

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Introduction to telecommunications</b>		Code <b>1010321351010324373</b>
Field of study <b>Electrical Engineering</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>3 / 5</b>
Elective path/specialty <b>-</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>First-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: <b>30</b> Classes: <b>-</b> Laboratory: <b>15</b> Project/seminars: <b>-</b>		No. of credits <b>3</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art <b>technical sciences</b> <b>Technical sciences</b>		ECTS distribution (number and %) <b>3 100%</b> <b>3 100%</b>
<b>Responsible for subject / lecturer:</b>  dr inż. Andrzej Tomczewski email: andrzej.tomczewski@put.poznan.pl tel. 616652379 Elektryczny ul. Piotrowo 3A, 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Knowledge of mathematics, basic of computer science, circuit theory, electromagnetic fields and microprocessor technology.
2	<b>Skills</b>	The use of mathematical tools for the analysis of simple continuous signals, basic measurements of electrical quantities, interpretation of the results of measurements and calculations, ability to effectively self-education in an area related to the chosen field of study.
3	<b>Social competencies</b>	Broaden their awareness of the need for competence in the field of electrical engineering work, willingness to work together as a team.
<b>Assumptions and objectives of the course:</b> Knowledge of both theoretical and practical issues related to the basic techniques of information transmission in wired and wireless communication systems. Presentation of the general characteristics of large telecommunications systems. Introduction to waves, antennas and radio systems. The acquisition of practical skills in the parameter measurement and analysis of the antenna systems, transmission lines, and basic analog and digital filters.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b> 1. explain the need for process sampling, quantization, coding and modulation signals in the transmission of information, explain the basic differences between the methods used commutation, describe the properties of different transmission media - [K_W10+++, K_W07+] 2. describe the structure and replace the functions of the most important elements of wireless communication systems - [K_W10+++, K_W06+]		
<b>Skills:</b> 1. define the concept of sampling, quantization and coding of signals in the data transmission, interpret the frequency spectrum of signals, apply knowledge of the basic range of analog and digital modulation, comparing the characteristics and describe the use of various types of radio waves - [K_U22++] 2. assess the possibility of using specific techniques of information transmission issues carried out by electrical engineer - [K_U02++, K_U14+]		
<b>Social competencies:</b> 1. openness to the use of modern communication techniques in order to increase the competitiveness of products and services offered by the company - [K_K04++]		

<b>Assessment methods of study outcomes</b>		
<p>Lecture:                      ? assess the knowledge and skills listed on the written exam with a combined: test and problematic (check the forums solving skills in the field of wired and wireless transmission of information).</p> <p>Laboratory:                      ? test preparation (knowledge) to the laboratory classes,                      ? rewarding practical knowledge gained during the previous laboratory,                      ? assess the knowledge and skills associated with taking measurements and their development in the form of reports.</p> <p>Get extra points for the activity in the classroom, and in particular for:                      ?ability to work within a team practice performing the task detailed in the laboratory,                      ?use of elements and techniques that go beyond the material in the field of the lecture and laboratory exercises,                      ?aesthetic diligence studies completed.</p>		
<b>Course description</b>		
<p>Social importance of telecommunications, an introduction to the theory of information, types of telecommunication systems, analog signal processing (discretization, quantization), spectral representation of the signal, analog modulation techniques, pulse and PCM modulation, spread-spectrum techniques, types and properties of line coding, noise and their role in data transmission in telecommunication systems, electrical and optical media transmission, connection-oriented and connectionless packet switching, multiplication method (TDM, FDM and WDM), broad telecommunications systems, study of transmission lines, and analog and digital low-pass filters, introduction to waves and antennas (TEM wave, the types and characteristics of antennas, radio wave propagation in free space, energy balance, wave propagation: mundane, tropospheric and ionospheric, measurement parameters and characteristics of antennas), examples of wireless transmission systems.</p>		
<b>Basic bibliography:</b>		
<p>1. Gotfryd M.: Podstawy telekomunikacji. Telekomunikacja analogowa i cyfrowa, Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów 2010.</p> <p>2. Kowalik R., Pawlicki C.: Podstawy teletechniki dla elektryków, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2006.</p> <p>3. Katulski R. J.: Propagacja fal radiowych w telekomunikacji bezprzewodowej, WKiŁ, Warszawa 2009.</p> <p>4. Szóstka J.: Fale i anteny, WKiŁ, Warszawa 2009.</p>		
<b>Additional bibliography:</b>		
<p>1. Zieliński T. P.: Cyfrowe przetwarzanie sygnałów. Od teorii do zastosowań, WKiŁ, Warszawa 2007.</p> <p>2. Szabatin J.: Podstawy teorii sygnałów, WKiŁ, Warszawa 2007.</p> <p>3. Haykin S.: Systemy telekomunikacyjne. Część I, WKiŁ, Warszawa 2004.</p>		
<b>Result of average student's workload</b>		
Activity	Time (working hours)	
1. udział w zajęciach wykładowych	30	
2. participation in laboratory classes	15	
3. participate in the consultations on the lecture	5	
4. participate in the consultations on the lab	5	
5. preparation laboratory	5	
6. prepare for the exam	20	
7. assessment of laboratory	2	
8. prepare for the completion of laboratory	5	
9. participation in the exam	3	
<b>Student's workload</b>		
Source of workload	hours	ECTS
Total workload	90	3
Contact hours	60	2
Practical activities	32	1