

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Dynamic of systems		Code 1010322331010322649
Field of study Electrical Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 2 / 3
Elective path/specialty Microprocessor Control Systems in	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 15 Classes: - Laboratory: - 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 knows the control theory and the rule of mathematical modelling
2	Skills	It knows to apply the knowledge from the range of control theory and rule of mathematical modelling
3	Social competencies	It can think and work enterprisingly in the area of the designing of the control of systems and the mathematical modelling
Assumptions and objectives of the course: The introduction with methods of description, analysis, synthesis and optimization of dynamic systems		
Study outcomes and reference to the educational results for a field of study		
Knowledge: 1. to characterize basic criteria of modelling, control and optimization of real systems with methods of the mathematical modeling of dynamic systems - [K_W04+++ K_W14 +++]		
Skills: 1. It knows to apply the knowledge from range of modelling, control and optimization of real systems with methods of the mathematical modeling of dynamic systems - [K_U15+++]		
Social competencies: 1. it can think and work enterprisingly in the area of the designing of algorithms of the digital signal processing, the control of power electronics systems and the mathematical modeling - [K_K01 ++ K_K02 ++]		
Assessment methods of study outcomes		

<p>Lecture</p> <p>? the credit of the lecture preceded with the credit of occupations laboratory exercises</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 introduction into the dynamics of systems. The description of systems about the various physical nature. The description continuous and discreet. The identification, the analysis and the synthesis of linear systems and non-linear continuous and discreet. The observability and the governableness. The stability of dynamic (open and closed) systems. The optimization of dynamic systems. Properties of non-linear dynamic systems.</p>		
Basic bibliography:		
<p>1. CHUA L.O., PEN-MIN Lin: Komputerowa analiza układów elektrycznych. Algorytmy i metody obliczeniowe. WNT, Warszawa 1981</p> <p>2. GÓRECKI H.: Optymalizacja układów dynamicznych. PWN, Warszawa 1993</p> <p>3. KACZOREK T., DZIELIŃSKI A., DĄBROWSKI W., ŁOPATKA R.: Podstawy teorii sterowania. PWN, Warszawa 1999</p> <p>4. OSOWSKI S: Modelowanie i symulacja układów i procesów dynamicznych. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2007</p> <p>5. PUCHAŁA A.: Dynamika maszyn i układów elektromechanicznych. PWN, Warszawa 1977</p> <p>6. SZACKA K.: Teoria układów dynamicznych. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 1999.</p>		
Additional bibliography:		
<p>1. BAKER Gregory L., GOLLUB Jerry P.: Wstęp do dynamiki układów chaotycznych. Wyd. Nauk. PWN, Warszawa 1998.</p> <p>2. KUDREWICZ Jacek: Nieliniowe obwody elektryczne. Wyd. Nauk.-Techn. WNT, Warszawa 1996.</p> <p>3. MEISEL J.: Zasady elektromechanicznego przetwarzania energii, WNT, Warszawa 1970</p> <p>4. PEITGEN H.-O., JÜRGENS H., SAUPE D.: Granice chaosu. Fraktale. Wyd. Nauk.. PWN, Warszawa 1997.</p> <p>5. WILSON R.J.: Wprowadzenie do teorii grafów. PWN, Warszawa 1985</p>		
Result of average student's workload		
Activity	Time (working hours)	
1. participation in the lectures	15	
2. participation in the laboratory exercises	15	
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	80	2
Contact hours	50	2
Practical activities	0	0