



COURSE DESCRIPTION CARD - SYLLABUS

Course name

DECISION MAKING/AIDING IN ENGINEERING AND MANAGEMENT. THE STATE OF THE ART

Course

Proposed by Discipline

Management and quality studies

Type of studies

Doctoral School

Form of study

full-time

Year/Semester

II/4

Course offered in

English

Requirements

elective

Number of hours

Lecture

4

Tutorials

Projects/seminars

Number of credit points

1

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

Prerequisites

Knowledge: basic mathematics. Understanding of mathematical models. Understanding the role and power of decision making.

Skills: analytical skills. Logical reasoning.

Social competencies: communication skills. Team work.

Course objective

Introduce students to the basic concepts of MCDM/A. Provide methodological background to rational decision making.



Course-related learning outcomes

Knowledge

A PhD student who graduated from doctoral school knows and understands:

- 1) the extent that enables revision of existing paradigms - global achievements, covering theoretical basis as well as general and selected specific issues, that are characteristic to scientific disciplines studied at the doctoral school, [P8S_WG/SzD_W01]
- 2) key developmental trends of science disciplines in which education takes place at the doctoral school, [P8S_WG/SzD_W02]
- 3) scientific research methodology in disciplines represented at the doctoral school. [P8S_WG/SzD_W03]

Skills

A PhD student who graduated from doctoral school can:

- 1) use the knowledge from different branches of science to creatively identify, formulate and to innovatively solve complex problems or to execute research tasks in particular:
 - define the aim and subject of scientific research, formulate a research hypothesis,
 - develop research methods, techniques and tools and use them creatively,
 - draw conclusions on the basis of research results, [P8S_UW/SzD_U01]
- 2) critically analyze and assess scientific research results, work of experts and other creative activities together with their contribution into knowledge development, [P8S_UW/SzD_U02]
- 3) transfer the results of scientific activity to the economic and social sphere, [P8S_UW/SzD_U03]
- 4) communicate on specialist issues on the level that allows active participation in international scientific community, [P8S_UK/SzD_U04]
- 5) initiate debates. [P8S_UK/SzD_U06]

Social competences

A PhD student who graduated from doctoral school is ready to:

- 1) critically assess the achievements within a given scientific discipline, [P8S_KK/SzD_K01]
- 2) critically evaluate their own contribution to the development of a given scientific discipline, [P8S_KK/SzD_K02]
- 3) acknowledge the importance of knowledge in solving cognitive and practical problems. [P8S_KK/SzD_K03]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

PQF code	Methods for verification of learning outcomes	Assessment criteria
W01, W02, W03	Case studies - active participation in discussion and problem solving exercises	Quality of the feedback provided; assessment of the students' work in the classroom
U01, U02, U03, U04,	Project - problem analysis and development of an innovative solution	Project assessment - final score



U06		
K01, K02, K03	Readings - class discussion. Team work	Assessment of the quality of class discussion

Programme content

1. Definition and Basic Concepts of Decision Making / Aiding (Differences between decision making and aiding, Paradigms of decision making and aiding).
2. Introduction to Multiple Criteria Decision Making/ Aiding (MCDM/A) (Basic terms and concepts - definition and interpretation, MCDM/A based Decision Aiding Process. Major actors and their roles, Classification of MCDM/A methods, MCDM/A- based solution procedure. Solving selected multi-objective decision problems).
3. Application of MCDM/A in Engineering and Management. Solving selected decision problems (Fleet Selection Problem, Crew Recruitment Problem – analysis, formulation and solution procedure).

Teaching methods

Lecture: Multimedia presentation including illustrations and examples.

Bibliography

Basic

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

Additional

1. Figueira, S. Greco and M. Ehrgott: Multiple Criteria Decision Analysis. State of the Art Surveys. Springer, New York, 2005.
2. Żak J.: The Methodology of Multiple Criteria Decision Making/Aiding in Transportation. W: Żak J., Hadas Y., Rossi R.: Advanced Concepts, Methodologies and Technologies for Transportation and Logistics. Springer, Berlin 2018, ss. 9-38.

Breakdown of average student's workload

	Hours	ECTS
Total workload	10	1.0
Classes requiring direct contact with the teacher	6	0.5
Student's own work (literature studies, preparation for tutorials, project preparation) ¹	4	0.5

¹ delete or add other activities as appropriate