

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Modulation methods in power electronics		Code 1010324391010326897
Field of study Electrical Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 5 / 9
Elective path/specialty Microprocessor's Control Systems in	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies	Form of study (full-time, part-time) part-time	
No. of hours Lecture: 9 Classes: - Laboratory: 9 Project/seminars: -		No. of credits 2
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 %) 2 100% 2 100%
Responsible for subject / lecturer: dr hab. inż. Ryszard Porada, prof. nadzw. email: ryszard.porada@put.poznan.pl tel. 48 61 665 2360 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	It has rudimentary knowledge from the range of electrical engineering and the signals theory.
2	Skills	It knows to use rudimentary knowledge from the range of the electrical engineering and the signals theory.
3	Social competencies	It can think and work enterprisingly in the area of the designing of systems with modulation.
Assumptions and objectives of the course: Learning of analog and digital modulation methods and their use in the power electronics.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. to describe rules of the modulation and to apply tools of the spectral analysis on basic level - [K_W04+ K_W22+++]		
Skills:		
1. to apply a principle the modulation and to use tools of the spectral analysis on basic level - [K_U03 ++ K_U17 ++]		
Social competencies:		
1. it can think and work enterprisingly in the area of the designing of power electronics systems in the aspect of the modulation of exit quantity - [K_K02 ++]		
Assessment methods of study outcomes		

<p>Lecture</p> <p>? the credit of the lecture preceded with the credit of occupations laboratory exercises and project,</p> <p>Designing work and laboratory exercises:</p> <p>? the test and awarding the knowledge of need-to-know to realization of placed problems in the given area of tasks,</p> <p>? verification skills on every exercises</p> <p>? evaluation of the knowledge and skills related to the realization of laboratory exercise, the evaluation of the report from done exercises.</p> <p>Obtaining additional points for activity during exercises, in particular way for:</p> <p>? proposing to discuss additional aspects of the subject</p> <p>? effective use of knowledge obtained during solving of given problem;</p> <p>? comments related to improve teaching material,</p> <p>? aesthetics of solved problems and reports ? within homework.</p>		
Course description		
<p>The characteristics of the modulation methods. Goals and kinds of the modulation. The classification of the modulation systems. Analog modulations. Impulse modulations. Digital modulations. Use of chosen of the modulation methods in the power electronics. Kinds and properties of the MSI modulation. Voltage and current modulation in power electronics systems.</p>		
<p>Basic bibliography:</p> <ol style="list-style-type: none"> 1. Izydorczyk J.: Płonka G., Tyma G., Teoria sygnałów, Wstęp, Wyd. Helion, 1999. 2. Mikołajuk K., Podstawy analizy obwodów energoelektronicznych, Państwowe Wydawnictwo Naukowe, Warszawa 1998. 3. Szabatin J.: Podstawy teorii sygnałów, WKiŁ, Warszawa 1982. 4. Tunia H., Smirnow A., Nowak M., Barlik R., Układy energoelektroniczne. Obliczanie, modelowanie, projektowanie, Wydawnictwa Naukowo-Techniczne, Warszawa 1982. 		
<p>Additional bibliography:</p> <ol style="list-style-type: none"> 1. Lyons R.G.: Wprowadzenie do cyfrowego przetwarzania sygnałów, WKiŁ, Warszawa 1999. 2. Mohan N., Undeland N., Robins W., Power Electronics, Jon Wiley & Sons Inc., New York 1999 		
Result of average student's workload		
Activity	Time (working hours)	
1. participation in the lectures	9	
2. participation in the laboratory exercises	9	
3. participation in consultations on the lecture	5	
4. participation in consultations on the laboratory exercises	10	
5. preparation for the laboratory exercises	10	
6. preparation for the exam	10	
7. preparation for the laboratory exercises pass	10	
8. participation in the exam	5	
Student's workload		
Source of workload	hours	ECTS
Total workload	78	2
Contact hours	38	1
Practical activities	9	1