BIALYSTOK UNIVERSITY OF TECHNOLOGY

FACULTY OF ELECTRICAL ENGINEERING

PLAN OF SECOND DEGREE POSTGRADUATE STUDY

course of study
ELECTRONICS DEVICES AND TELECOMMUNICATIONS

BIAŁYSTOK 2019

6.15. Program studiów stacjonarnych w języku angielskim

General course objectives and employment or further education opportunities for the graduates:

Bialystok University of Technology, the Faculty of Electrical Engineering, offers students full-time and part-time second-degree studies in Electronics and Telecommunications.

Second degree studies in Electronics and Telecommunications provide graduates with specialist preparation to engage in a wide range of activities in the field of electronics and telecommunications in design, operation, production and supervision, as well as to undertake innovative activities of different kind. This field of study makes use of advanced technology and includes specialised interdisciplinary knowledge of electronics, telecommunications, optoelectronics, fibre optics and photonics, programmable digital systems, information and coding theory, software engineering and electromagnetic compatibility, as well as the design and management of telecommunication networks and services and the security of information systems.

What is more, the graduates of the second-degree studies, after additional training in didactics, may also undertake work at technical universities and in vocational schools or continue their education in third degree studies (doctoral studies).

Explanation of symbols:

ET2 – learning outcomes for the field of study for second cycle courses in the field of Electronics and Telecommunications; 01, 02, 03 and subsequent numbers – learning outcome number; W – category of knowledge; U – category of skills; K – category of social competence

P7s – learning outcomes for the area of technical sciences for second cycle courses

Tab. 1. References of the effects of second-degree studies in Electronics and telecommunications to the second level characterization of the Polish Qualifications Framework level 7

Symbol	Learning outcomes for Electronics and Telecommunications After having completed a second degree course, graduates of Electronics and Telecommunications has the knowledge, skills and social competences in the following area	PQF symbol in the field of technical sciences	PQF symbol qualifications of engineering competence
Knowledge: the graduate knows and understands:			
ET2_W01	selected areas of mathematics and physics in an in-depth manner which allows him/her to solve complex issues from the field of electronics,	P7S_WG	
ET2_W02	advanced issues from the field of photonics necessary to understand optical information processing systems and telecommunication systems,	P7S_WG	P7S_WG
ET2_W03	in an orderly and theoretically founded manner the generation and detection of signals with reference to modern methods of information processing and coding,	P7S_WG	P7S_WG
ET2_W04	in an orderly manner the issues of electronic and optoelectronic metrology and equipment design - including the problems of electromagnetic compatibility,	P7S_WG	P7S_WG
ET2_W05	in a detailed manner the issues of security of telecommunication systems, data transmission in ICT networks and management of these systems,	P7S_WK, P7S_WG	P7S_WG

ET2_W06	in an orderly manner the specificity of optoelectronic technology and nanotechnology, as well as the main trends in the development of electronics, telecommunications, photonics and fiber optic technology,	P7S_WK, P7S_WG	
ET2_W07	in an in-depth manner the specificity of equipment components of telecommunication networks, in particular programmable digital and microprocessor systems,	P7S_WG	P7S_WG
ET2_W08	techniques of design and construction of modern electronic devices using artificial intelligence,	P7S_WG, P7S_WK	P7S_WG
ET2_W09	in an orderly manner the issues of intellectual property protection, transfer of knowledge and commercialization of research results.	P7S_WK	P7S_WK
Skills: the graduate can:			
ET2_U01	obtain information from various sources, including those in a foreign language and use them to formulate valid opinions,	P7S_UW	
ET2_U02	work individually and in a team and coordinate the work of the team, keeping the schedule,	P7S_UO	
ET2_U03	develop reports and technical documentation of implemented research tasks or projects,	P7S_UW	P7S_UW
ET2_U04	develop and give presentations concerning an experiment, project or research task - also in a foreign language,	P7S_UK	
ET2_U05	use a foreign language at the B2+ level (CEF) in a communicative way, also when using foreign technical literature,	P7S_UK	
ET2_U06	organize the process of developing one's knowledge and skills through self-education,	P7S_UU	
ET2_U07	formulate and test hypotheses concerning technical systems using the studied mathematical models and analytical methods,	P7S_UW	
ET2_U08	carry out simulations and synthesis, as well as measurements of electronic and telecommunication devices , including measurements of their electromagnetic compatibility,	P7S_UW	P7S_UW
ET2_U09	plan and perform tests of electronic and telecommunication equipment and systems, offering improvements or innovations,	P7S_UW	P7S_UW
ET2_U10	design unusual electronic circuits and electronic systems, respecting the rights of intellectual and industrial property protection,	P7S_UW	P7S_UW
ET2_U11	develop electronic and telecommunication systems, analysing commercial aspects, including cost-effectiveness of implementation,	P7S_UW	P7S_UW
ET2_U12	solve research and technical problems using systematic approach and integrating knowledge from the fields of: electronics, telecommunications, computer science, photonics and fiber optic technology,	P7S_UW	P7S_UW
ET2_U13	develop systems evaluating their usefulness and applying new technological advances in microtechnology, nanotechnology and elastic electronics,	P7S_UW	
ET2_U14	select and assess the suitability of technical, technological and organizational factors of electronic communication systems - also with respect to management and security.	P7S_UW	P7S_UW

Social competence: the graduate is ready to:			
ET2_K01	solve technical problems and formulate hypotheses applying critical assessment of the existing state and basing on expert knowledge,	P7S_KK	
ET2_K02	work in a team and coordinate it in an entrepreneurial manner, respecting the principles of ethics, including the protection of intangible and legal property, as well as the expectations of the social environment,	P7S_KO	
ET2_K03	engage in technical activity which inspires professional development in a changing social environment and the maintenance of professional ethics standards.	P7S_KR	

Programme of studies:

- form: full-time,
- number of semesters: 3,
- number of ECTS points necessary to obtain qualifications related to the degree of studies: 90,
- plan of studies, including elective modules and the structure of studies.
- Amounts of student - 30

EXPLANATIONS FOR THE PLAN OF STUDIES

Abbreviations:

L – lecture, C – class, LC – laboratory class, P – project, SW – specialization workshop, S – seminar; LE – lecture followed by examination;

HES – module belonging to the group of humanistic, economical and management modules.

Others:

A. There are 15 weeks of classes in each semester.
B. Each module lasts for only one semester.
C. Prerequisites – modules, which student should obligatory have finished before the beginning of a given module.

Form of assessment:

- examination at the end of a lecture and assessment with final mark at the end of other forms of classes for a given module or assessment with final mark of each form of classes for a given module.
- points for a module (ECTS) student obtain after the assessment of a module, e.g. positive marks from all forms of classes.
- nominal number of points in each semester is 30.

In the course of the second-degree studies, student learns foreign language on B2+ level, in accordance with the Common European Framework of Reference (CERN) for Languages.

Tab.4. Plan of full-time studies on „Electronic devices and telecommunications" specialization

Semester I		Semester II		Semester III	
Foreign language	2 C 2 ECTS	CAD tools for designing telecommunication networks	1 L 2 SW 3 ECTS	Diploma seminar	2 S 2 ECTS
Numerical methods	1 L 2 SW 3 ECTS	Electromagnetic compatibility	1 LE 2 LC 3 ECTS	Master thesis	15 ECTS
Methods of optimization	1 L 2 SW 3 ECTS	Management of telecommunications networks and services	1 LE 2 LC 3 ECTS	Building of telecommunication infrastructure	1 L 1 P 2 ECTS
Optical fiber technology and photonics	2 LE 2 LC 4 ECTS	Project in fiberoptic networks	2 P 2 ECTS	Security of information systems	2 LE 1 LC 3 ECTS
Antennas and propagation 1	2 LE 3 ECTS	ICT network design	1 P 2 ECTS	Work placement 2	2 ECTS
Programmable digital circuits	1 L 2 LC 1 P 3 ECTS	Antennas and propagation 2	1 LC 1 SW 2 ECTS	HES - Professional responsibility, construction law	2 L 2 ECTS
Theory of information and coding	1 LE 2 SW 4 ECTS	Electronic measurement equipment	1 L 2 LC 3 ECTS	Free-space optical communications	1 L 1 ECTS
Reliability and diagnostics	1 L 1 ECTS	Methods of modulation and detection of optical radiation	1 L 1 C 2 ECTS	HES – elective course	2 S 3 ECTS
TCP/IP networks and applications	1 L 2 LC 3 ECTS	Power systems in optical telecommunication	1 P 1 ECTS		
Lasers and optical amplifiers	2 L 1 LC 2 P 4 ECTS	Telecommunication systems of navigation and localization	1 L 1 SW 2 ECTS		
		Elective course 1*	1 L 1 LC/SW/P 3 ECTS		
		Elective course 2*	1 L 1 LC/SW/P 2 ECTS		
		Elective course 3*	1 L 1 LC/SW/P 2 ECTS		
Sum	**30 ECTS**		**30 ECTS**		**30 ECTS**
Hours per week	**30**		**28**		**12**
Hours per semester	**450**		**420**		**180**
		Total number of hours on the second degree studies			**1050**

Elective courses for full-time programme on „Electronic devices and telecommunications" specialization

Elective course 1		Elective course 2		Elective course 3	
Mobile applications	1 L 1 SW	Digital signal processors in telecommunication systems	1 L 1 LC	System programming of embedded devices	1 L 1 SW
Databases and data warehouses	1 L 1 SW	Software defined radio	1 L 1 SW	Communication interfaces in embedded systems	1 L 1 LC
Digital radio links	1 L 1 P	Wireless broadcasting systems	1 L 1 LC	Integrated circuits and systems	1 L 1 SW
Wave optics	1 L 1 LC	Statistical theory of communication	1 L 1 LC	On-Chip digital systems	2 LC
Optical sensors and microsystems	1 L 1 LC	Diagnostics of telecommunication optical fiber networks	1 L 1 LC	Photonic structures	1 L 1 C
Methods of artificial intelligence	1 L 1 SW			Optoelectronic medical devices	2 L
				Elements of nanotechnology	2 L

HES – elective course (sem. 3)	
Techniques of presentation	2 S
Innovations in electronic industry	2 S

List of courses provided for the field of study “Electronics and telecommunications” – full-time programme, specialization “Electronic devices and telecommunications”.

Tab.5 Obligatory courses for full-time programme on „ Electronic devices and telecommunications” specialization

CODE	Course name	Number of hours in a week						ECTS
		L	Ć	LC	P	Sw	S	
TS2E100001	Numerical methods	1				2		3
TS2E100002	Methods of optimization	1				2		3
TS2E100003	Optical fiber technology and photonics	2E		2				4
TS2E100004	Antennas and propagation 1	2E						3
TS2E100005	Programmable digital circuits	1		2	1			3
TS2E100006	Theory of information and coding	1E				2		4
TS2E100007	Reliability and diagnostics	1						1
TS2E100008	TCP/IP networks and applications	1		2				3
TS2E100009	Lasers and optical amplifiers	2		1	2			4
TS2E200010	CAD tools for designing telecommunication networks	1				2		3
TS2E200011	Electromagnetic compatibility	1E		2				3
TS2E200012	Management of telecommunications networks and services	1E		2				3
TS2E200013	Project in fiberoptic networks				2			2
TS2E200014	ICT network design				1			2
TS2E200015	Antennas and propagation 2			1		1		2
TS2E200016	Electronic measurement equipment	1		2				3
TS2E200017	Methods of modulation and detection of optical radiation	1	1					2
TS2E200018	Power systems in optical telecommunication				1			1
TS2E200019	Telecommunication systems of navigation and localization	1				1		2
TS2E300020	Diploma seminar						2	2
TS2E300021	Master thesis							15
TS2E300022	Building of telecommunication infrastructure	1			1			2
TS2E300023	Security of information systems	2E		1				3
TS2E300024	Work placement 2							2
TS2E300025	HES - Professional responsibility, construction law	2						2
TS2E300026	Free-space optical communications	1						1

*Tab.6 Foreign languages courses for full-time programme on „*Electronic devices and telecommunications*" specialization*

CODE	Course name	Number of hours in a week						ECTS
		L	Ć	LC	P	Sw	S	
TS2E100051	Foreign language – English		2					2
TS2E100052	Foreign language – German		2					2
TS2E100053	Foreign language – Russian		2					2

*Tab.7. Elective HES (Humanistic, Economic, Social) courses for full-time programme on „*Electronic devices and telecommunications*" specialization*

CODE	Course name HES elective course (sem. 3)	Number of hours in a week						ECTS
		L	Ć	LC	P	Sw	S	
TS2E300132	Techniques of presentation						2	3
TS2E300134	Innovation in electronic industry						2	3

*Tab.8 Elective courses for full-time programme on „*Electronic devices and telecommunications*" specialization*

CODE	Course name	Number of hours in a week						ECTS
		L	Ć	LC	P	Sw	S	
	Elective course 1							
TS2E200101	Mobile applications	1				1		3
TS2E200102	Databases and data warehouses	1				1		3
TS2E200103	Digital radio links	1			1			3
TS2E200104	Wave optics	1		1				3
TS2E200105	Optical sensors and microsystems	1		1				3
TS2E200107	Methods of artificial intelligence	1				1		3
	Elective course 2							
TS2E200108	Digital signal processors in telecommunication systems	1		1				2
TS2E200109	Software defined radio	1				1		2
TS2E200110	Wireless broadcasting systems	1		1				2
TS2E200111	Diagnostics of telecommunication optical fiber networks	1		1				2
TS2E200112	Statistical theory of communication	1				1		2
	Elective course 3							
TS2E200113	System programming of embedded devices	1				1		2
TS2E200114	Communication interfaces in embedded systems	1		1				2
TS2E200115	Integrated circuits and systems	1				1		2
TS2E200116	On-Chip digital systems			2				2
TS2E200117	Elements of nanotechnology	2						2
TS2E200118	Optoelectronic medical devices	2						2
TS2E200119	Photonic structures	1	1					2