COURSE DESCRIPTION CARD - SYLLABUS

Course name

Systems engineering and analysis

Course

Field of study

Logistics

Area of study (specialization)

Level of study

First-cycle studies

Form of study

part-time

Year/Semester

3/5

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

Number of hours

Lecture

14

Laboratory classes

0

Other (e.g. online)

0

Tutorials

12

Projects/seminars

0

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

Prerequisites

Knowledge of mathematics at the level of the basic academic course. The ability to obtain information from the indicated sources and to cooperate in a team.

Course objective

Teaching creative and multi-variant thinking, conceptual design of products and services (systems), optimization of technical systems throughout their life cycle

Course-related learning outcomes

Knowledge

1. The student knows the basic issues of construction, technology and techniques related to logistics [P6S_WG_05]

2. The student knows the basic issues of the life cycle of socio-technical systems and the life cycle of industrial products. [P6S_WG_06]

Skills

The student is able to identify in engineering tasks systemic and non-technical aspects, as well as socio-technical, organizational and economic [P6S_UW_04]

The student is able to apply the appropriate experimental and measuring techniques to solve the problem within the studied subject, including computer simulation within logistics and its specific issues, and supply chain management. [P6S_UW_03]

The student is able to identify changes in requirements, standards, regulations, technical progress and the reality of the labor market, and on their basis determine the needs of acquiring knowledge [P6S_UU_01]

Social competences

1. The student is aware of a critical assessment and noticing the cause-effect relationships in the implementation of the set goals and the ordering of the importance of tasks [P6S_KK_01]

2. The student is aware of cooperation and work in a group on solving problems within logistics and supply chain management. [P6S_KR_02]

3. The student is aware of initiating activities related to the formulation and transfer of information and cooperation in society in the field of logistics [P6S_KO_02]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Completion of the lecture based on a written exam, assessed according to the following scale:

below 41% - 2.0, from 41% - 3.0, from 52% - 3.5, from 64% - 4.0, from 76% - 4.5, from 88% - 5.0

Completion of exercises based on tests and activity in the classroom. Rating according to the following scale:

below 50% - 2.0, from 58% - 3.0, from 66% - 3.5, from 75% - 4.0, from 83% - 4.5, from 91% - 5.0

Programme content

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

Simple models of systems behavior: market equilibrium, production model, competition for resources, arms race, urbanization, wear of machinery and technical systems. Identification, evolution and forecasting of systems behavior. Differential equations in system modeling. System analysis tools. Elements of decision analysis. Optimization of technical systems at the concept stage.

Classes: Solving problems in the field of system analysis, multi-criteria decision making, system reliability, system behavior forecasting, application of simple economic models in systems engineering issues.

Teaching methods

Lecture - informative and conversational lecture with the use of presentations and multimedia materials or in the form of a webinar

Exercises - an exercise method, solving problems and tasks using the methods presented. Remote implementation is also possible

Bibliography

Basic

1. Blanchard B.S., Fabrycky W.J., Systems Engineering and Analysis, Prentice Hall, New Jersey, 1990

2. Cempel C., Teoria i inżynieria systemów – zasady i zastosowania myślenia systemowego, Wydawnictwo Instytut Technologii Eksploatacji, Radom 2006.

3. Robertson J. i S., Pełna analiza systemowa WNT, Warszawa, 1999

Additional

1. NASA Systems Engineering Handbook (SP-2016-6105), Rev https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20170001761.pdf

2. System engineering handbook, INCOSE, Wiley, 2015

Breakdown of average student's workload

	Hours	ECTS
Total workload	63	3,0
Classes requiring direct contact with the teacher	28	1,0
Student's own work (literature studies, preparation for lecture, for classes, preparation for tests/exam) [1]	35	2,0

[1] delete or add other activities as appropriate