



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Systems engineering

### Course

Field of study

Management and production engineering

Area of study (specialization)

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

1/1

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

### Number of credit points

1

### Lecturers

Responsible for the course/lecturer:

PhD Hubert Jopek

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Faculty of Mechanical Engineering

ul. Piotrowo 3, 60-965 Poznań

Responsible for the course/lecturer:

### 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. The student knows the basic issues of production management



2. The student knows the basic issues of the life cycle of socio-technical systems (logistics systems) and the life cycle of industrial products)

#### Skills

1. The student can see system and non-technical aspects in engineering tasks, as well as socio-technical, organizational and economic

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

3 is able to identify changes in requirements, standards, regulations, technical progress and the reality of the labor market, and on their basis determine the need for supplementing knowledge

#### Social competences

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

2. The student is aware of cooperation and group work on solving problems within logistics and supply chain management

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

#### 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

#### Programme content

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. 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

#### 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  | 25    | 1,0  |
| Classes requiring direct contact with the teacher   | 15    | 0,5  |
| Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam <sup>1</sup> | 10    | 0,5  |

<sup>1</sup> delete or add other activities as appropriate