STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Mathematical Decision Making**	Code **1011102211010346436**	
Field of study **Safety Engineering - Full-time studies - Second-**	Profile of study (general academic, practical) **(brak)**	Year /Semester **1 / 1**
Elective path/specialty **Work Safety Management**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**
Cycle of study: **Second-cycle studies**	Form of study (full-time,part-time) **full-time**	

No. of hours	No. of credits
Lecture: **15** Classes: **30** Laboratory: **-** Project/seminars: **-**	**4**

Status of the course in the study program (Basic, major, other) **(brak)**	(university-wide, from another field) **(brak)**

Education areas and fields of science and art **social sciences** **Economics**	ECTS distribution (number and %**)** **4 100%** **4 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Students have knowledge of mathematics, particularly calculus and algebra.
2	**Skills**	Students can determine the extremes of functions of one variable, compute the partial derivatives, operate on matrices. Students can check the basic properties of the relationship.
3	**Social competencies**	Students are eager to learn.

Assumptions and objectives of the course:

The aim of the course is to familiarize students with the different methods that help in making the best decisions.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Students know and understand methods to make optimal decisions. - [K2A-W01, K2A-W04]

2. Students know a mathematical model and the optimization criterion for the real issues. - [K2A-W01, K2A-W04]

Skills:

1. Students are able to formulate a mathematical model of linear and nonlinear programming problems. - [K2A-U1-5, K2A-U10, K2A-U12, K2A-U18]

2. Students can discuss the real issues of the optimal solution for any changes in the input data. - [K2A-U1-5, K2A-U10, K2A-U12, K2A-U18]

3. Students can analyze the decision problem in terms of expectations for the results obtained and the amount of work needed to receive. - [K2A-U1-5, K2A-U10, K2A-U12, K2A-U18]

Social competencies:

1. Students understand the need and knows the possibilities of lifelong learning. - [K2A-K1, K2A-K3]

2. Students see the opportunity to use the learned knowledge into practice. - [K2A-K1, K2A-K3]

Assessment methods of study outcomes

Formative assessment:
a) In regards to classes: on the basis of two written tests.
b) Regarding lectures: on the basis of oral or written assignments relating to the material covered during current or previous lectures.
Collective assessment:
a) In respect to classes:receive 51% of the total points is equivalent to completing the exercise, the assessment "change" every 10 percentage points.
b) Considering lectures: the average of formative marks.

Course description

?   Mathematic programming
?   Network algorithms: determination of the shortest path in the graph, determination of the maximum flow in the transport network
?   Transport Problems
?   Games
?   Rough set theory;
?   Relations: orders
?   Fuzzy set theory

Basic bibliography:

1. Grabowski W., Programowanie matematyczne, PWE Warszawa 1980.

2. Zangwill W.I., Programowanie nieliniowe, WNT, Warszawa 1974.

3. Łachwa A., Rozmyty świat zbiorów, liczb, relacji, faktów, reguł i decyzji, Wydawnictwo EXIT, Warszawa 2001.

4. Roy B., Wielokryterialne wspomaganie decyzji, WNT, Warszawa, 1990.

Additional bibliography:

1. Simonnard L., Programowanie Liniowe, PWN, Warszawa 1967.

2. Kukuła K. (red.), Badania operacyjne w przykładach i zadaniach, PWN, W-wa 2004.

3. Lindgren B.W., Elementy teorii decyzji, WNT, Warszawa 1977.

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures	15
2. Participation in exercises	30
3. Consultation	5
4. Preparing for training	15
5. Preparing for colloquia	20

Student's workload

Source of workload	hours	ECTS
Total workload	85	4
Contact hours	50	2
Practical activities	50	2