STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Systems theory and analysis		**1011101351010217941**
Field of study	Profile of study (general academic, practical)	Year /Semester
Logistics - Full-time studies - First-cycle studies	**general academic**	**3 / 5**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
-	**Polish**	**obligatory**
Cycle of study:	Form of study (full-time,part-time)	
First-cycle studies	**full-time**	
No. of hours		No. of credits
Lecture: **15** Classes: **30** Laboratory: **-** Project/seminars: **-**		**3**
Status of the course in the study program (Basic, major, other)	(university-wide, from another field)	
other	**university-wide**	
Education areas and fields of science and art		ECTS distribution (number and %)
technical sciences		**3 100%**
Technical sciences		**3 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	knowledge in mathematics, differential equations, numerical methods.
2	**Skills**	logical thinking, using information obtained from the library and the internet.
3	**Social competencies**	understanding 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, 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. Has basic knowledge in the field of computer science (information technology), economics and organization of transport, production and service management, design of production systems (design of industrial plants) - [K1A_W09]
2. Has basic knowledge about the life cycle of socio-technical systems (logistic systems) - [K1A_W21]

Skills:

1. Is able to independently develop a given problem within the studied subject - [K1A_U05]
2. Is able to formulate using the analytical, simulation or experimental methods falling within the framework of system engineering and system analysis project task and solve this task in the field of logistics and its detailed issues and supply chain management - [K1A_U09]

Social competencies:

1. Is aware of the need to learn throughout life; to inspire and organize the learning process of other people within the issues covered in the subject studied - [K1A_K01]
2. He is eager to cooperate and work in a group to solve problems within the studied subject - [K1A_K03]
3. He can see causal relationships in the implementation of set goals and rank the importance of tasks - [K1A_K04]

Assessment methods of study outcomes

Forming rating:

a) in the field of exercises: on the basis of an assessment of the current progress of task implementation;

b) in the field of lectures: based on answers to questions about the material discussed.

Summary rating:

a) in the field of exercises based on solved tasks and problems;

b) in the scope of lectures in the form of a test consisting of questions that cover all the effects of education or public presentation on the indicated topic concluded with a discussion and evaluation of the form and quality of the materials prepared.

Course description

Lecture: Basic concepts and definitions regarding: systems theory, systems engineering, systems analysis, structural and cybernetic system definition, system state and stability, types of system structures, process as a system, etc. System reliability, mathematical modeling of the system, structural models of the system, analysis functional system, system decomposition.

Simple models of system behavior: market equilibrium, production model, resource rivalry, arms race, urbanization, wear of machines and technical systems. Identification, evolution and prediction of system behavior. Differential equations in system modeling. Artificial neural networks - system model as a "black box". Efficiency of neural networks as non-linear models of phenomena and processes. Operation of the neural network and its learning. System method. The rigors of the system method. System engineering.

Solving tasks from modeling and systems analysis. Identification, evolution and prediction of system behavior. Calculation methods. Description and methods of solving the traveling salesman problem. Transport tasks.

Teaching methods:

Lecture - informative and conversational lecture

Exercises - a method of training

Basic bibliography:

Additional bibliography:

Result of average student's workload

Activity	Time (working hours)
1. Lectures	15
2. Classes	30
3. Consultation	5
4. Exam	3
5. Disscus about the exam	2
6. Preparation to the classes	10
7. Preparation to pass the exam	10

Student’s workload

Source of workload	hours	ECTS
Total workload	75	3
Contact hours	55	2
Practical activities	30	1