

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Electronic converters of signals		Code 1010321361010321573
Field of study Electrical Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 3 / 6
Elective path/specialty Measurement Systems in Industry and	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 15 Classes: - Laboratory: 30 Project/seminars: -		No. of credits 3
Status of the course in the study program (Basic, major, other) (brak)		(university-wide, from another field) (brak)
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. Andrzej Odon email: andrzej.odon@put.poznan.pl tel. 616652599 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge of algebra, mathematical analysis, physics, electrical engineering, electronics, computer science, and metrology Basic knowledge in the scope of electronic analog circuits and digital techniques
2	Skills	Ability of the efficient self-education in the area concerned with electronic processors of signals
3	Social competencies	Awareness of the necessity of broadening of the competencies in the field of electrical engineering and willingness to cooperate in a team
Assumptions and objectives of the course: - Knowledge of characteristics and applications of analog, analog-to-digital and digital-to-analog converters. - Knowledge in the scope of modern techniques of measuring data processing		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Ability to explain the principles and techniques of measuring signals acquisition for applications in industry and biomedical engineering - [K_W03 +]		
2. Ability to describe the importance and the application possibilities of present measuring systems - [K_W14 ++]		
Skills:		
1. Ability to design measuring systems creatively, using possibilities offered by new technologies, taking into account limitations of current aktualnego status of knowledge and technique - [K_U03 ++, K_U22 +]		
2. Ability to work independently and as a team in design and construction companies - [K_U05 +]		
Social competencies:		
1. Ability think and act enterprisingly in the area of measuring systems to be used in industry and biomedical engineering - [K_K01 +]		
2. Understanding the need of broad popularization of the knowledge concerned the area of simple and complex measuring systems - [K_K05 +]		
Assessment methods of study outcomes		

Lectures: <ul style="list-style-type: none">- evaluation of the knowledge with an exam related to the content of lectures (test, computational and problem questions), awarding marks in laboratory exercises)- continuous estimation in all classes (awarding attendance in lectures, activity and quality of perception).		
Laboratory exercises: <ul style="list-style-type: none">- continuous estimating with the tests,- awarding the skill increase,- the evaluation of knowledge and skills connected with the measuring tasks and prepared reports		
Course description		
<ul style="list-style-type: none">- Analog converters of electrical signals: operational amplifiers to be used as V/V, I/U, U/I converters; detectors of voltage peak and RMS values; sample-and-hold converters.- Digital-to-analog converters: parameters, functional components, converters with reference voltage source, converters with current switch over.- Analog-to-digital converters of voltage: parameters, functional components, errors of processing, different means of processing: double-integration, compensating, flash, sigma-delta, and other.- Experimental studies of selected types of electronic converters of signals.		
Basic bibliography: <ul style="list-style-type: none">1. Z. Kulka, A. Libura, M. Nadachowski, Przetworniki analogowo-cyfrowe i cyfrowo-analogowe, WKŁ, Warszawa 19872. U. Tietze, Ch. Schenk, Układy półprzewodnikowe, WNT, Warszawa 20013. J. Zakrzewski, Czujniki i przetworniki pomiarowe, Wyd. Politechniki Śląskiej, Gliwice 2004		
Additional bibliography: <ul style="list-style-type: none">1. J. Jakubiec, J. Roj, Pomiarowe przetwarzanie próbkujące, Wyd. Politechniki Śląskiej, Gliwice 20002. Denton J. Dailey, Electronic Devices and Circuits, copyright 2001 by Prentice-Hall, Inc., Upper Sadle River, New Jersey 07548, USA. Warszawa 2002.		
Result of average student's workload		
Activity	Time (working hours)	
1. Participation in lectures	15	
2. Participation in laboratory classes	30	
3. Participation in consulting with the lecturers	15	
4. Preparation to laboratory exercises and preparation of the reports	15	
5. Preparation to the exam	16	
Student's workload		
Source of workload	hours	ECTS
Total workload	91	3
Contact hours	60	2
Practical activities	50	2