

DESCRIPTION OF THE PROGRAM OF STUDIES

Main field of study: telecommunication

Profile: general academic

Level of studies: second level

Form of studies: stationary

1. General description

<i>1.1 Number of semesters:</i> 3	<i>1.2 Total number of ECTS points necessary to complete studies at a given level:</i> 90
<i>1.3 Total number of hours:</i> 930	<i>1.4 Prerequisites (particularly for second-level studies) :</i> <i>Candidates for master studies in the field of Telecommunications may recruit after obtaining at least the title of engineer in admitted fields of study, referred to the document "Conditions and procedure of recruitment for higher education at Wrocław University of Science and Technology" for a given academic year requirements defined annually by the Senate of the Wrocław University of Science and Technology, and the Faculty of Electronics Council</i>

<p>1.5 Upon completion of studies graduate obtains MAGISTER INŻYNIER 2nd degree qualifications</p>	<p>1.6 Graduate profile, employability: The graduate is prepared to independently solve engineering problems in the field of operation, management and advanced diagnostics of ICT networks, marketing and technical consultancy related to their design, implementation and maintenance of ICT systems and networks, performance of installation services, network security, creation and handling of electronic document circulation . In addition, the specialization prepares for the operation and development of complex ICT systems used in industry, administration, military, police, health care, education, with particular emphasis on the techniques of Internet database systems. As part of the specialization, graduates gain knowledge from two levels of Cisco CCNA Exploration 1 and 3 Academy courses. Graduates are prepared to conduct diagnostics and maintenance of the ICT network, ICT project management, and ICT systems administration. The knowledge of a graduate of this field of study, including IT and telecommunications knowledge, allows him to find and start work in units conducting production and service activities for ICT. Positions typical for graduates of this specialization include: ICT network maintenance specialist, ICT project manager, ICT system administrator (operators, banks, industry), specialist in the implementation of ICT solutions, technical consulting services in the field of ICT.</p>
<p>1.7 Possibility of continuing studies: After completing the second-cycles studies, there is a possibility of continuing educational at a doctoral school or in postgraduate studies.</p>	<p>1.8 Indicate connection with University's mission and its development strategy: The study program is fully correlated with the mission of the university and its development strategy adopted by the Senate of Wrocław University of Science and Technology in March, 21st 2013 (Resolution nr 127/7/2012-2016) as amended (Resolution nr 227/11/2012-2016 and Resolution nr 759/34/2012-2016)</p>

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⁷KO – general education courses, FD – basic sciences courses, K – main field of study courses, S – specialization courses

2. Detailed description

2.1 Total number of learning outcomes in the program of study: W (knowledge) =19, U (skills) =21, K (competences) =4 W + U + K =44

2.2 For the main field of study assigned to more than one discipline - the number of learning outcomes assigned to the discipline:

D1 (major) (this number must be greater than half the total number of learning outcomes)

D2

D3

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D4

2.3 For the main field of study assigned to more than one discipline - percentage share of the number of ECTS points for each discipline:

D1 % ECTS points

D2 % ECTS points

D3 % ECTS points

D4 % ECTS points

2.4a. For the general academic profile of the main field of study – the number of ECTS points assigned to the classes related to the University's academic activity in the discipline or disciplines to which the main field of study is assigned – DN (must be greater than 50% of the total number of ECTS points from 1.2)

2.4b. For the practical profile of the main field of study - the number of ECTS points assigned to the classes shaping practical skills (must be greater than 50% of the total number of ECTS points from 1.2)

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2.5 Concise analysis of compliance of the assumed learning outcomes with the needs of the labor market

Zakładane efekty kształcenia są zgodne z potrzebami rynku pracy. Takie stanowisko jest uprawomocnione wynikami analiz potrzeb rynku pracy, zawartych w następujących opracowaniach:

- „Analiza zapotrzebowania gospodarki na absolwentów kierunków kluczowych w kontekście realizacji strategii Europa 2020” – wykonana w kwietniu 2012.
- "Prognoza zapotrzebowania gospodarki regionu na siłę roboczą w układzie sektorowo-branżowym i kwalifikacyjno-zawodowym w województwie dolnośląskim", w szczególności raport pt. Analiza zapotrzebowania na kadry w branżach uznanych za strategiczne dla dolnośląskiego rynku pracy” w ramach Regionalnej Strategii Innowacji na lata 2011-2020 – opracowanie udostępnione w 2010.
- Raport końcowy „Sytuacja na dolnośląskim rynku pracy – badanie zapotrzebowania na zawody, kwalifikacje i umiejętności” oraz raporty cząstkowe pt. : „Badanie oferty dolnośląskiego rynku edukacji zawodowej” i „Analiza potencjału dolnośląskich Powiatów i Gmin w zakresie rynku pracy i edukacji” – opracowania w ramach projektu pt. „Obserwatorium Dolnośląskiego Rynku Pracy i Edukacji” realizowanego w ramach poddziałania 6.1.2 Programu Operacyjnego Kapitał Ludzki współfinansowanego przez Unię Europejską ze środków Europejskiego Funduszu Społecznego - wykonane w roku 2011.
- Raport pt. „Określenie struktury zawodowej mieszkańców Dolnego Śląska oraz zdefiniowanie i opisanie kierunków rozwoju dolnośląskiego rynku pracy”, Ageron Polska opracowanie w ramach badań współfinansowanych przez Unię Europejską z Europejskiego Funduszu Społecznego w programie Kapitał Ludzki Poddziałanie 8.1.4.: Przewidywanie Zmiany Gospodarczej – wykonane w roku 2010.
- Raport pt. „Badanie ewaluacyjne ex-ante dotyczące oceny zapotrzebowania gospodarki na absolwentów szkół wyższych kierunków matematycznych, przyrodniczych i technicznych” w ramach bazy badań ewaluacyjnych Narodowej Strategii Spójności (NSS) na lata 2007-2013.

Wyniki analiz potwierdzają zwiększone zapotrzebowanie na absolwentów kierunku teleinformatyka, uznając teleinformatykę za branżę

2.6. Łączna liczba punktów ECTS, którą student musi uzyskać na zajęciach wymagających bezpośredniego udziału nauczycieli akademickich lub innych osób prowadzących zajęcia (wpisać sumę punktów ECTS dla kursów/ grup kursów oznaczonych kodem BU1, przy czym dla studiów stacjonarnych liczba ta musi być większa niż 50 % całkowitej liczby punktów ECTS z p. 1.2)

54,5 ECTS

2.7. Total number of ECTS points, which student has to obtain from basic sciences classes

Number of ECTS points for obligatory subjects	4
Number of ECTS points for optional subjects	0
Total number of ECTS points	4

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2.8. Total number of ECTS points, which student has to obtain from practical classes, including project and laboratory classes (enter total number of ECTS points for courses/group of courses denoted with code P)

Number of ECTS points for obligatory subjects	16
Number of ECTS points for optional subjects	47
Total number of ECTS points	63

2.9. Minimum number of ECTS points, which student has to obtain doing education blocks offered as part of University-wide classes or other main field of study (enter number of ECTS points for courses/groups of courses denoted with code O)

11 ECTS

2.10.. Total number of ECTS points, which student may obtain doing optional blocks (min. 30% of total number of ECTS points)

68 ECTS

3. Description of the process leading to learning outcomes acquisition:

Following the curriculum, students attend organized classes. According to the regulations of higher education at Wrocław University of Science and Technology, the student is required to participate in classes. Classes are conducted in the forms specified in the regulations of studies, while using both traditional methods and didactic tools as well as the possibilities offered by the university e-learning platform. Outside of class hours, the tutors are available to students during the consultation hours designated and announced on the Faculty's website. An important element of learning is the student's own work, consisting in preparing for classes (on the basis of materials provided by the lecturers and recommended literature), studying literature, preparing reports and reports, preparing for tests and exams.

Each PQF learning outcome is assigned the codes of the courses included in the study program. Completing these courses (this course) means obtaining the given effect. Courses are credited on the basis of the forms of control of acquired knowledge, skills and social competences, defined in the course cards. Failure to achieve the learning outcomes assigned to the course by the student results in the failure to complete the course and the necessity to do it again.

As part of the study program, students carry out student apprenticeships, with a duration of not less than 160 hours. Internships are carried out in the workplace selected by the student, on an individual basis during the holiday period. The basis for completing the internship is confirmation of completion of the internship and a positive evaluation of the employer. Completing the internship is a confirmation of the achievement of the assigned learning outcomes.

Successful completion of each semester of studies is conditional upon obtaining the number of ECTS points in a specific study program, which is tantamount to achieving most of the learning outcomes envisaged in a given semester. Failed courses must be repeated in the following semesters, thus achieving the remaining

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learning outcomes.

Successful completion of studies is possible after the student achieves all learning outcomes specified in the study program.

The quality of the classes and the achievement of learning outcomes are controlled by the Department's Education Quality Assurance System, including procedures for creating and modifying education programs, individualizing study programs, implementing the teaching process and diplomas. Quality control of the education process includes the evaluation of the learning outcomes achieved by students. Quality control of the classes is supported by visits and surveys, carried out according to strictly defined departmental procedures.

4.. List of education blocks:

4.1 List of obligatory blocks

4.1.1 List of general education blocks

4.1.1.1 Liberal-managerial subjects block (4 ECTS points)

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			University-wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1	FLEU00001	Komunikacja społeczna- Social Comm.	0	0	0	0	1	K2TEL_W03	15	60	2		1	T	Z	O			KO
2	TKEA17030W	Przedsiębiorczość w ICT (GK) - ICT Business	2	0	0	0	0	K2TEL_W02	30	60	2		1	T	Z				K
Total			2	0	0	0	1	-	45	120	4	0	2	-	-	-	-	0	-

Altogether for general education blocks

Total number of hours					Total number of ZZU	Total number of CNPS hours	Total number of ECTS points	Total number of ECTS points for DN classes ⁵	Number of ECTS points for BU classes ¹
lec	cl	lab	pr	sem					
2	0	0	0	1	45	120	4	0	2

4.1.2 List of basic sciences blocks

4.1.2.1 Mathematics block

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁵ classes	BU ¹ classes			University-wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1	MAEA00202W	Statystyka matematyczna (GK) - Mathematics Statistics	1	0	0	0	0	K2TEL_W03	15	60	3		1	T	Z	O			PD
2	MAEA00202C	Statystyka matematyczna (GK) - Mathematics Statistics	0	1	0	0	0	K2TEL_U04	15	30			1	T	Z	O		2	PD
Total			1	1	0	0	0	-	30	90	3	0	2	-	-	-	-	2	-

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4.1.2.2 Physics block

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/grou p of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁴ classes	BU ¹ classes			Universit y-wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1	TKEU00005W	Optyka - Optics	1	0	0	0	0	K2TEL_W01	15	30	1		0,5	T	Z				KO
Total			1	0	0	0	0	-	15	30	1	0	0,5	-	-	-	-	0	-

Altogether for general education blocks

Total number of hours					Total number of	Total number of CNPS hours	Total number of ECTS points	Total number of ECTS points for DN classes ⁵	Number of ECTS points for BU classes ¹
lec	cl	lab	pr	sem	ZZU				
2	1	0	0	0	45	120	4	2,5	

4.1.3 List of the main field of study blocks

4.1.3.1 Obligatory main field of study blocks

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours		Number of ECTS points			Form ² of course/grou p of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁴ classes	BU ¹ classes			Universit y-wide ⁴	Concerning scientific activities ⁵	Practical ⁶	Type ⁷
1	TKEA00005W	Metody optymalizacji- Optimization Methods	2	0	0	0	0	K2TEL_W04	30	90	3		1	T	E(w)				KO
2	TKEA17011L	Zaawansowane techniki sieciowe - Advanced Network Techniques	0	0	4	0	0	K2TEL_U08	60	150	5	5	2,5	T	Z		DN	5	K
3	TKEA00026W	Metody numeryczne – Numerical Methods	2	0	0	0	0	K2TEL_W05	30	90	5	5	1	T	Z		DN		KO
4	TKEA00026P	Metody numeryczne – Numerical Methods	0	0	0	2	0	K2TEL_U11	30	60			1	T	Z		DN	2	KO
5	TKEA15004W	Technika w. cz. w telekomunikacji (GK) - HF Techniques in Telecommunicatinos	2	0	0	0	0	K2TEL_W07	30	60	4	4	1	T	Z		DN		KO
6	TKEA15004L	Technika w. cz. w telekomunikacji (GK) - HF Techniques in Telecommunicatinos	0	0	1	0	0	K2TEL_U07	15	60			1	T	Z		DN	2	KO
7	TKEA00025W	Elementy sieci optycznych (GK) - Optical Networks Elements	2	0	0	0	0	K2TEL_W06	30	60	4	4	1	T	Z		DN		KO
8	TKEA00025P	Elementy sieci optycznych (GK) - Optical Networks Elements	0	0	0	1	0	K2TEL_U06	15	60			1	T	Z		DN	2	KO
9	TKEA17031W	Systemy wbudowane (GK) - Embedded Systems	1	0	0	0	0	K2TEL_W10	15	30	3	3	0,5	T	Z		DN		K
10	TKEA17031L	Systemy wbudowane (GK) - Embedded Systems	0	0	2	0	0	K2TEL_U10	30	60			1	T	Z		DN	2	K
11	TKEA17022W	Kompresja informacji (GK) - Compression of Information	1	0	0	0	0	K2TEL_W09	15	30	2	2	0,5	T	E(w)		DN		K
12	TKEA27022L	Kompresja informacji (GK) - Compression of Information	0	0	1	0	0	K2TEL_U09	15	30			0,5	T	Z		DN	1	K
Total			10	0	8	3	0	-	315	780	26	23	12	-	-	-	-	14	-

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Altogether for general education blocks

Total number of hours					Total number of ZZU	Total number of CNPS hours	Total number of ECTS points	Total number of ECTS points for DN classes ⁵	Number of ECTS points for BU classes ¹
lec	cl	lab	pr	sem					
10	0	8	3	0	315	780	26	23	12

4.2 List of optional blocks

4.2.1 List of general education blocks

4.2.1.1 Foreign languages block (min 5 ECTS points)

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours					Number of ECTS points					Form ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁴ classes	BU ¹ classes	Form ² of course/group of courses	Way ³ of crediting	Universit y-wide ⁴	Concerning scientific activities ⁵	Practical ⁶			Type ⁷			
1		Język obcy II - Foreign Language II	0	3	0	0	0	K2TEL_U01	45	60	2		1	T	Z	O			1	KO				
2		Język obcy I - Foreign Language I	0	1	0	0	0	K2TEL_U02	15	30	1		1	T	Z	O			1	KO				
Razem			0	4	0	0	0	-	60	90	3	0	2	-	-	-	-	2	-					

Altogether for general education blocks

Total number of hours					Total number of ZZU	Total number of CNPS hours	Total number of ECTS points	Total number of ECTS points for DN classes ⁵	Number of ECTS points for BU classes ¹
lec	cl	lab	pr	sem					
0	4	0	0	0	60	90	3	0	2

4.2.2 List of specialization blocks

4.2.2.1 Specialization subjects (Modern Telecommunications) blocks

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol GK)	Weekly number of hours					Learning effect symbol	Number of hours					Number of ECTS points					Form ² of course/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	Total	DN ⁴ classes	BU ¹ classes	Form ² of course/group of courses	Way ³ of crediting	Universit y-wide ⁴	Concerning scientific activities ⁵	Practical ⁶			Type ⁷			
1	TKEA17021W	Filtracja ortogonalna sygnałów stochastycznych stoch. sign.- Orthogonal filtering of stochastic signals (GK)	1	0	0	0	0	S2TMT_W02	15	30	1	1	0,5	T	Z			DN		S				
2	TKEA0010L	Aplikacje mobilne - Mobile Applications	0	0	2	0	0	S2TMT_U10	30	60	2	2	1	T	Z			DN	2	S				
3	TKEA014S	Seminarium specjalnościowe - Specialization Seminar	0	0	0	0	2	S2TIM_W10, S2TIM_K01	30	90	3	3	1	T	Z			DN	2	S				

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4	TKEA00028W	Sieci optyczne - Optical Networks 1	2	0	0	0	0	S2TMT_W05	30	90	3	3	1	T	Z		DN		S
5	TKEA019W	Sieci multimedialne (GK) - Multimedia Systems	1	0	0	0	0	S2TMT_W02	15	30	4	4	1	T	E(w)		DN		S
6	TKEA019L	Sieci multimedialne (GK) - Multimedia Systems	0	0	2	0	0	S2TMT_U02	30	60			2	T	Z		DN	2	S
7	TKEA007W	Elementy sieci fotonicznych (GK) - Photonic Communication Components	2	0	0	0	0	S2TMT_W01	30	90	5	5	2	T	Z		DN		S
8	TKEA007L	Elementy sieci fotonicznych (GK) - Photonic Communication Components	0	0	2	0	0	S2TMT_U01	30	60			1	T	Z		DN	2	S
9	TKEA009W	Sieci mobilne (GK) - Mobile Networks	1	0	0	0	0	S2TMT_W03	15	90	5	5	1	T	Z		DN		S
10	TKEA009L	Sieci mobilne (GK) - Mobile Networks	0	0	1	0	0	S2TMT_U03	15	30			1	T	Z		DN	1	S
11	TKEA009P	Sieci mobilne (GK) - Mobile Networks	0	0	0	1	0	S2TMT_U03	15	30			1	T	Z		DN	1	S
12	TKEA020W	Sieci satelitarne (GK) - Satellite Communication Networks	1	0	0	0	0	S2TMT_W08	15	30	2	2	1	T	Z		DN		S
13	TKEA020S	Sieci satelitarne (GK) - Satellite Communication Networks	0	0	0	0	1	S2TMT_U08	15	30			1	T	Z		DN	1	S
14	TKEA00002S	Seminarium dyplomowe - MSc Seminar	0	0	0	0	2	S2TIM_U10	30	90	3	3	2	T	Z		DN	3	S
15	TKEA15001	Praca dyplomowa - Final MSc Projekt	0	0	0	0	0	S2TIM_U11, S2TIM_K02		360	12	12	6	T	Z		DN	12	S
16	TKEA00033W	Techniki ultraszerokopasmowe i terahercowe – UWB and THz Techniques	1	0	0	0	0	S2TMT_W07	15	60	3	3	1	T	Z		DN		S
17	TKEA00033S	Techniki ultraszerokopasmowe i terahercowe - UWB and THz Techniques	0	0	0	0	1	S2TMT_U07	15	30			1	T	Z		DN	1	S
	TKEA00032W	Odbiorniki cyfrowe (GK) - Digital receivers	1	0	0	0	0	S2TMT_W06	15	60	3	3	1	T	Z		DN		S
	TKEA00032P	Odbiorniki cyfrowe (GK) - Digital receivers	0	0	0	1	0	S2TMT_U06	30	30			1	T	Z		DN	1	S
18	TKEA00029L	Sieci optyczne 2 (GK) - Optical Networks 2	0	0	2	0	0	S2TMT_U05	30	60	2	2	1	T	Z		DN	2	S
19	TKEA023W	Bezpieczeństwo systemów teleinformatycznych (GK) - Security in Teleinformatics systems	1	0	0	0	0	S2TMT_W04	15	60	5	5	1	T	Z		DN		S
20	TKEA023L	Bezpieczeństwo systemów teleinformatycznych (GK) - Security in Teleinformatics systems	0	0	3	0	0	S2TMT_U04	45	90			1,5	T	Z		DN	3	S
Razem			11	0	12	2	6	-	480	1560	53	52	30	-	-	-	-	33	-

Altogether for general education blocks

Total number of hours					Total number of ZZU	Total number of CNPS hours	Total number of ECTS points	Total number of ECTS points for DN classes ⁵	Number of ECTS points for BU classes ¹
lec	cl	lab	pr	sem					
11	0	12	2	6	480	1560	53	52	30

¹BU – number of ECTS points assigned to hours of classes requiring direct participation of academic teachers and other persons conducting classes

²Traditional – enter T, remote – enter Z

³Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

⁴University-wide course / group of courses – enter O

⁵DN - number of ECTS points assigned to the classes related to the University's academic activity in the discipline/disciplines to which the main field of study is assigned

⁶Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁷KO – general education courses, FD – basic sciences courses, K – main field of study courses, S – specialization courses

4.3 Training block - concerning principles of training crediting – attachment no. ...

Training at second degree studies are not planned

4.4 „Diploma dissertation” block

Type of diploma dissertation	magister	
Number of diploma dissertation sem	Number of ECTS points	Code
1	12 P(12)	TKEA15001
Character of diploma dissertation		
Project, computer program, etc.		
Number of BU1 ECTS points	6	

5. Ways of verifying assumed learning outcomes

Type of classes	Sposoby weryfikacji zakładanych efektów kształcenia
lecture	exam or e-exam, written work prepared on the basis of lectures and recommended literature, oral or written test, conditioning the accession to the final test, dissertation solving the selected problem posed in the lecture material, lecture discussion, final test, evaluation of the number of correct answers obtained, test exam , oral exam, written or e-test, written tests, written test, exam, cryptographic competition, final test, lecture test, written test, test, active participation in lectures, written tests, written exam, oral answer , quiz, written test, test
class	oral answers, quizzes, tests and / or e-tests, discussions, tests, exercises, evaluation of oral answers, evaluation of solutions for exemplary exercises, final test, short written tests, written test, written tests
laboratory	efficiency of operation of instruments and their connection, protocols, innovation of the solution and presentation of results, evaluation of written reports on the implementation of subsequent laboratory exercises, assessment of preparation for laboratory classes and correctness of the exercises, observation of laboratory exercises, code inspection of programs made with the participation of the laboratory teacher, presentation of the application , verification of practical skills on a computer. assessment of the degree of implementation of exercises in the laboratory, laboratory exercises reports, assessment of the report containing the experiment design, necessary simulation software, results and conclusions from the research, partial e-tests, discussions, written reports, oral and written answers, checking the preparation for the laboratory, acceptance and evaluation of reports, final evaluation in the laboratory, active participation in classes, written test - test, evaluation of the progress of work during laboratory classes

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project	evaluation of the project, presentation, discussion, activity in design classes, initial presentation of the project issue, final presentation of the project, evaluation of two projects (implementation and presentation), completed (written) project, presentation of the project and its defense, evaluation of the presentation of subsequent stages of the project and skills working in a team: keeping to the schedule, being active in a team, the ability to apply the principles of project management, assessing the quality of the project and project documentation
seminar	presentation participating in the discussion
training	practice report
diploma dissertation	przygotowana praca dyplomowa

6. Range of diploma examination

Pytania kierunkowe (TEL)

1. Static optimization task: types and methods of its solution .
2. Methods of numerical solution of partial differential equations.

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3. Impedance matching methods in RF systems and phenomena arising from the mismatch.
4. Structures of RF made in LTCC technology and MMIC.
5. WDM systems, WDM transmission capabilities.
6. Principle of VLAN.
7. Methods for image and sound compression.
8. Microcontrollers architecture for embedded systems.

Pytania specjalnościowe (TMT)

1. Elements of the multimedia system: organization and functions.
2. EDFA amplifier .
3. Photonic crystal fiber structures.
4. Satellite networks: structure and the parameters.
5. Link budget of a satellite link.
6. Mobile networks: the characteristics of the next generation, structure, functions of components, operation, transmission techniques and protocols.
7. Principles of mobile network planning: requirements relating to electromagnetic compatibility.
8. Traffic management in IP networks.
9. Dimensioning capacity IP network for real-time services.
10. Security mechanisms in computer networks: access protection, traffic filtering and content confidentiality.
11. Reflectometer measurements in optical networks.
12. Operation of photomixer and terahertz spectrometer.

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7. Requirements concerning deadlines for crediting courses/groups of courses for all courses in particular blocks

No requirements

8.. Plan of studies (attachment no. 4)

Approved by faculty student government legislative body:

.....
Data Imię, nazwisko i podpis przedstawiciela studentów

.....
Data Podpis Dziekana:

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