

PROGRAM OF STUDIES

FACULTY: Microsystem Electronics and Photonics

MAIN FIELD OF STUDY: Electronics and telecommunications

BRANCH OF SCIENCE: technical-engineering

DISCIPLINES: D1 automatics, electronics and electrical engineering

EDUCATION LEVEL: second-level studies

FORM OF STUDIES: full-time studies

PROFILE: general academic

LANGUAGE OF STUDY: English

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Resolution no. 753/32/2016-2020 of the Senate of Wrocław University of Science and Technology from the 16th of May 2019

In effect since 1.10.2019

ASSUMED LEARNING OUTCOMES

Faculty: Microsystem Electronics and Photonics

Main field of study: Electronics and Telecommunications

Education level: second-level studies

Profile: general academic

Branch of science: engineering and technology

Discipline / disciplines (for several disciplines, please indicate the major discipline)

automatics, electronics and electrical engineering

Explanation of the markings:

P6U – universal first degree characteristics corresponding to education at the first-level studies - 6 PRK level *

P7U – universal first degree characteristics corresponding to education at the second-level studies - 7 PRK level *

P6S – second degree characteristics corresponding to education at the first-level studies - 6 PRK level *

P7S – second degree characteristics corresponding to education at the second-level studies - 7 PRK level *

W - category "knowledge"

U - category "skills"

K - category "social competences"

K (*faculty symbol*) _W1, K (*faculty symbol*) _W2, K (*faculty symbol*) _W3, ... - main-field-of study learning outcomes related to the category "knowledge"

K (*faculty symbol*) _U1, K (*faculty symbol*) _U2, K (*faculty symbol*) _U3, ... - main-field-of study learning outcomes related to the category "skills"

K (*faculty symbol*) _K1, K (*faculty symbol*) _K2, K (*faculty symbol*) _K3, ... - main-field-of study learning outcomes related to the category "social competences"

S (*faculty symbol*) _W..., S (*faculty symbol*) _W..., S (*faculty symbol*) _W..., ... - specialization learning outcomes related to the category "knowledge"

S (*faculty symbol*) _U..., S (*faculty symbol*) _U..., S (*faculty symbol*) _U..., ... - specialization learning outcomes related to the category "skills"

S (*faculty symbol*) _K..., S (*faculty symbol*) _K..., S (*faculty symbol*) _K..., ... - specialization learning outcomes related to the category "social competences"

... _inž. – learning outcomes related to the engineer competences

Main field of study learning outcomes	Description of learning outcomes for the main-field-of study Electronics and Telecommunications Upon completion of the field of study the graduate:	Reference to PRK characteristics		
		Universal first degree characteristics (U)	Second degree characteristics typical for qualifications obtained in higher education (S)	
			Characteristics for qualifications on 7 levels of PRK	Characteristics for qualifications on 7 levels of PRK
KNOWLEDGE (W)				
K2eit_W01	has extended and deepened knowledge in the area of sciences and disciplines (physics, chemistry, biology, informatics, materials engineering) necessary to understand the essence of phenomena/properties being the result of size reduction, which are used in nanotechnology	P7U_W	P7S_WG	
K2eit_W02	has extended and deepened knowledge in the field of physics, encompassing basis of quantum physics and solid state physics and theoretical and experimental bases of specific phenomena from the area of electronics and photonics, necessary to understand the phenomena (photoelectronic, electro-acoustic, super-conductivity)	P7U_W	P7S_WG	
K2eit_W03	has basic knowledge concerning theory and methods of linear and nonlinear programming used in optimization procedures		P7S_WG	
K2eit_W04	has theoretically grounded knowledge concerning typical techniques and numerical algorithms applied in engineering, such as: numerical differentiation and integration, experiment design, optimization applied to solving equations or equation systems, both linear and nonlinear, numerical interpolation or optimization and systems of differential equations	P7U_W	P7S_WG	
K2eit_W05	knows and understands the elements of mathematical statistics in terms of possibilities of its application in engineering practice and scientific research	P7U_W		
K2eit_W06	has basic knowledge concerning ordinary and partial differential equations, integral equations, theory of stochastic processes (stationary, Markow, renewal, gaussian processes), Hilbert spaces, necessary to understand mathematical problems in sciences of engineering character	P7U_W		

K2eit_W07	has knowledge concerning reliability theory, methods of elements and devices testing, diagnostic methods, basic characteristics in theory of reliability, typical distributions, reliability of systems, estimation of reliability parameters, experiment design, testing and diagnostics as well as failure models		P7S_WG	P7S_WG_INŽ
K2eit_W08	has knowledge concerning basis of operation of force and deflection sensors basing on piezoresistive and piezoelectric effects, methods of calculation of measurement sensitivity and resolution of piezoresistive sensors and designs of MEMS systems		P7S_WG	
K2eit_W09	has ordered, theoretically grounded, general and detailed knowledge in the range of exact and technical sciences in the areas related to the field of study	P7U_W	P7S_WG	P7S_WG_INŽ
K2eit_W10	has knowledge on the basic concepts of production management systems useful for managers of small or middle enterprises; knows modern production systems and production management systems as well as information about finances, market analysis, logistics, people management, which are necessary in strategic management of enterprises		P7S_WK	P7S_WK_INŽ
K2eit_W11	has knowledge necessary to understand economic, legal, social and beyond technical factors of engineering activities and their using in engineering practice		P7S_WK	P7S_WK_INŽ
K2eit_W12	has basic knowledge concerning management, quality management and running a business		P7S_WK	P7S_WK_INŽ
K2eit_W13	has knowledge concerning sensor technologies, including the knowledge necessary to understand the physical and mechanical principles of operation of sensors and actuators; knows relations between their functional parameters and structure; has basic knowledge on sensor and actuators technologies	P7U_W	P7S_WG	P7S_WG_INŽ
<p>Learning outcomes in KNOWLEDGE category for specialization:</p> <ul style="list-style-type: none"> • Microsystems (EMS) are presented in attachment no. I • Optoelectronics and Waveguide Technology (EOT) are presented in attachment no. II • Electronics, Photonics, Microsystems (EPM) are presented in attachment no. III 				

SKILLS (U)

K2eit_U01	is able to assess and use devices/objects with nanometric dimensions (especially semiconductor devices and other ones, made using different technologies)		P7S_UW	P7S_UW_INŽ
K2eit_U02	is able to assess and use the phenomena occurring in solid state materials in quantum electronics applications		P7S_UW	P7S_UW_INŽ
K2eit_U03	using the methods of linear and nonlinear programming, is able to solve problems and tasks, optimizing the goal	P7U_U	P7S_UW	P7S_UW_INŽ
K2eit_U04	is able to use the learned numerical methods for solving typical engineering tasks	P7U_U	P7S_UW	P7S_UW_INŽ
K2eit_U05	has basic practical skills concerning presentation, analysis and interpretation of data and application of statistical methods in the analysis of various physical phenomena	P7U_U	P7S_UK P7S_UW	P7S_UW_INŽ
K2eit_U06	is able to correctly and effectively use the knowledge concerning differential and integral equations, as well as stochastic processes, for qualitative and quantitative analysis of mathematical problems related to the studied engineering discipline	P7U_U	P7S_UW	P7S_UW_INŽ
K2eit_U07	is able to solve problems concerning calculation of reliability characteristics, calculation of parameters using measurement data, planning of testing methods, planning of diagnostic methods	P7U_U	P7S_UW	P7S_UW_INŽ
K2eit_U08	is able to explain the operating principle and basic characteristics and designs of deflection actuators using piezoelectric and electrostatic actuation	P7U_U	P7S_UK	
K2eit_U09	is able, using literature information and basing on the result of own work, integrating, interpreting and critically evaluating, to prepare and give an oral presentation relevant to the field of study	P7U_U	P7S_UW P7S_UK P7S_UU	
K2eit_U10	is able to use the acquired knowledge on modern production systems, processes of production management, market analysis, logistics and people management	P7U_U	P7S_UO P7S_UW	P7S_UW_INŽ
K2eit_U11	is able to formulate and test the hypotheses connected with engineering problems and simple research work		P7S_UW	P7S_UW_INŽ
K2eit_U12	is able to assess the usefulness and possibilities of application of modern achievements in the fields of technique and technology connected with the current field of study		P7S_UW	P7S_UW_INŽ

K2eit_U13	is able to perform critical analysis of the way of functioning and assess novel technical solutions, especially connected with the current field of study, such as devices, objects, systems, processes, services		P7S_UW	P7S_UW_INŽ
K2eit_U14	is able to suggest rationalization proposal/improvements to existing technical solutions		P7S_UW	P7S_UW_INŽ
K2eit_U15	is able to assess and use semiconductor devices and other devices fabricated using various techniques/technologies		P7S_UW	P7S_UW_INŽ
K2eit_U16	is able to define the fields of further education and follow the process of self-learning	P7U_U		
K2eit_U17	knows foreign language at the upper-intermediate level (B2+) used in the studied field of specialization; is able to communicate in work (oral communication and writing), knows more than one foreign language		P7S_UK	
Learning outcomes in SKILLS category for specialization:				
<ul style="list-style-type: none"> • Microsystems (EMS) are presented in attachment no. I • Optoelectronics and Waveguide Technology (EOT) are presented in attachment no. II • Electronics, Photonics, Microsystems (EPM) are presented in attachment no. III 				
SOCIAL COMPETENCES (K)				
K2eit_K01	shows curiosity about new innovative design solutions and production processes		P7S_KK	
K2eit_K02	perceives the aspects connected with collecting and presentation of measurement data in various areas of engineering practice and the need of using statistical methods for their description	P7U_K	P7S_KK P7S_KR	
K2eit_K03	perceives the necessity of undertaking and putting into practice optimization measures in various areas of life	P7U_K	P7S_KK P7S_KO	
K2eit_K04	takes into account the need of using numerical methods in design process		P7S_KK	
K2eit_K05	can think and act in a creative and entrepreneurial way		P7S_K P7S_KK	
K2eit_K06	properly recognizes, solves, and acting in a team, puts into practice the knowledge concerning analysis of mathematical problems		P7S_KK P7S_KO P7S_KR	

K2eit_K07	is able to properly define priorities for realization of a task defined by himself/herself or other person; can safely perform measurements and work out results of measurements	P7U_K	P7S_KR	
K2eit_K08	is conscious of importance of the issues connected with implementation and functioning in engineering activity of modern production systems, production management systems, logistics and people management	P7U_K	P7S_KK	
K2eit_K09	realizes the need of formulating and sharing in society, also with the use of mass media, the information and opinions concerning achievements in the field of study, and other aspects of electronic engineer's activity, in a clear, commonly understandable way, justifying various points of view	P7U_K	P7S_KO P7S_KR	
K2eit_K10	is conscious of importance and realizes beyond technical aspects and consequences of engineering activity, including its impact on environment and associated with it responsibility for taken decisions	P7U_K	P7S_KO P7S_KR	
K2eit_K11	is able to define priorities for realization of a particular task	P7U_K		
K2eit_K12	properly recognizes and settles dilemmas connected with professional activity		P7S_KR	
<p>Learning outcomes in SOCIAL COMPETENCES category for specialization:</p> <ul style="list-style-type: none"> • Microsystems (EMS) are presented in attachment no. I • Optoelectronics and Waveguide Technology (EOT) are presented in attachment no. II • Electronics, Photonics, Microsystems (EPM) are presented in attachment no. III 				

Specialization Electronics, Photonics, Microsystems

Specialization learning outcomes	Description of learning outcomes for the specialization Electronics, Photonics, Microsystems Upon completion of the specialization the graduate:	Reference to PRK characteristics		
		Universal first degree characteristics (U)	Second degree characteristics typical for qualifications obtained in higher education (S)	
			Characteristics for qualifications on 7 levels of PRK	Characteristics for qualifications on 7 levels of PRK
KNOWLEDGE (W)				
S2epm_W01	has extended and deepened knowledge concerning technological processes applied in widely understood thin-film microelectronics, with the use of knowledge on the phenomena occurring in plasma processes conducted at reduced pressure	P7U_W	P7S_WG	
S2epm_W02	has deepened and theoretically grounded knowledge in the field of photonics, including the knowledge necessary to understand the operation of optical telecommunications systems and optical recording and processing of information	P7U_W	P7S_WG	P7S_WG_INŻ
S2epm_W03	has deepened and ordered knowledge concerning applications and design of optical fiber measurement systems used in contemporary technique	P7U_W	P7S_WG	P7S_WG_INŻ
S2epm_W04	has extended deepened and ordered knowledge, from the field of physics and basis of chemistry, necessary to understand the principles of operation of supplying systems in microsystems (principle of operation, technological and design solutions, exploitation parameters)	P7U_W	P7S_WG	P7S_WG_INŻ
S2epm_W05	has ordered and theoretically grounded knowledge related to the structure, operation principles, properties and applications of physical and chemical sensors as well as microsystems made using thick-film and LTCC (Low Temperature Cofired Ceramics) technology; knows trends in the development of LTCC microsystems		P7S_WG	

S2epm_W06	has theoretically grounded knowledge concerning physico-chemical, and technological bases, design, fabrication, operation and applications of analytical microsystems, microreactors, bio-chips and lab-on-chips		P7S_WG	P7S_WG_INŽ
S2epm_W07	has extended and deepened knowledge concerning theoretical and practical aspects of the application of numerical methods for modeling and design in the area of microsystems	P7U_W	P7S_WG	
S2epm_W08	has extended and deepened knowledge in the field of physics, encompassing basis of quantum physics and solid state physics, including the knowledge necessary to understand the physical phenomena having an important impact on the properties of novel materials and operation of advanced photonic devices	P7U_W	P7S_WG	
S2epm_W09	has knowledge concerning the principles of designing electronic devices with the use of optoelectronic and optical fiber subsystems, satisfying presumed input parameters	P7U_W	P7S_WG	
S2epm_W10	has knowledge on the structure and principles of operation of contemporary operating systems, with special emphasis on Linux family and embedded systems; knows the principles of using of low-level system functions as well as programming and configuration of embedded systems intended, among others, for microcontrollers	P7U_W	P7S_WG	
S2epm_W11	has deepened, theoretically grounded knowledge from the field of photonics, including the knowledge necessary to understand the operation of optical telecommunication systems and optical recording and processing of information; has ordered knowledge concerning the devices being components of teleinformatic networks, including the wireless ones	P7U_W	P7S_WG	P7S_WG_INŽ

S2epm_W12	knows the issues concerning the basic optical phenomena in solid state, the structure and technology of device structures, band-gap engineering and the energetic structure on the level of energetic sub-bands with a precise control of built-in potentials, technology of quantum structures and methods of controlling their energetic properties; knows the parameters, structures and operation principles of semiconductor light sources, including the VCSEL or QCL laser structures and the lasers with multidimensional photonic crystals	P7U_W	P7S_WG	P7S_WG_INŽ
S2epm_W13	has ordered, theoretically grounded general and detailed knowledge in the field of exact and technical sciences relevant to the studied specialization; knows basic principles of editing of research projects and diploma thesis	P7U_W	P7S_WG	P7S_WG_INŽ
S2epm_W14	has knowledge in the field of packaging technologies, testing and assessment the quality of bonding of electronic sub-assemblies on printed wire boards; recognizes the physical backgrounds of soldering process, the soldering technologies applied on industrial scale; has knowledge on industrial safety rules in the bonding and de-bonding process	P7U_W	P7S_WG	P7S_WG_INŽ
S2epm_W15	has theoretically grounded knowledge concerning physico-mechanical, technological, design, fabrication, operation and application bases of microsystems of MEMS and MOEMS type	P7U_W	P7S_WG	
S2epm_W16	has ordered and theoretically grounded knowledge on photovoltaics, including the knowledge necessary to understand physical basis of photovoltaic elements operation as well as designing and quality assessment of photovoltaic systems	P7U_W	P7S_WG	P7S_WG_INŽ
SKILLS (U)				
S2epm_U01	is able to design a technological process of thin-film deposition, including the processes occurring in gas discharge	P7U_U	P7S_UW	P7S_UW_INŽ
S2epm_U02	is able to choose and assess optical fiber and optoelectronic elements used in designing of photonic systems and optical fiber networks; is familiar with the techniques of measurements of waveguides, waveguide couplers and possibilities of their application in waveguide systems		P7S_UW	

S2epm_U03	is able to plan a process of testing of a complex electronic circuit and electronic or photonic system; is able to design electronic circuits and systems intended for different applications, including monolithic and hybrid electronic and photonic circuits		P7S_UW	P7S_UW_INŽ
S2epm_U04	is able to correctly and effectively use the knowledge about differential and integral equations as well as stochastic processes for qualitative and quantitative analysis of mathematical problems relevant to the studied specialization	P7U_U	P7S_UW	P7S_UW_INŽ
S2epm_U05	is able to select and apply, depending on requirements as well as available solutions and exploitation parameters, a proper supplying source for a microsystem		P7S_UW	P7S_UW_INŽ
S2epm_U06	is able to design specific sensors, actuators and microsystems; is able to develop prerequisites concerning design of chosen devices and develop an algorithm of technological process for their fabrication		P7S_UW	P7S_UW_INŽ
S2epm_U07	is able to describe, assess and compare the operation of analytic gaseous and fluidic microsystems; knows the principles of design, fabrication, operation and application of microsystems in chemistry and microchemistry		P7S_UW	P7S_UW_INŽ
S2epm_U08	is able to use the acquired knowledge for carrying out the studies of the components of analytical microsystems (valves, metering units, mixers and detectors); is familiar with the operation principles of advanced analytical microsystems (e.g. integrated gas chromatograph)		P7S_UW	P7S_UW_INŽ
S2epm_U09	is able to plan and safely carry out measurements and work out the measurement results		P7S_UW	P7S_UW_INŽ
S2epm_U10	is able - while formulating and solving tasks associated with modeling and design of microsystems - to integrate knowledge coming from different sources		P7S_UW	
S2epm_U11	is able to develop detailed documentation of the results of experiment, a design or research project; is able to prepare a report containing discussion of the results		P7S_UK	

S2epm_U12	is able to develop a system solution and define the physical phenomenon from the field of optoelectronics and waveguide technology, satisfying the given project task; is able to plan a design process, is able to develop electronic schemes of a device, design printed wire boards and casing, and asses the cost of fabrication of the device		P7S_UW P7S_UW	P7S_UW_INŽ
S2epm_U13	has a skill of using low-level system functions as well as program and configure embedded systems intended for microcontrollers		P7S_UW	
S2epm_U14	is able to work individually and in a team; is able to assess time consumption for task execution; is able to manage a small team in a way ensuring completion of the task in due time; is able to prepare and give a presentation on realization of a task or research project and conduct a discussion concerning the presentation; is able to use English at the level sufficient for communication, also in professional issues, reads with understanding professional literature and is able to prepare and give a short oral presentation on realization of a task or research project	P7U_U	P7S_UW P7S_UK P7S_UO P7S_UU	
S2epm_U15	is familiar with the techniques and measuring stands for characterization of epitaxial device structures and can use them in practice; knows and is able to apply optical spectroscopic methods, such as photoluminescence, photo reflection or electronic reflection, for the characterization quantum properties of semiconductor structures		P7S_UW	P7S_UW_INŽ
S2epm_U16	is able to implement the regulations of WEEE and RoHS directives; is able to recognize and eliminate the bonding faults described in IPC standards		P7S_UW	P7S_UW_INŽ
S2epm_U17	has a skill of manual soldering using resistance and gas soldering tools; is able to carry out reflow soldering process and manual debonding, using a professional service station; is able to match the parameters of soldering process to the applied materials		P7S_UW	P7S_UW_INŽ

S2epm_U18	is able, using literature information and basing on the results of own work, while integrating, interpreting and making critical evaluation, to prepare diploma thesis and give an oral presentation relevant to the field of study	P7U_U	P7S_UW P7S_UK P7S_UU	
S2epm_U19	is able to identify and formulate specification of complex engineering tasks (relevant to the field of study) taking into account their beyond technical aspects		P7S_UW	
S2epm_U20	is able to solve problems concerning: calculation of reliability characteristics, calculation of parameters with the use of measurement data, planning of testing methods, planning of diagnostics methods		P7S_UW	P7S_UW_INŻ
SOCIAL COMPETENCES (K)				
S2epm_K01	is able to work individually and in a team	P7U_K		
S2epm_K02	is open to novel innovative design solutions and production processes applied in electronics and photonics		P7S_KK	
S2epm_K03	is able to think and act in innovative and entrepreneurial way	P7U_K	P7S_KK	
S2epm_K04	perceives the necessity of functionality assessment of optoelectronic systems in different areas of life and is able to take effective measures to put such solutions in practice	P7U_K	P7S_KK P7S_KO	
S2epm_K05	properly identifies, solves and puts into practice, co-operating in a team, the knowledge connected with the analysis of engineering problems		P7S_KK P7S_KO P7S_KR	
S2epm_K06	takes into account the necessity to use numerical methods in the design process of photonic and microelectronic structures		P7S_KK	
S2epm_K07	is able to properly define the priorities for realization of a task defined by himself/herself or other person; is able to perform measurements safely and work out results of measurements	P7U_K		
S2epm_K08	is conscious of the importance and understands the necessity of putting into practice renewable energy sources	P7U_K	P7S_KK	
S2epm_K09	is able to plan and develop a project implementation plan, is able to interact and work in a group, taking on different roles	P7U_K	P7S_KR	

DESCRIPTION OF THE PROGRAM OF STUDIES

1. General description

1.1 Number of semesters: 3	1.2 Total number of ECTS points necessary to complete studies at a given level: 90
1.3 Total number of hours: for studies in English – 1110	1.4 Prerequisites (particularly for second-level studies): The procedure, mode and recruitment requirements are annually determined by the Wrocław University of Science and Technology Senate. Information on recruitment for studies can be found on the website of the Wrocław University of Science and Technology Recruitment Department. As an additional requirement for admission for the second-level studies, the candidate should complete the studies from the list of related fields. The list is published on the website of the Wrocław University of Science and Technology Recruitment Department.
1.5 Upon completion of studies graduate obtains professional degree of: magister inżynier	1.6 Graduate profile, employability: The graduate can design and use electronic integrated circuits - using analogue and digital technology, lasers, optical fibers and photovoltaic cells - using modern technologies. He can design and operate telecommunications and teleinformation networks, manufacture and use micro and nanosystems, ie sensors and microsensors and microrobots used in medicine, pharmaceutical industry, automotive, aviation, environmental protection and objects protection. The graduate has in-depth knowledge enabling quick adaptation to the dynamically changing IT reality and in the scope of new materials and new technologies. Offered in the field of "electronics and telecommunications", specialties (EOT, EMS, EPM) give the possibility of universal preparation of graduates and cover the issues of electronics, photonics, computer science, optoelectronics and telecommunications, which is their great asset on the modern labor market.

	<p><i>Specific practical knowledge acquired thanks to the access to modern computer and network hardware and software, knowledge of foreign languages allow graduates to take up studies at the third level of education at national universities and universities in the European Union. The graduate has both the ability to take independent engineering projects, participate in team work, and manage teams of people.</i></p>
<p><i>1.7 Possibility of continuing studies: Graduate is prepared for the 3-rd level study</i></p>	<p><i>1.8 Indicate connection with University's mission and its development strategy:</i></p> <p>In accordance with the mission of the University and the "Strategy for Development of Wrocław University of Science and Technology 2016-2020", the Wrocław University of Science and Technology is a technical university, which as an autonomous technical university, university research institution recognizes the creative, critical and tolerant personality of students and PhD students as well as setting directions for the development of science and technology. The university, in the service of the society, realizes its mission through: inventions and innovations, the highest standards in scientific research, transfer of knowledge, high quality of education and freedom of criticism with respect for the truth. The Faculty of Microsystem Electronics and Photonics is one of its units, that is important in the implementation and combining of high theoretical, research and expert competences with didactic and educational competences. The concept of education / educational model adopted at the Faculty fulfills the standards written in the university documents and the Development Strategy of the Microsystem Electronics and Photonics (Resolution No. 128/13/2012-2016) expressed by the Development Plan of the Microsystem Electronics and Photonics and Strategic Objectives of the Faculty together with merits of their implementation. The concept of education at the Faculty takes into account the perspective of the development of higher education set by the Ministry of Science and Higher Education for 2015-2030.</p>

2. Detailed description

2.1 Total number of learning outcomes in the program of study: W (knowledge) = 29, U (skills) = 37, K (competences) = 21 W + U + K = 87

2.2 For the main field of study assigned to more than one discipline - the number of learning outcomes assigned to the discipline: not applicable

2.3 For the field of study assigned to more than one discipline - percentage share of the number of ECTS points for each discipline: not applicable

2.4 For the general academic profile 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 faculty is assigned (must be greater than 50% of the total number of ECTS points from 1.1): 78 ECTS

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

When educating in a general academic profile, the Faculty offers its education to graduates of first and second level studies and other groups interested in the development and improvement of qualifications acquired outside formal education. Ultimately, studies on this profile should prepare a professional staff for the economy and science, including project leaders, research groups and technical teams. Education in the field of Electronics and Telecommunications (EiT) is concurrent with the strategic framework for smart specializations of Lower Silesia in the area of electronics and related areas as well as National Smart Specialization (KIS 8, 9, 11 and 13).

The resources of knowledge, skills and social competences of students / graduates of the EiT course are the result of attributing learning outcomes to a specific degree of study related to the courses provided. Learning outcomes, determined for the directional courses and in the scope of a given specialty, are referred to the learning outcomes for the area of engineering and technical sciences. They should provide students / graduates with deep, structured and theoretically founded knowledge, which is advanced general knowledge of the discipline of automatics, electronics and electrical engineering, containing the main developmental trends of the discipline and selected issues in the field of detailed knowledge concerning, among others. selected facts, objects and phenomena and related methods and theories, explaining the complex relationships between them. The adopted solution regarding the increase of competences in the transition to a higher level of qualifications, while ensuring the "openness" of the second degree studies, gives the opportunity to acquire more advanced knowledge and skills (with specific social competences) in a narrower thematic scope. Potential future employers in the region are informed about the level of knowledge, skills and social competences attained by students / graduates through the industry representatives included in the Faculty Convent and affecting the range of determined learning outcomes.

The acquired basic knowledge as well as detailed knowledge in the field should be wide enough for the student / graduate of the faculty to be able to adapt their competences to the changing conditions and challenges that will be faced by him during his decades-long professional career. Employers implementing a modern work organization and innovative technologies in their companies have such expectations. The effects attributed to the courses, achieved during the education process, will ensure, in accordance with the expectations of future employers, that the graduate possesses knowledge about development trends and new, recently implemented achievements not only in the field of electronics and telecommunications, optoelectronics, photonics, computer science, but also in such areas as, among others medicine or environmental protection.

The assumed effect, achieved in the education process, regarding knowledge, is the graduate's advanced knowledge about technology transfer and knowledge related to management (including quality management) and running a business. The effect of education should also be general knowledge, taken into account in engineering practice, necessary to understand social, economic, legal and other, non-technical conditions of engineering activities. Such effects are achieved by implementing university-wide courses. Such knowledge will enable the graduate to understand the realities relating to the organization of production processes and the conditions in which they are conducted. It will also allow him to take into account such conditions in his individual work and teamwork, which as a result of achieving effects he is able to take responsibly. This kind of knowledge resource from the university graduate is expected by the modern labor market. The learning courses included in the course

cards, implemented in the field of study, ensure that the graduate achieves the ability to integrate the knowledge of various fields and disciplines with the application of a system approach in the formation and solving of engineering tasks. The labor market expects that the results achieved in the education process will ensure that the graduate is prepared to work in an industrial environment with the knowledge of work safety principles, in particular with work at a specific position / device. In this respect, the effects achieved in the implementation of laboratory-type courses are important here. A student / graduate should see the need to improve and improve the production process, or existing technical solutions at the workplace. After achieving the learning outcomes, he / she should be able to, taking into account non-technical aspects, according to the given specification, design and execute (using appropriate methods, techniques and tools) a complex device, system or process.

Bearing in mind that the task of assumed and achieved learning outcomes is to meet, to the greatest extent, the expectations of entrepreneurs employing our graduates, an important element of the assessment of the educational process are the hospitations and departmental surveys addressed to students and graduates during each semester. Verification of compliance of the assumed learning outcomes with market expectations and needs is also taking place during the numerous contacts of our graduates with the Faculty's employees.

2.6. The total number of ECTS points that a student must obtain in classes requiring direct participation of academic teachers or other persons conducting classes and students (enter the sum of ECTS points for courses / groups of courses marked with the BK1 code) 59,7 ECTS

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

Number of ECTS points for obligatory subjects	6
Number of ECTS points for optional subjects	0
Total number of ECTS points	6

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

Number of ECTS points for obligatory subjects	12
Number of ECTS points for optional subjects	42
Total number of ECTS points	54

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) 9 ECTS points

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

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

Students achieve the assumed learning outcomes primarily during classes organized by the university as part of the educational process. Learning outcomes assigned to the category of "knowledge", including the content of education associated with them, are provided during lectures and seminar classes. Effects including skills, social and engineering competences are achieved in practical classes, with direct contact with academic teachers, conducted in the form of exercises, laboratories or project classes.

The diploma thesis implemented by students, including complex engineering problems as well as measurement and research issues, enables the student to consolidate the obtained learning outcomes. In the education process, students carry out classes in the Faculty's modern technological and research laboratories. These classes are related to the research projects conducted at the Faculty concerning new and current research areas, thanks to which students gain research experience and have the opportunity to participate in scientific research.

Students have the opportunity to take advantage of additional, non-obligatory forms of education that facilitate achieving learning outcomes through participation in consultations, laboratory consultations, compensatory courses and additional classes co-organized by the Faculty with industry external companies (e.g. as part of the LabVIEW Academy or IQRF Smart School program).

The achievement of the assumed learning outcomes by students is verified on a regular basis by means of a systematic assessment carried out in the form of: tests, oral answers, reports, laboratory protocols, projects or multimedia presentations. In lectures, achieving the expected learning outcomes, including a wider range of learning content, is verified by tests, partial or final exams.

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 (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	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷
1.	FLD129580W	Philosophy of Science and Technology	1					K2eit_K09 K2eit_K10 K2eit_K12	15	60	2	1,2	T	Z	O		KO	Ob
2.	ZMZ000134W	Contemporary Management	2					K2eit_W10 K2eit_W11 K2eit_W12 K2eit_U10 K2eit_K05 K2eit_K08 K2eit_K11	30	90	3	1,8	T	Z	O		KO	Ob
Total			3	0	0	0	0		45	150	5	3						

4.1.1.2 Foreign languages block (0 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	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷
Total																		

4.1.1.3 Sporting classes block (0 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	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷
Total																		

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

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

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶ KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷ Optional – enter W, obligatory – enter Ob

4.1.1.4 Information technologies block (0 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	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷	
Total																			

Altogether for general education blocks

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points for BK classes ¹
lec	cl	lab	pr	sem				
3	0	0	0	0	45	150	5	3

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	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷
1.	MAT001449W	Mathematics	2					K2eit_W06	30	60	2	1,2	T	E	O		PD	Ob
2.	MAT001449C	Mathematics		2				K2eit_U06 K2eit_K02	30	60	2	1,4	T	Z	O	P	PD	Ob
Total			2	2	0	0	0		60	120	4	2,6						

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

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

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷Optional – enter W, obligatory – enter Ob

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/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷
1.	ETD008084W	Solid State Electronics	2					K2eit_W02 K2eit_U02	30	60	2	1,2	T	Z			PD	Ob.
		Total	2	0	0	0	0		30	60	2	1,2						

4.1.2.3 Chemistry 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	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷
		Total																

4.1.2.4 Informatics 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	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷
		Total																

Altogether for basic sciences blocks:

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points for BK classes ¹
lec	cl	lab	pr	sem				
4	2	0	0	0	90	180	6	3,8

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

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

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶ KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷ Optional – enter W, obligatory – enter Ob

4.1.3 List of 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/group of courses	Way ³ of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷
1.	ETD008081W	Statistics for EPM	1					K2eit_W05	15	30	1	0,6	T	Z			K	Ob
2.	ETD008081C	Statistics for EPM		1				K2eit_U05 K2eit_K02	15	60	2	1,4	T	Z		P	K	Ob
3.	ETD008082W	Numerical Methods	1					K2eit_W04 K2eit_K07	15	30	1	0,6	T	Z			K	Ob
4.	ETD008082L	Numerical Methods			1			K2eit_U04 K2eit_K04 K2eit_K07	15	60	2	1,4	T	Z		P	K	Ob
5.	ETD008083W	Optimization Methods	1					K2eit_W03	15	30	1	0,6	T	Z			K	Ob
6.	ETD008083C	Optimization Methods		1				K2eit_U03 K2eit_U11 K2eit_K03	15	60	2	1,4	T	Z		P	K	Ob
7.	ETD008085W	Nanotechnology	1					K2eit_W01 K2eit_W09	15	30	1	0,6	T	Z			K	Ob
8.	ETD008085S	Nanotechnology					2	K2eit_U01 K2eit_U15 K2eit_K01	30	60	2	1,4	T	Z		P	K	Ob
9.	ETD009588W	Sensors and Actuators	1					K2eit_W08 K2eit_W13 K2eit_U08	15	60	2	1,2	T	Z			K	Ob
10.	ETD009079W	Diagnostics and Reliability	1					K2eit_W07	15	30	1	0,6	T	Z			K	Ob
11.	ETD009079P	Diagnostics and Reliability				1		K2eit_U07 K2eit_K06	15	60	2	1,4	T	Z		P	K	Ob
Total			6	2	1	1	2		180	510	17	11,2						

Altogether (for main-field-of-study blocks):

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points for BK classes ¹
lec	cl	lab	pr	sem				
6	2	1	1	2	180	510	17	11,2

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

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

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶ KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷ Optional – enter W, obligatory – enter Ob

4.2 List of optional blocks

4.2.1 List of general education blocks

4.2.1.1 Liberal-managerial subjects blocks (0 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	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷	
		Total																	

4.2.1.2 Foreign languages block (3 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	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷
1.	JZL100709BK	Foreign Language 2B+		1				K2eit_U17	15	30	1	0,7	T	Z	O	P	KO	W
2.	JZL100710BK	Foreign Language A1/A2		3				K2eit_U17	45	60	2	1,4	T	Z	O	P	KO	W
		Total	0	4	0	0	0		60	90	3	2,1						

4.2.1.3 Sporting classes block (0 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	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷	
		Total																	

4.2.1.4 Information technologies block (0 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	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷	
		Total																	

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

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

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶ KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷ Optional – enter W, obligatory – enter Ob

Altogether for general education blocks:

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

4.2.2 List of basic sciences blocks

4.2.2.1 Mathematics block (0 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	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷	
Total																			

4.2.2.2 Physics block (0 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	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷	
Total																			

4.2.2.3 Chemistry block (0 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	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷	
Total																			

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

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

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶ KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷ Optional – enter W, obligatory – enter Ob

Altogether for basic sciences blocks:

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points for BK classes ¹
lec	cl	lab	pr	sem				

4.2.3 List of main-field-of-study blocks

4.2.3.1 Main-field-of-study optional block (0 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	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷	
Total																			

Altogether for main-field-of-study blocks:

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points for BK classes ¹
lec	cl	lab	pr	sem				

4.2.4 List of specialization blocks

4.2.4.1 Specialization subjects (Electronics, Photonics, Microsystem) block (59 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	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷
1.	ETD009589W	MOEMS	1					S2epm_W06 S2epm_W15	15	30	1	0,6	T	Z			S	W

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

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

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶ KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷ Optional – enter W, obligatory – enter Ob

2.	ETD009589L	MOEMS			1			S2epm_U11 S2epm_K01	15	60	2	1,4	T	Z		P	S	W
3.	ETD008564W	Optical Fibers	2					S2epm_W02 S2epm_W03	30	60	2	1,2	T	E			S	W
4.	ETD008564L	Optical Fibers			2			S2epm_U02 S2epm_K01	30	60	2	1,4	T	Z		P	S	W
5.	ETD008568W	Vacuum and Plasma Techniques	2					S2epm_W01	30	30	1	0,6	T	Z			S	W
6.	ETD008566W	Autonomous Power Supplying Systems	2					K2eit_W11 S2epm_W04 S2epm_U05 S2epm_K08	30	60	2	1,2	T	Z			S	W
7.	ETD009584W	Advanced Optoelectronics	1					S2epm_W12 S2epm_W08	15	30	1	0,6	T	E	O		S	W
8.	ETD009584L	Advanced Optoelectronics			1			S2epm_U03 S2epm_U15 S2epm_K04	15	30	1	0,7	T	Z			S	W
9.	ETD009584P	Advanced Optoelectronics				2		S2epm_U03 S2epm_U15 S2epm_K04	30	60	2	1,4	T	Z		P	S	W
10.	ETD009571W	Optical-Fiber Networks	1					S2epm_W02 S2epm_W11	15	30	1	0,6	T	Z			S	W
11.	ETD009571P	Optical-Fiber Networks				1		S2epm_U02 S2epm_K09	15	30	1	0,7	T	Z		P	S	W
12.	ETD009572W	Operating Systems	1					S2epm_W10	15	30	1	0,6	T	Z			S	W
13.	ETD009572L	Operating Systems			1			S2epm_U13 S2epm_K01	15	60	2	1,4	T	Z		P	S	W
14.	ETD009583W	Design and Construction of Optoelectronics Circuits	1					S2epm_W09	15	30	1	0,6	T	Z			S	W
15.	ETD009583P	Design and Construction of Optoelectronics Circuits				1		S2epm_U02 S2epm_U12 S2epm_K09	15	60	2	1,4	T	Z		P	S	W
16.	ETD009574W	Photovoltaics	2					S2epm_W16	30	60	2	1,2	T	Z			S	W
17.	ETD009574L	Photovoltaics			2			S2epm_U11 S2epm_K01	30	60	2	1,4	T	Z		P	S	W
18.	ETD009575W	Microsystem Modeling	1					S2epm_W07	15	30	1	0,6	T	Z			S	W
19.	ETD009575L	Microsystem Modeling				2		S2epm_U04 S2epm_U10 S2epm_K06 S2epm_K09	30	60	2	1,4	T	Z		P	S	W
20.	ETD009576W	Analytical Microsystems	1					S2epm_W06	15	30	1	0,6	T	Z			S	W
21.	ETD009576L	Analytical Microsystems				1		S2epm_U07 S2epm_U08 S2epm_U09 S2epm_K01	15	60	2	1,4	T	Z			S	W

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

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

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶ KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷ Optional – enter W, obligatory – enter Ob

22.	ETD009582W	Ceramic Microsystems	2					S2epm_W05 S2epm_U06	30	60	2	1,2	T	E			S	W
23.	ETD009582P	Ceramic Microsystems				1		S2epm_U06 S2epm_K02	15	30	1	0,7	T	Z		P	S	W
24.	ETD009585W	Packaging of EPM	1					S2epm_W14	15	30	1	0,6	T	Z			S	W
25.	ETD009585L	Packaging of EPM			2			S2epm_U16 S2epm_U17 S2epm_K07	30	30	1	0,7	T	Z		P	S	W
26.	ETD009586S	Diploma Seminar				2		K2eit_W01- K2eit_W12, S2epm_W01- S2epm_W14 K2eit_U01- K2eit_U16, S2epm_U01- S2epm_U19 S2epm_K01 S2epm_K03 S2epm_K05	30	60	2	1,4	T	Z		P	S	W
27.	ETD009581D	MSc Thesis Work				12		K2eit_W01- K2eit_W12, S2epm_W01- S2epm_W14 K2eit_U01- K2eit_U16, S2epm_U01- S2epm_U20 K2eit_K01- K2eit_K12, S2epm_K01- S2epm_K09	180	600	20	14	T	Z		P	S	W
Total			18	0	12	17	2		735	1770	59	39,6						

Altogether for specialization blocks:

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points for BK classes ¹
lec	cl	lab	pr	sem				
18	0	12	17	2	735	1770	59	39,6

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

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

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶ KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷ Optional – enter W, obligatory – enter Ob

4.3 Training block

Name of training			
Number of ECTS points	Number of ECTS points for BK classes¹	Training crediting mode	Code
Training duration		Training objective	

4.4 „Diploma dissertation” block

Type of diploma dissertation	magisterska		
Number of diploma dissertation semesters	Number of ECTS points	Code	
1	20	EPM: ETD009581D	
Character of diploma dissertation			
<p>Faculty students may, in the collection of topics of diploma dissertations, choose a diploma dissertation of different characters:</p> <ul style="list-style-type: none"> - analytical, (analysis, e.g. numerical, properties) - technological (Technology of epitaxial growth) - project (Project of a sensor) - design (Laboratory stand for annealing by RTS method) - application (Assessment of applicability) - usage (Application of a heterostructure in construction) - research (Testing, characterization) - survey (Current state of knowledge concerning the growth mechanisms) 			
Number of BK¹ ECTS points	14		

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

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

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶ KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷ Optional – enter W, obligatory – enter Ob

5. Ways of verifying assumed learning outcomes

Type of classes	Ways of verifying assumed learning outcomes
lecture	exam, test, oral answers, written assessment
class	test, oral answers, discussion, report, activity
laboratory	test, oral answers, discussion, report, activity, mean marks from laboratories
project	test, oral answer, discussion, report, activity, project, project defence, attendance, presentation
seminar	oral answers, discussion, activity, presentation, issues
diploma dissertation	prepared diploma dissertation

6. Range of diploma examination

The scope of the diploma exam covers the content of education provided as part of the studies. The list of current diploma issues in a given academic year is updated annually (in consultation with academic teachers supervising individual courses and approved by the Program Committee) and published on the Faculty's website. The lists cover issues concerning the content of education of directional courses and specialization courses.

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

<i>No.</i>	<i>Course / group of courses code</i>	<i>Name of course / group of courses</i>	<i>Crediting by deadline of... (number of semester)</i>

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

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

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶ KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷ Optional – enter W, obligatory – enter Ob

8. Plan of studies (attachment no. 3c)

Approved by faculty student government legislative body:



8.05.2019
Date

Wojciech Porębiński
Name and surname, signature of student representative



8.05.2019
Date

dr hab. inż. Rafał Walczak, prof. uczelni
Dean's signature

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

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

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶ KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷ Optional – enter W, obligatory – enter Ob

PLAN OF STUDIES

FACULTY: Microsystem Electronics and Photonics

MAIN FIELD OF STUDY: Electronics and telecommunications

EDUCATION LEVEL: second-level studies

FORM OF STUDIES: full-time studies

PROFILE: general academic

SPECIALIZATION: Electronics, Photonics, Microsystems

LANGUAGE OF STUDY: ENGLISH

Resolution no. 753/32/2016-2020 of the Senate of Wrocław University of Science and Technology from the 16th of May 2019

In effect since 1.10.2019

Plan of studies structure in point and hourly layout

2nd level studies																													
full-time																													
main field of study: Electronics and Telecommunications,																													
specialization: Electronics, Photonics, Microsystems																													
sem. 1					sem. 2					sem. 3																			
lec	cl	lab	pr	sem	lec	cl	lab	pr	sem	lec	cl	lab	pr	sem	lec	cl	lab	pr	sem										
										obligatory courses																			
										optional courses																			
										specialization courses																			
Autonomous Power Supplying Systems																													
2																													
ETD008566 2																													
Vacuum and Plasma Techniques E					Ceramic Microsystems E																								
1					2 1																								
ETD008568 2					ETD009582 2 1																								
Optical Fibers E					Analytical Microsystems																								
2 2					1 2																								
ETD008564 2 2					ETD009576 1 1																								
MOEMS					Microsystem Modeling																								
1 2					1 2																								
ETD009589 1 1					ETD009575 1 2																								
Nanotechnology					Photovoltaics																								
1 2					2 2																								
ETD008085 1 2					ETD009574 2 2																								
Solid State Electronics					Design and Construction of Optoelectronics Circuits					Packaging of EPM																			
2					1 2					1 1																			
ETD008083 2					ETD009583 1 1					ETD009585 1 2																			
Optimization Methods					Operating Systems					Diploma Seminar																			
1 2					1 2					2																			
ETD008083 1 1					ETD009572 1 1					ETD009586 2																			
Numerical Methods					Optical-Fiber Networks					MSc Thesis Work																			
1 2					1 1					20																			
ETD008082 1 1					ETD009571 1 1					ETD009581D 2																			
Statistics for EPM					Advanced Optoelectronics E					Sensors and Actuators																			
1 2					1 1 2					2																			
ETD008081 1 1					ETD009584 1 1 2					ETD009588 1																			
Mathematics E					Contemporary Management					Diagnostics and Reliability																			
2 2					3					1 2																			
MAT001449 2 2					ZMZ000134 2					ETD009079 1 1																			
Foreign Language B2+					Foreign Language A1/A2					Philosophy of Science and Technology																			
1					2					2																			
JZL100709BK 1					JZL100710BK 3					FLD129580 1																			
lec	cl	lab	pr	sem	lec	cl	lab	pr	sem	lec	cl	lab	pr	sem	lec	cl	lab	pr	sem										
sem. 1					sem. 2					sem. 3																			
29	ECTS	14	7	6	0	2				30	ECTS	13	2	9	6	0				31	ECTS	6	0	1	22	2			
26	hours	15	5	4	0	2				27	hours	12	3	7	5	0				11	hours	4	0	2	3	2			
total					total					total																			
lec					lec					lec																			
31					31					90																			
cl					cl					cl																			
8					8					8																			
lab					lab					lab																			
13					13					13																			
pr					pr					pr																			
8					8					8																			
sem					sem					sem																			
4					4					4																			
64					64					64																			

Set of obligatory and optional courses and groups of courses in semestral arrangement

Semester 1

Obligatory courses / groups of courses Number of ECTS points 18

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	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷
1.	MAT001449W	Mathematics	2					K2eit_W06	30	60	2	1,2	T	E	O		PD	Ob
2.	MAT001449C	Mathematics		2				K2eit_U06 K2eit_K02	30	60	2	1,4	T	Z	O	P	PD	Ob
3.	ETD008081W	Statistics for EPM	1					K2eit_W05	15	30	1	0,6	T	Z			K	Ob
4.	ETD008081C	Statistics for EPM		1				K2eit_U05 K2eit_K02	15	60	2	1,4	T	Z		P	K	Ob
5.	ETD008082C	Numerical Methods	1					K2eit_W04 K2eit_K07	15	30	1	0,6	T	Z			K	Ob
6.	ETD008082L	Numerical Methods			1			K2eit_U04 K2eit_K04 K2eit_K07	15	60	2	1,4	T	Z		P	K	Ob
7.	ETD008083W	Optimization Methods	1					K2eit_W03	15	30	1	0,6	T	Z			K	Ob
8.	ETD008083C	Optimization Methods		1				K2eit_U03 K2eit_U11 K2eit_K03	15	60	2	1,4	T	Z		P	K	Ob
9.	ETD008084W	Solid State Electronics	2					K2eit_W02 K2eit_U02	30	60	2	1,2	T	Z			PD	Ob
10.	ETD008085W	Nanotechnology	1					K2eit_W01 K2eit_W09	15	30	1	0,6	T	Z			K	Ob
11.	ETD008085S	Nanotechnology					2	K2eit_U01 K2eit_U15 K2eit_K01	30	60	2	1,4	T	Z		P	K	Ob
Total			8	4	1	0	2		225	540	18	11,8						

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

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

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶ KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷ Optional – enter W, obligatory – enter Ob

Optional courses / groups of courses (165 hours in semester, 11 points ECTS)

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	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷
1.	ETD009589W	MOEMS	1					S2epm_W06 S2epm_W15	15	30	1	0,6	T	Z			S	W
2.	ETD009589L	MOEMS			1			S2epm_U11 S2epm_K01	15	60	2	1,4	T	Z		P	S	W
3.	ETD008564W	Optical Fibers	2					S2epm_W02 S2epm_W03	30	60	2	1,2	T	E			S	W
4.	ETD008564L	Optical Fibers			2			S2epm_U02 S2epm_K01	30	60	2	1,4	T	Z		P	S	W
5.	ETD008568W	Vacuum and Plasma Techniques	2					S2epm_W01	30	30	1	0,6	T	Z			S	W
6.	ETD008566W	Autonomous Power Supplying Systems	2					K2eit_W11 S2epm_W04 S2epm_U05 S2epm_K08	30	60	2	1,2	T	Z			S	W
7.	JZL100709BK	Foreign Language B2+		1				K2eit_U17	15	30	1	0,7	T	Z	O	P	KO	W
Total			7	1	3	0	0		165	330	11	7,1						

Altogether in semester:

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points for BK classes ¹
lec	cl	lab	pr	sem				
15	5	4	0	2	390	870	29	18,9

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

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

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶ KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷ Optional – enter W, obligatory – enter Ob

Semester 2

Obligatory courses / groups of courses

Number of ECTS points 3

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	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷
1.	ZMZ000134W	Contemporary Management	2					K2eit_W10 K2eit_W11 K2eit_W12 K2eit_U10 K2eit_K05 K2eit_K08 K2eit_K11	30	90	3	1,8	T	Z	O		KO	Ob
Total			2	0	0	0	0		30	90	3	1,8						

Optional courses / groups of courses (375 hours in semester, 27 points ECTS)

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	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷
1.	ETD009584W	Advanced Optoelectronics	1					S2epm_W12 S2epm_W08	15	30	1	0,6	T	E	O		S	W
2.	ETD009584L	Advanced Optoelectronics			1			S2epm_U03 S2epm_U15 S2epm_K04	15	30	1	0,7	T				S	W
3.	ETD009584P	Advanced Optoelectronics				2		S2epm_U03 S2epm_U15 S2epm_K04	30	60	2	1,4	T			P	S	W
4.	ETD009571W	Optical-Fiber Networks	1					S2epm_W02 S2epm_W11	15	30	1	0,6	T				S	W
5.	ETD009571P	Optical-Fiber Networks				1		S2epm_U02 S2epm_K09	15	30	1	0,7	T			P	S	W
6.	ETD009572W	Operating Systems	1					S2epm_W10	15	30	1	0,6	T				S	W
7.	ETD009572L	Operating Systems			1			S2epm_U13 S2epm_K01	15	60	2	1,4	T			P	S	W

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

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

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶ KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷ Optional – enter W, obligatory – enter Ob

8.	ETD009583W	Design and Construction of Optoelectronics Circuits	1					S2epm_W09	15	30	1	0,6	T				S	W
9.	ETD009583P	Design and Construction of Optoelectronics Circuits				1		S2epm_U02 S2epm_U12 S2epm_K09	15	60	2	1,4	T			P	S	W
10.	ETD009574W	Photovoltaics	2					S2epm_W16	30	60	2	1,2	T				S	W
11.	ETD009574L	Photovoltaics			2			S2epm_U11 S2epm_K01	30	60	2	1,4	T			P	S	W
12.	ETD009575W	Microsystem Modeling	1					S2epm_W07	15	30	1	0,6	T				S	W
13.	ETD009575L	Microsystem Modeling			2			S2epm_U04 S2epm_U10 S2epm_K06 S2epm_K09	30	60	2	1,4	T			P	S	W
14.	ETD009576W	Analytical Microsystems	1					S2epm_W06	15	30	1	0,6	T				S	W
15.	ETD009576L	Analytical Microsystems			1			S2epm_U07 S2epm_U08 S2epm_U09 S2epm_K01	15	60	2	1,4	T				S	W
16.	ETD009582W	Ceramic Microsystems	2					S2epm_W05 S2epm_U06	30	60	2	1,2	T	E			S	W
17.	ETD009582P	Ceramic Microsystems				1		S2epm_U06 S2epm_K02	15	30	1	0,7	T			P	S	W
18.	JZL100710BK	Foreign Language A1/A2		3				K2eit_U17	45	60	2	1,4	T	Z	O	P	KO	W
Total			10	3	7	5	0		375	810	27	17,9						

Altogether in semester:

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points for BK classes ¹
lec	cl	lab	pr	sem				
12	3	7	5	0	405	900	30	19,7

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

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

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶ KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷ Optional – enter W, obligatory – enter Ob

Semester 3

Obligatory courses / groups of courses

Number of ECTS points 7

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	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷
1.	ETD009588W	Sensors and Actuators	1					K2eit_W08 K2eit_W13 K2eit_U08	15	60	2	1,2	T	Z			K	Ob
2.	ETD009079W	Diagnostics and Reliability	1					K2eit_W07	15	30	1	0,6	T	Z			K	Ob
3.	ETD009079P	Diagnostics and Reliability				1		K2eit_U07 K2eit_K06	15	60	2	1,4	T	Z		P	K	Ob
4.	FLD129580W	Philosophy of Science and Technology	1					K2eit_K09 K2eit_K10 K2eit_K12	15	60	2	1,2	T	Z	O		KO	Ob
Total			3	0	0	1	0		60	210	7	4,4						

Optional courses / groups of courses (255 hours in semester, 24 points ECTS)

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	BK classes ¹			university-wide ⁴	practical ⁵	kind ⁶	type ⁷
1.	ETD009585W	Packaging of EPM	1					S2epm_W14	15	30	1	0,6	T	Z			S	W
2.	ETD009585L	Packaging of EPM			2			S2epm_U16 S2epm_U17 S2epm_K07	30	30	1	0,7	T	Z		P	S	W

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

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

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶ KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷ Optional – enter W, obligatory – enter Ob

3.	ETD009586S	Diploma Seminar					2	K2eit_W01- K2eit_W12, S2epm_W01- S2epm_W14 K2eit_U01- K2eit_U16, S2epm_U01- S2epm_U19 S2epm_K01 S2epm_K03 S2epm_K05	30	60	2	1,4	T	Z		P	S	W
4.	ETD009581D	MSc Thesis Work					12	K2eit_W01- K2eit_W12, S2epm_W01- S2epm_W14 K2eit_U01- K2eit_U16, S2epm_U01- S2epm_U20 K2eit_K01- K2eit_K12, S2epm_K01- S2epm_K09	180	600	20	14	T	Z		P	S	W
Total			1	0	2	12	2		255	720	24	16,7						

Altogether in semester:

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points for BK classes ¹
lec	cl	lab	pr	sem				
4	0	2	13	2	315	930	31	21,1

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

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

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶ KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷ Optional – enter W, obligatory – enter Ob

2. Set of examinations in semestral arrangement


Course / group of courses code	Names of courses / groups of courses ending with examination	Semester
MAT001449W ETD008564W ETD008565W	1. Mathematics 2. Optical Fibers 3. Vacuum and Plasma Techniques	1
ETD009584W ETD009582W	1. Advanced Optoelectronics 2. Ceramic Microsystems	2

3. Numbers of allowable deficit of ECTS points after particular semesters


Semester	Allowable deficit of ECTS points after semester
1	12
2	6

Opinion of student government legislative body

8.05.2019
Date


Wojciech Porębiński
Name and surname, signature of student representative

8.05.2019
Date


dr hab. inż. Rafał Walczak, prof. uczelni
Dean's signature

¹BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

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

⁵Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

⁶ KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

⁷ Optional – enter W, obligatory – enter Ob