



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Mathematical Decision Making

### Course

Field of study

Safety Engineering

Area of study (specialization)

Integrated Management of Safety in Organization

Level of study

Second-cycle studies

Form of study

part-time

Year/Semester

1/1

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

### Number of hours

Lecture

10

Laboratory classes

0

Other (e.g. online)

0

Tutorials

16

Projects/seminars

0

### Number of credit points

4

### Lecturers

Responsible for the course/lecturer:

dr Piotr Rejmenciak

Responsible for the course/lecturer:

e-mail: [piotr.rejmenciak@put.poznan.pl](mailto:piotr.rejmenciak@put.poznan.pl)

Poznan University of Technology

ul. Piotrowo 3, 60-965 Poznań

### Prerequisites

Students can determine the extremes of functions of one variable, compute the partial derivatives, operate on matrices.

### Course objective

To familiarize students with the scope and purpose of building mathematical models, creating and using simple mathematical decision models.

### Course-related learning outcomes

Knowledge

- knows the issues related to Mathematical Decision Making: linear programming, nonlinear programming, networks, transport issues, fuzzy sets, game theory.



- knows the issues of the possibility of using Mathematical Decision Making in the field of occupational safety and ergonomics,

#### Skills

- can choose the proper method in order to make the right decision,
- student can plan and conduct experiments, interpret obtained results and draw conclusions,
- can make decisions based on mathematical methods,
- can formulate and justify the opinion on the selected decision,

#### Social competences

- is aware of the need to recognize the cause-and-effect relationships that are relevant during the implementation of the set goals and rank the importance of alternative or competitive tasks.

#### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

- lectures: written final test on the last lecture, the student receives credit after obtaining at least 51% of points possible to obtain,
- tutorials: 2 tests, the student receives credit after obtaining at least 51% of points possible to obtain.

#### Programme content

Mathematic programming; network algorithms: determination of the shortest path in the graph, determination of the maximum flow in the transport, networks, transport problems, games, making decisions with many goals and in conditions of uncertainty, fuzzy set theory.

#### Teaching methods

- lectures: multimedia presentation supplemented by examples given on the board.
- tutorials: solving sample tasks on the board.

#### Bibliography

##### Basic

1. Jędrzejczyk Z., Kukuła K., Skrzypek J., Walkosz A. (2014), Badania operacyjne w przykładach i zadaniach, Wydawnictwo Naukowe PWN, Warszawa.
2. Lindgren B.W. (1977), Elementy teorii decyzji, WNT, Warszawa.
3. Łachwa A. (2001), Rozmyty świat zbiorów, liczb, relacji, faktów, reguł i decyzji, Wydawnictwo EXIT, Warszawa.
4. Zangwill W.I. (1974), Programowanie nieliniowe, WNT, Warszawa.

##### Additional

1. Simmonard L. (1969), Programowanie liniowe, PWN, Warszawa.



### Breakdown of average student's workload

	Hours	ECTS
Total workload	56	4,0
Classes requiring direct contact with the teacher	26	2,0
Student's own work (literature studies, preparation for tutorials, preparation for tests, preparation for presentations) <sup>1</sup>	30	2,0

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