COURSE DESCRIPTION CARD - SYLLABUS

Course name
Systems engineering and system analysis

Course

Field of study
Logistics
Area of study (specialization)

Level of study
First-cycle studies
Form of study
full-time

Year/Semester
3/5
Profile of study
general academic
Course offered in
Polish
Requirements
compulsory

Number of hours

Lecture
15
Laboratory classes

Other (e.g. online)

Tutorials
30
Projects/seminars

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:
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Prerequisites

By joining this course, students should demonstrate knowledge of mathematics at the level of the basic academic course and elementary knowledge of economics. They should also have the ability to obtain information from the indicated sources and be ready to cooperate as part of the team.

Course objective

Present an engineering activity in a broader context of human activity and progress and encourage to creative thinking and conceptual design of products and services (systems).

Course-related learning outcomes

Knowledge

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

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

Skills

1. is able to see in engineering tasks system and non-technical aspects as well as socio-technical, organizational and economic [P6S_UW_04]

2. 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].

3 can identify changes in requirements, standards, regulations, technical progress and the reality of the labor market, and based on them determine the needs of supplementing knowledge in the field of marketing in the area of logistics and supply chain management [P6S_UU_01].

Social competences

1. 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. 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 system modeling, system structural models, functional analysis system, system decomposition.

Simple models of systems behavior: market equilibrium, production model, competition for resources, arms race, urbanization, wear of machinery and technical systems. Forecasting of systems behavior. Differential equations in system modeling. Artificial neural networks, a "black box" model of the system. System method. The rigors of the system method. System engineering.

Classes: Solving problems in modeling and systems analysis. Identification, evolution and forecasting of systems behavior. Computational methods, basic methods of system analysis - decision support methods, application of simple economic models in systems engineering issues, reliability analysis.

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. Robertson J. i S., Complete Systems Analysis: The Workbook, the Textbook, the Answers , Dorset House, 1998

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

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

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	45	2,0
Student's own work (literature studies, preparation for tutorials, preparation for tests/exam) [1]	30	1,0

[1] delete or add other activities as appropriate