COURSE DESCRIPTION CARD - SYLLABUS

Course name

Decision Making and Aiding in Logistics

Course

Field of study

Logistics

Area of study (specialization)

Logistics Systems

Level of study

Second-cycle studies

Form of study

full-time

Year/Semester

1/1

Profile of study

general academic

Course offered in

English

Requirements

elective

Number of hours

Lecture

30

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars

30

Number of credit points

5

Lecturers

Responsible for the course/lecturer:

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Faculty of Engineering Management

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Responsible for the course/lecturer:

Prerequisites

Student has a basic background in logistics, mathematical modeling and quantitative (operations research) methods. He/ she can carry out analytical tasks and manage projects as well as apply operations research methods in logistics. He/ she is able to perform a team work.

Course objective

To familiarize students with the basic concepts, paradigms and terms of decision making and aiding and show them how to apply the methodology of decision making and aiding in logistics. The course intends to present a spectrum of decision making and aiding tools and their application in solving complex logistics decision problems.

Course-related learning outcomes

Knowledge

1. Student knows dependencies in the given area and their relations with logistics [P7S_WG_01]

2. Student knows issues in the field of production engineering and its connections with the field of logistics [P7S_WG_02]

3. Student knows extended concepts for logistics and its specific issues and supply chain management [P7S_WG_05]

4. Student knows the detailed methods, tools and techniques characteristic of the studied subject in logistics [P7S_WK_01]

5. Students knows extended issues in the field of mathematics and optimization methods in studying the structure of economic and logistic phenomena and systems [P7S_WG_04]

Skills

1. Based on the literature review and analysis of other sources of information, student can collect and provide, in an orderly manner, information on the problem within the framework of logistics and its specific issues and supply chain management [P7S_UW_01]

2. Student can communicate using appropriately selected resources in a professional environment and in other environments within logistics and its specific issues as well as supply chain management [P7S_UW_02]

3. Student can make a critical analysis of technical solutions used in the analyzed logistics system (in particular with regard to technical devices, objects and processes) [P7S_UW_04]

4. Student can assess the suitability and the possibility of using new achievements (techniques and technologies) in the field of logistics and functionally related areas [P7S_UW_06]

5. Student can formulate and solve tasks through interdisciplinary integration of knowledge from different fields and disciplines used to design logistics systems [P7S_UO_01]

6. Student can identify changes in requirements, standards, regulations, technological development and behaviour of the labor market. Based on their recognition he/she is able to determine the needs to extend and enhance his/ her own and others' knowledge [P7S_UU_01]

Social competences

1. Student recognizes cause - effect relationships in achieving the defined goals and is able to grade the significance of alternative or competitive tasks [P7S_KK_01]

2. Student is responsible for his/ her own work and ready to comply with the rules of working in a team and taking responsibility for the tasks carried out jointly [P7S_KR_01]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

LECTURE:

- formative assessment: homeworks, discussions summarizing individual lectures, giving the student the opportunity to assess the understanding of the problem, active participation in lectures

- final grade/ assessment: 45 minute written exam in the subject, test composed of 20-25 questions (open and closed), passing threshold - 50%.

PROJECT:

- formative assessment: assessment of class activities, active participation in classes

- final assessment: grading the project in the field of decision making and aiding in logistics, evaluation of the student's skills in mathematical modeling of the decision problem and his/ her ability to perform computational experiments

Programme content

1. Introduction to the topic. The essence of Decision Making (DM) and Decision Aiding (DA) in logistics. Content of the lecture and characteristics of the projects.

2. Definition and basic characteristics of Decision Making (DM) and Decision Aiding (DA). Similarities and differences.

3. The scheme/ paradigm and stakeholders/ participants of DM and DA processes in logistics.

4. Major decision problems in logistics - their features and solution procedures. Classification of logistics decision problems. Selection of certain decision problems for project analysis.

5. Multiple criteria character of decision processes in logistics. Major standards of logistics customer's service (6 R concept) and their implications - multiple criteria evaluation of logistics solutions.

6. The Methodology of Multiple Criteria Decision Making/ Aiding (MCDM/A) - historical background, major methodological schools (French/ European vs. American).

7. Basic terms and concepts of MCDM/A (Multiple criteria decision problem - MCDP, consistent family of criteria, Pareto optimal solution, Maximal Point and Nadir Point, etc.), classification of MCDM/A methods.

8. Solving selected categories of decision problems in logistics. Ranking problems, sorting problems, choice (optimization) problems. Application of appropriate solution procedures. Phases of decision problems recognition and solving.

9. Characteristics of alternative approaches: multiple criteria matehmatical programming, multiple criteria ranking procedures, multiple criteria sorting methods.

10. Description and characteristics of selected MCDM/A methods - Electre, AHP/ANP, Promethee, UTA, VIG, LBS, Mackbeth.

11. Analysis and solving selected real life logistics decision problems, Case studies. Scheduling of logistics processes; selection of logistics service providers; location analysis in logistics; fleet composition problem; evaluation of warehouses/ distribution centers.

12. Practical application of decision problem identification, mathematical modeling - structuring and solving in the project. Computational experiments. Preference modeling. Generating final solutions. Application of the MCDM/A methodology.

Teaching methods

Lecture: conversatory lecture; interactive discussion.

Project: project method. Practical analysis of the decision problem. Computational experiments.

Bibliography

Basic

Żak J.: Multiple Criteria Decision Making/ Aiding in Engineering.Teaching Materials. Poznań University of Technology. EU Program - "Engineer of the Future", Poznań, 2014.

Żak J.: The Methodology of Multiple Criteria Decision Making/Aiding in Transportation. In: Żak J., Hadas Y., Rossi R.(Eds.): Advanced Concepts, Methodologies and Technologies for Transportation and Logistics. Springer, Heidelberg, 2018, pp. 9-38.

Żak J.: The Methodology of Multiple Criteria Decision Making/Aiding as a System-Oriented Analysis for Transportation and Logistics. In: Świątek J., Tomczak J.: Advances in Systems Science- Proceedings of the International Conference on Systems Science 2016. Springer, Heidelberg, 2017, pp. 265 - 284.

Additional

Figueira J., Greco S., Ehrgott M.: Multiple Criteria Decision Analysis. State of the Art Surveys. Springer, New York, 2005.

Koksalan M., Wallenius J., Zionts S.: Multiple Criteria Decision Making. From Early History to the 21st Century. World Scientific, New Jersey - London - Singapore, 2011.

Breakdown of average student's workload

	Hours	ECTS
Total workload	150	5,0
Classes requiring direct contact with the teacher	60	2,0
Student's own work (literature studies, preparation for tutorials - development of presentations, preparation for tests/exam, project preparation) [1]	90	3,0

[1] delete or add other activities as appropriate