verification	Obligatory
German A1 block I	Tutorials: 60	3	Graded assignment	Optional
Spanish A1 block I	Tutorials: 60	3	Graded assignment	Optional
French A1 block I	Tutorials: 60	3	Graded assignment	Optional
Physical Education 2	Tutorials: 30	0	Pass	Obligatory
Sum	411	30		

Semester 4

Course	Number of hours	ECTS points	Form of verification	Obligatory
Team Project	Project work: 40	6	Graded assignment	Obligatory
Civic Knowledge and Engagement III	Seminar: 3 Lecture: 3	1	Graded assignment	Obligatory
Electronic Circuits	Laboratory classes: 30 Lecture: 30	4	Graded assignment	Obligatory
Electronic Equipment Design	Laboratory classes: 30 Lecture: 30	4	Graded assignment	Obligatory
Reprogrammable Digital Systems	Laboratory classes: 30 Lecture: 30	4	Graded assignment	Obligatory
Optoelectronics	Laboratory classes: 30 Lecture: 30	4	Graded assignment	Obligatory
Digital Communications	Laboratory classes: 30 Lecture: 30	4	Graded assignment	Obligatory
Foreign Language Block II		3	Graded assignment	Obligatory group
The student chooses one module from the group.				
German A2 block II	Tutorials: 60	3	Graded assignment	Optional
German B1 block II	Tutorials: 60	3	Graded assignment	Optional

Course	Number of hours	ECTS points	Form of verification	Obligatory
German B2 block II	Tutorials: 60	3	Graded assignment	Optional
Spanish A2 block II	Tutorials: 60	3	Graded assignment	Optional
Spanish B1 block II	Tutorials: 60	3	Graded assignment	Optional
Spanish B2 block II	Tutorials: 60	3	Graded assignment	Optional
French A2 block II	Tutorials: 60	3	Graded assignment	Optional
French B1 block II	Tutorials: 60	3	Graded assignment	Optional
French B2 block II	Tutorials: 60	3	Graded assignment	Optional
Italian A1 block II	Tutorials: 60	3	Graded assignment	Optional
Italian A2 block II	Tutorials: 60	3	Graded assignment	Optional
Polish A1 block II	Tutorials: 60	3	Graded assignment	Optional
Polish A2 block II	Tutorials: 60	3	Graded assignment	Optional
German A1 block II	Tutorials: 60	3	Graded assignment	Optional
Spanish A1 block II	Tutorials: 60	3	Graded assignment	Optional
French A1 block II	Tutorials: 60	3	Graded assignment	Optional
Physical Education 3	Tutorials: 30	0	Pass	Obligatory
Sum	436	30		

Semester 5

Course	Number of hours	ECTS points	Form of verification	Obligatory
Technology Transfer Project	Seminar: 10 Project work: 75	7	Exam	Obligatory subjects to choose from
Power Electronic Supplies	Laboratory classes: 45 Lecture: 15	5	Graded assignment	Obligatory

Course	Number of hours	ECTS points	Form of verification	Obligatory
Diagnostics of Electronic Circuits	Laboratory classes: 45 Lecture: 15	4	Graded assignment	Obligatory
Object Oriented Programming	Laboratory classes: 30 Lecture: 15	3	Graded assignment	Obligatory
Wireless Systems and Networks	Laboratory classes: 45 Lecture: 30	5	Graded assignment	Obligatory
Elective Courses 1		6	Graded assignment	Obligatory group
The student chooses 1 subject				
Automotive Electronics	Laboratory classes: 45 Project work: 15 Lecture: 30	6	Graded assignment	Optional
Renewable Energy Sources for Sustainable Power Generation	Laboratory classes: 45 Project work: 15 Lecture: 30	6	Graded assignment	Optional
Sum	415	30		

Semester 6

Course	Number of hours	ECTS points	Form of verification	Obligatory
Mobility Semester	Total number of contact hours: 375	30	Graded assignment	Obligatory subjects to choose from
Sum	375	30		

Semester 7

Course	Number of hours	ECTS points	Form of verification	Obligatory
Diploma Seminar	Seminar: 20	3	Graded assignment + exam	Obligatory
Final Project	Diploma Thesis: 0	15	Pass	Obligatory subjects to choose from
Internship	Internship: 0	6	Pass	Obligatory
Elective Courses 2		6	Graded assignment	Obligatory group
The student chooses 1 subject				
Energy Storage and Battery Management Systems	Laboratory classes: 45 Project work: 15 Lecture: 30	6	Graded assignment	Optional
Control and Autonomy of Drive Systems	Laboratory classes: 45 Project work: 15 Lecture: 30	6	Graded assignment	Optional
Electric Drives	Laboratory classes: 45 Project work: 15 Lecture: 30	6	Graded assignment	Optional
Diagnostics of Electronic Automotive Systems	Laboratory classes: 45 Project work: 15 Lecture: 30	6	Graded assignment	Optional
Smart Grid	Laboratory classes: 45 Project work: 15 Lecture: 30	6	Graded assignment	Optional
Fundamentals of AI for Electronics	Laboratory classes: 45 Project work: 15 Lecture: 30	6	Graded assignment	Optional
Advanced Diagnostics	Laboratory classes: 45 Project work: 15 Lecture: 30	6	Graded assignment	Optional
High Frequency Electronics	Laboratory classes: 45 Project work: 15 Lecture: 30	6	Graded assignment	Optional

Course	Number of hours	ECTS points	Form of verification	Obligatory
Advanced Embedded Systems	Laboratory classes: 45 Project work: 15 Lecture: 30	6	Graded assignment	Optional
Sum	110	30		