

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Systems theory and analysis		Code 1011101251010217941
Field of study Logistics - Full-time studies - First-cycle studies	Profile of study (general academic, practical) (brak)	Year /Semester 3 / 5
Elective path/specialty -	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: 30 Classes: 30 Laboratory: - Project/seminars: -		No. of credits 4
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 %) 4 100% 4 100%
Responsible for subject / lecturer: dr hab. Tomasz Stręk email: tomasz.strek@put.poznan.pl tel. 61 665 2339 Faculty of Mechanical Engineering and Management ul. Piotrowo 3, 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	mathematics, ordinary differential equations.
2	Skills	logical thinking, find basic data in libraries and internet.
3	Social competencies	understanding of the need to learn and acquire new knowledge.
Assumptions and objectives of the course: Show engineering activity in the broader context of human activity and progress, and learn creative thinking and conceptual design of products and services (systems).		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. It has a basic knowledge of computer science (information technology), economics and transportation, production management and services, production systems design (industrial design) (T1A_W02) - [K1A_W09] 2. It has a basic knowledge of the life cycle of socio-technical systems (logistics systems) (T1A_W06) - [K1A_W21]		
Skills:		
1. Student is able to independently develop a set, housed in the subject being studied issue (T1A_U05) - [K1A_U05] 2. Student can formulate using analytical methods, simulation or experimental located within the subject being studied design task and solve the task in the field of logistics and its specific issues (inventory management, logistics, distribution, and manufacturing and sourcing, logistics service, ekologicystyki) and supply chain management (T1A_U09) - [K1A_U09]		
Social competencies:		
1. It is aware of the need for lifelong learning; inspire and organize the learning process of others in the coming within studiowanym concerning issues (T1A_KO1) - [K1A_K01] 2. It is willing to cooperate and work in teams to resolve contained within the subject being studied problems (T1A_KO3) - [K1A_K03] 3. He can see cause-and-effect relationships in the implementation of the set objectives and importance rangować tasks (T1A_KO4) - [K1A_K04]		

Assessment methods of study outcomes		
<p>Forming Rating:</p> <p>a) In the exercise: on the basis of the current progress of the tasks;</p> <p>b) in respect of lectures: on the basis of answers to questions about the material discussed.</p> <p>Rating summary:</p> <p>a) In the exercise on the basis of tasks to be solved and problems;</p> <p>b) in respect of lectures in a test consisting in the form of questions that cover all the learning outcomes or public presentation indicated the completion of the discussion and the evaluation form and the quality of the prepared materials.</p>		
Course description		
<p>Basic concepts and definitions of the theory of systems, systems engineering, systems analysis, definition, structural and cybernetic system, condition and stability of the system, types of structures, systems, processes as a system, etc.. Reliability of the system, mathematical modeling of the system, structural models of the system, the system functional analysis, decomposition of the system.</p> <p>Simple models of the behavior of systems: market equilibrium model of production, competition for resources, the arms race, urbanization, consumption of machines and systems. Identification, evolution and behavior prediction systems. Differential equations in modeling systems. Artificial neural networks - model the system as a black box. The effectiveness of neural networks as a non-linear models of phenomena and processes. Operation of the neural network and its learning. Method system. Rigorous methods of the system. Systems engineering.</p> <p>Solving systems modeling and analysis. Identification, evolution and behavior prediction systems. Computational methods. The description and the method of solving the traveling salesman problem. Transport tasks.</p>		
Basic bibliography:		
<p>1. . Cempel C., Teoria i inżynieria systemów - zasady i zastosowania myślenia systemowego, Wydawnictwo Instytut Technologii Eksploatacji, Radom, 2006</p> <p>2. Cempel C., Teoria i Inżynieria Systemów, e-skrypt, Internet http://neur.am.put.poznan.pl</p> <p>3. Gutenbaum J., Modelowanie matematyczne systemów, AOW EXIT, Warszawa, 2003</p> <p>4. Duch W., Korbicz J., Rutkowski L., Tadeusiewicz R.: Bio cybernetyka i inżynieria biomedyczna, Sieci neuronowe, tom 6, Akademicka Oficyna Wydawnicza Exit, Warszawa 2000</p>		
Additional bibliography:		
<p>1. . Mazur M., 1976, Pojęcie systemu i rygory jego stosowania. [w:] Materiały Szkoły Podstaw Inżynierii Systemów nr 2, Komitet Budowy Maszyn PAN, Orzysz. Przedruk w Postępowach Cybernetyki, z. 2, 1987, s. 21-29</p>		
Result of average student's workload		
Activity	Time (working hours)	
1. Lecture	30	
2. Practice	30	
3. Consultations	5	
4. Preparing to practice	10	
5. Preparing to exam	10	
6. Exam	3	
7. Exam	2	
Student's workload		
Source of workload	hours	ECTS
Total workload	90	4
Contact hours	70	3
Practical activities	30	1