Lodz University of Technology

Study programme

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

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Basic information

Name of the field of study:	Electronics and Telecommunications
Level of study:	second-cycle programme (magister inżynier)
Study profile:	general academic
Form of studies:	full-time studies
Duration of studies (number of semesters):	3
The number of ECTS points required to complete studies:	90
Total number of hours of classes:	1125
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:	45
Professional title awarded to graduates:	magister inżynier
ISCED code:	0714
Language of study:	polish

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	**2EIT1**	Knows an thoroughly understands complex concepts and phenomena in electronics and telecommunications, as well as the methods and theories explaining the relationships between them; knows the main development trends in electronics and telecommunications; understands the fundamental processes occurring in the life cycle of electronic and telecommunications devices and systems.	P7U_W	P7S_WG, P7S_WK, P7S_WG_inż
2	**2EIT10**	Is ready to participate in and initiate projects, including those of a social nature, contributing knowledge and skills related to engineering aspects, including electronics and telecommunications.	P7U_K	P7S_KO, P7S_KR
3	**2EIT2**	Knows and understands the economic, legal, and other conditions of various professional activities related to electronics and telecommunications, including the concepts and principles of industrial property protection and copyright.	P7U_W	P7S_WK, P7S_WK_inż
4	**2EIT3**	Is able to formulate and solve non-typical problems in electronics and telecommunications by critically analyzing and evaluating existing solutions, formulating and verifying hypotheses, planning and conducting experiments, including measurements and computer simulations, and applying, adapting, or developing new methods and tools.	P7U_U	P7S_UW, P7S_UW_inż
5	**2EIT4**	Is able to design and construct electronic and telecommunications devices and systems in accordance with a given specification, using appropriately selected methods, tools, and materials, while considering economic, ethical, and other non-technical aspects.	P7U_U	P7S_UW, P7S_UW_inż
6	**2EIT5**	Is able to communicate with diverse audiences on topics in the field of electronics and telecommunications, including using English at a B2+ level and specialized terminology; is able to present and evaluate diverse opinions and positions, and lead and participate in debates.	P7U_U	P7S_UK
7	**2EIT6**	Is able to work in a team, assuming various roles, with particular emphasis on leadership; is able to direct teamwork by setting goals, planning, and critically assessing the task at hand.	P7U_U	P7S_UO
8	**2EIT7**	Is able to utilize literature, databases, and other information sources, including advanced information and communication technologies, and, if necessary, acquire new knowledge using appropriate learning strategies; is able to guide others in this area.	P7U_U	P7S_UU
9	**2EIT8**	Is ready to critically evaluate their own knowledge and the content they receive; when solving problems in the field of electronics and telecommunications, is ready to act based on current knowledge, taking into account expert opinions and other reliable sources.	P7U_K	P7S_KK, P7S_KO

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
10	**2EIT9**	Is willing to adhere to and develop the ethical principles of the engineering profession in the broadly defined field of electronics and telecommunications, and to uphold the ethos and develop the achievements of this profession.	P7U_W, P7U_K	P7S_WK, P7S_KO, P7S_KR

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

No.	Course name	Program content	2EIT1	2EIT10	2EIT2	2EIT3	2EIT4	2EIT5	2EIT6	2EIT7	2EIT8	2EIT9
1	Autonomous Electronic System		x				x	x	x			
2	Design and Diagnostics of Electronic Systems											
3	Microprocessor Systems		x			x	x					
4	Wireless Communications		x			x						
5	Numerical Methods and Optimisation		x			x						
6	Research Methodology				x	x				x		
7	Entrepreneurship and Technology Transfer				x					x		
8	Research and Development Project in Electronics/Telecommunication			x		x		x		x	x	
9	Micro and Nanotechnology for Electronics		x			x						
10	Programming in Intelligent Computing											
11	Measurements in Optical Fibre Networks		x			x						
12	Wireless ICT Networks		x			x						
13	Foreign Language for Specialist Purposes	Foreign language course at B2+ level; developing the ability to communicate effectively in speech and writing, using specialist terminology from the field of study.						x				
14	Internet of Things		x			x						
15	Microwave Technique											
16	Advanced mobile technologies											
17	Advanced CAD/CAM/EDA tools											
18	Modern Microprocessor Systems		x			x	x					
19	Processors and Operating Systems in Industrial Applications					x	x					

No.	Course name	Program content	2EIT1	2EIT10	2EIT2	2EIT3	2EIT4	2EIT5	2EIT6	2EIT7	2EIT8	2EIT9
20	Control-measurement Systems in Industrial Electronics					x	x					
21	Electromagnetic Compatibility											
22	Research and Development Project in Electronics/Telecommunication			x		x		x	x		x	
23	Diploma Seminar	Applicable legal regulations, rules for writing a master's thesis, and presentation and discussion of the results of the thesis. Preparation for a competency exam testing the aggregate learning outcomes.		x				x			x	x
24	Final Project		x			x				x	x	x
25	Internship									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	Autonomous Electronic System	10		10	10	
2	Design and Diagnostics of Electronic Systems	4		4	4	
3	Microprocessor Systems	4		4	4	
4	Wireless Communications	4		4	4	
5	Numerical Methods and Optimisation	4		4	4	
6	Research Methodology	2	2			
7	Entrepreneurship and Technology Transfer	2	2			
8	Research and Development Project in Electronics/Telecommunication	10		10	10	
9	Micro and Nanotechnology for Electronics	5		5	5	
10	Programming in Intelligent Computing	3		3	3	
11	Measurements in Optical Fibre Networks	5		5	5	
12	Wireless ICT Networks	5		5	5	
13	Foreign Language for Specialist Purposes	2				
14	Internet of Things	5		5	5	
15	Microwave Technique	5		5	5	
16	Advanced mobile technologies	5		5	5	
17	Advanced CAD/CAM/EDA tools	5		5	5	
18	Modern Microprocessor Systems	5		5	5	
19	Processors and Operating Systems in Industrial Applications	5		5	5	
20	Control-measurement Systems in Industrial Electronics	5		5	5	
21	Electromagnetic Compatibility	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
22	Research and Development Project in Electronics/Telecommunication	4	4	4	4	4
23	Diploma Seminar	2				
24	Final Project	20		20	20	
25	Internship	4				

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).	78/90 (86.67%)
The total number of ECTS credits to be earned by a student through courses in the fields of humanities or social sciences	8
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	78/90 (86.67%)

Methods of verifying and assessing learning outcomes

Verification of achieved learning outcomes requires the use of diverse forms of student assessment, appropriate to the categories of knowledge, skills, and social competencies to which these outcomes relate. The selection of suitable tools also depends on the specifics of the subject and the form of classes, and is described in the syllabi of individual courses. The achievement of the required learning outcomes is verified through:

1. Written work (exams, tests, reports, essays, projects, posters, thesis, etc.);
2. Oral statements (oral knowledge checks, public presentations such as delivering a paper, presentation, etc.);
3. Practical and/or project tasks (both group and individual);
4. Observation and evaluation of student activity during classes;
5. Self-assessment and peer assessment (especially in the case of group projects);
6. Competency exam and diploma exam.

Verification may be formative (partial, repeated during classes) and/or summative (final assessment). The final verification result is given according to the currently applicable grading scale.
The course coordinator or instructor is obliged, during the first class, to discuss the course syllabus and to formulate and provide documented information to students regarding the methods of verification and the conditions for conducting assessments of learning outcomes.

Professional internships

Duration: 4 weeks

ECTS points earned: 4

Internships conducted in accordance with the study program in a form adapted to the profile and specificity of the field of study and in accordance with the rules set forth by the faculty and the University.

Characteristics of the course

Graduate profile

A graduate of the second-cycle (Master's degree) program in Electronics and Telecommunications has advanced competencies in modern electronics, telecommunications, and computer science, and is familiar with the development trends in these areas of science and technology. The graduate is particularly prepared for advanced electronic circuit design, a variety of modern microprocessor systems, and wireless communication systems, as well as advanced computational intelligence programming. The graduate has well-developed soft skills, particularly in planning and organizing teamwork, as well as in communicating and presenting results. A graduate of Electronics and Telecommunications is prepared to pursue a variety of careers in companies operating in electronics, telecommunications, ICT, IT, or other areas related to these fields. Their professional activities can involve both design and engineering, as well as research and development. Thanks to being well-prepared for further independent learning the graduate is able to manage their own professional development and/or pursue third-cycle studies.

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

With reference to the "Strategy of Lodz University of Technology for 2025-2030" (Resolution No. 39/2024 of the Senate of Lodz University of Technology of June 26, 2024), the developed study program is related to the following objectives:

INTERNATIONALIZATION Area, specific objective 4: Development of internationalization in the field of education. The program includes an English-language specialization, within which two double diploma agreements are implemented with partners from Italy (Università di Napoli Federico II) and Spain (Universidade de Vigo).

EDUCATION Area, specific objective 2: Improving the educational offer, including complementary forms of education, in response to the challenges of the socio-economic environment. The concept and content of the program were extensively consulted with the socio-economic environment. The Business Council established for the field of study provides advisory and consulting support also during program implementation.

EDUCATION Area, Specific Objective 3: Strengthening the talent management process by individualizing the education paths of undergraduate and doctoral students. The ability to choose one of the program's two specializations ensures an elective rate of over 80%. Over 50% of the program's content is elective within the selected specialization. The subjects "Research and Development Project" and "Research and Development Project in Electronics/Telecommunication" offer the opportunity to choose topics implemented in collaboration with the business community as well as with research units at Lodz University of Technology, either individually or in a team setting.

EDUCATION Area, Specific Objective 5: Increasing student participation in research conducted at the university and intensifying students' practical experience outside the university. Program subjects are largely taught by research-active scientists, including supervisors of student research groups. Project subjects, in particular, offer topics related to research activities conducted at Lodz University of Technology. Students often continue working on such topics through direct collaboration with TUL units offering courses in the field. The program also includes a 4-week student internship.

STUDENTS Area, Specific Objective 1: Supporting students in achieving key competencies aligned with labor market expectations. Thanks to well-established cooperation with the socio-economic environment, the program is optimized for students to achieve these key competencies. Furthermore, the program includes a 4-week student internship, implemented with proven business partners, which ensures the additional development of skills and attitudes expected by the labour market.

Educational objectives and employment and continuing education opportunities

The main educational goal for graduate is to achieve advanced competences in electronics and telecommunications, based on both the latest achievements and development trends in these areas of science and technology. This goal is to be achieved with particular emphasis on practical and application skills, as well as individual student needs. These needs primarily include enabling students to develop in their chosen areas of electronics and telecommunications and a conveniently planned course of study. The content of the core subjects has been selected so that each graduate acquires knowledge and skills that can be directly applied in specialized professional activities typical of the current labour market and research activities. Particular emphasis is placed on preparation in the analysis and design of electronic systems, taking into account the specific application area, microprocessor systems and optoelectronics, and the implementation of modern telecommunications and IT networks. Students also acquire knowledge and skills that allow for further education in third-cycle studies. Students learn to use knowledge and independently acquire it, verify and select

information from various sources, including electronic sources. Part of the education, also on the Polish-language track, is offered in English. This prepares students to utilize the rich English-language literature and function in an international environment. The English-language track (Applied Electronics specialization) was developed in collaboration with the University of Naples Federico II and forms the basis for two double-degree agreements with a partner in Naples (Italy) and a partner in Vigo (Spain). Based on an understanding of the needs of the electronics and microelectronics industries in EU countries, the Applied Electronics specialization offers a large number of practical classes, both projects and laboratories.

Graduates of second-cycle studies in Electronics and Telecommunications have the opportunity to pursue a variety of jobs in companies specializing in electronics, telecommunications, ICT, IT, or other related fields. This work can involve both design and engineering, as well as research and development. Thanks to the preparation for further independent learning, they can manage their own professional development and/or pursue third-cycle studies.

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

As part of the preparations for the program update, a meeting with representatives of six entities from the socio-economic environment was held in 2023, supplemented by a survey completed by nine entities. In September 2024, a Business Council was established at the Electronics and Telecommunications and Electronic and Telecommunication Engineering Program Council, consisting of six people – representatives of companies representing industries closely related to the subject matter of the program (Liki Mobile Solutions, RATEART, ZF, Solinerg, Corning, Ericsson). In December 2024, a meeting was held devoted entirely to consultations on the new Electronics and Telecommunications study program.

As a result of consultations with the socio-economic environment, key competencies for graduates of the program were identified, of which the following are particularly important for the second-cycle program:

- Diagnosing faults and finding errors: The ability to detect and locate errors in electronic systems, which is essential for solving technical problems.
- Maintaining and expanding systems: Graduates should be able to develop and maintain existing systems, projects in which they have not previously participated.
- Teamwork and project management skills, including the ability to collaborate effectively in interdisciplinary teams.
- Willingness to work on large projects: Ability to work on extensive systems that require both the development of new components and the maintenance and expansion of existing solutions.
- Orientation towards continuous development (Life Long Learning): Ability to quickly adopt new technologies and adapt to changing market conditions.

Analysis of company representatives' responses indicates that a graduate of Electronics and Telecommunications should possess interdisciplinary knowledge and skills combining a solid technical foundation with a flexible approach to solving complex problems. Soft skills, such as teamwork, project management using agile methodologies, and a strong motivation for continuous professional development are also essential, enabling adaptation to the dynamically changing technology market.

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

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

The unit organizing education

Faculty of Electrical, Electronic, Computer and Control Engineering

Education program

Semester 1

Course	Number of hours	ECTS points	Form of verification	Obligatory
Autonomous Electronic System	Project work: 45 Lecture: 20	10	Exam	Obligatory subjects to choose from
Design and Diagnostics of Electronic Systems	Laboratory classes: 30 Lecture: 20	4	Graded assignment	Obligatory subjects to choose from
Microprocessor Systems	Laboratory classes: 30 Lecture: 20	4	Graded assignment	Obligatory subjects to choose from
Wireless Communications	Laboratory classes: 30 Lecture: 20	4	Graded assignment	Obligatory subjects to choose from
Numerical Methods and Optimisation	Laboratory classes: 30 Lecture: 30	4	Graded assignment	Obligatory subjects to choose from
Research Methodology	Seminar: 10 Lecture: 15	2	Graded assignment	Obligatory
Entrepreneurship and Technology Transfer	Project work: 20 Lecture: 10	2	Graded assignment	Obligatory
Sum	**330**	**30**		

Semester 2

Course	Number of hours	ECTS points	Form of verification	Obligatory
Research and Development Project in Electronics/Telecommunication	Project work: 45	10	Graded assignment	Obligatory subjects to choose from
Programming in Intelligent Computing	Laboratory classes: 30	3	Exam	Obligatory subjects to choose from
Foreign Language for Specialist Purposes	Tutorials: 45	2	Graded assignment	Obligatory
Elective Courses		15	Graded assignment	Obligatory group
The student chooses 3 subjects				
Micro and Nanotechnology for Electronics	Laboratory classes: 45 Lecture: 15	5	Graded assignment	Optional
Measurements in Optical Fibre Networks	Project work: 45 Lecture: 15	5	Graded assignment	Optional
Wireless ICT Networks	Project work: 45 Lecture: 15	5	Graded assignment	Optional
Internet of Things	Project work: 45 Lecture: 15	5	Graded assignment	Optional
Microwave Technique	Project work: 45 Lecture: 15	5	Graded assignment	Optional
Advanced mobile technologies	Project work: 45 Lecture: 15	5	Graded assignment	Optional
Advanced CAD/CAM/EDA tools	Project work: 45 Lecture: 15	5	Graded assignment	Optional
Modern Microprocessor Systems	Laboratory classes: 45 Lecture: 15	5	Graded assignment	Optional
Processors and Operating Systems in Industrial Applications	Laboratory classes: 45 Lecture: 15	5	Graded assignment	Optional
Control-measurement Systems in Industrial Electronics	Laboratory classes: 45 Lecture: 15	5	Graded assignment	Optional

Course	Number of hours	ECTS points	Form of verification	Obligatory
Electromagnetic Compatibility	Laboratory classes: 30 Lecture: 30	5	Graded assignment	Optional
Sum	**300**	**30**		

Semester 3

Course	Number of hours	ECTS points	Form of verification	Obligatory
Research and Development Project in Electronics/Telecommunication	Project work: 45	4	Exam	Obligatory subjects to choose from
Diploma Seminar	Seminar: 30	2	Exam	Obligatory
Final Project	Diploma Thesis: 0	20	Pass	Obligatory subjects to choose from
Internship	Internship: 0	4	Pass	Obligatory
Sum	**75**	**30**		