

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Digital measurement in telecommunications		Code 1010832131010834041
Field of study Electronics and Telecommunications	Profile of study (general academic, practical) general academic	Year /Semester 2 / 3
Elective path/specialty Telecommunication Systems	Subject offered in: Polish	Course (compulsory, elective) elective
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 2 Classes: - Laboratory: - Project/seminars: 1		No. of credits 3
Status of the course in the study program (Basic, major, other) other		(university-wide, from another field) from field
Education areas and fields of science and art technical sciences Technical sciences		ECTS distribution (number and %) 3 100% 3 100%
Responsible for subject / lecturer: dr hab. inż. Anna Domańska prof.PP, prof. nadzw. email: domanska@et.put.poznan.pl tel. 61 665 3865 Faculty of Electronics and Telecommunications ul. Polanka 3, 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	K1_W6 Has a systematic knowledge, together with necessary mathematical background, of 1D signal theory; this knowledge allows him/her to understand the representation of signals and signal analysis in time domain and frequency domain. K1_W18 Has a systematic knowledge, together with necessary mathematical background, of the fundamentals of metrology, which is necessary to measure the signal properties and the parameters of electronic and telecommunication systems components. Has knowledge of measurement methods, measurement equipment and computerized measurement systems.
2	Skills	K1_U01 Is able to extract information from Polish or English language literature, databases and other sources. Is able to synthesize gathered information, draw conclusions, and justify opinions. K1_U03 Is able to prepare a well-documented study, in English or in Polish, on problems related to electronics and telecommunication. K1_U15 Is able to determine basic parameters and properties of signals and telecommunication systems, under predefined constraints.
3	Social competencies	K1_K01 Is aware of the limitations of his/her current knowledge and skills; is committed to further self-study.
Assumptions and objectives of the course: Recognition of decisive factors about functions, parameters and properties of digital measuring equipments applied in telecommunications		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Has in-depth knowledge of construction and operation of communication systems used to provide multimedia services. - [K2_W01] 2. Has knowledge of construction, architecture and practical application of programmable digital circuits. - [K2_W02] 3. Has a systematic practical knowledge of designing ICT networks or sound processing techniques or measurement and embedded systems. - [K2_W14]		
Skills:		

1. Is able to prepare a scientific paper or technical report and give a presentation (in English or in Polish) on solving a problem in the area of electronics and/or telecommunication; is able to participate in a discussion related to the presented problem. - [K2_U02]
2. Is able to evaluate the parameters of telecommunication satellite systems. Is able to evaluate the parameters which determine the positioning accuracy of a satellite navigation system. Is able to measure the parameters of signals and components of satellite navigation systems. - [K2_U10]
3. Is able to use various measurement techniques. - [K2_U13]
Social competencies:
1. Is aware of the limitations of his/her current knowledge and skills; is committed to lifelong learning. - [K2_K04]
2. Is aware of the necessity to approach solving technical problems with responsibility and professionalism. - [K2_K05]

Assessment methods of study outcomes		
Exam from the range of programmatic contents Final report, elaboration of given project problem Current check of progresses from realization of project		
Course description		
Data processing algorithms in digital measurement instrumentation Uncertainty analysis in high-accuracy digital measurements Digitizing waveform recorders Data acquisition systems DDS signal generators Spectrum analyzers Vector signal analyzers Digital oscilloscope, DSP in high performance oscilloscopes		
Basic bibliography:		
1. Kamieniecki A., Współczesny oscyloskop. Budowa i pomiary, BTC 2009 2. Rak R., Wirtualny przyrząd pomiarowy, Oficyna Wydawnicza PW 2003 3. Stępień R., Syntezy DDS, BTC, Legionowo 2011 4. Agilent, National Instruments, Tektronix, application notes		
Additional bibliography:		
1. ed. Keithley, Data Acquisition and Control Handbook, 2001 2. Zieliński T., Cyfrowe przetwarzanie sygnałów, WKŁ 2009		
Result of average student's workload		
Activity	Time (working hours)	
1. Lectures	30	
2. Preparation to exam	20	
3. Exam	2	
4. Project	15	
5. Preparation to project exercises	10	
6. Elaboration of project report	10	
7. Consultations	2	
Student's workload		
Source of workload	hours	ECTS
Total workload	90	3
Contact hours	50	2
Practical activities	35	1