

**Module/Course Syllabus**  
**Program: COMPUTER SCIENCE**  
 Full-time master degree program

<b>Course:</b>	<b>Multi-criteria conclusion methods</b>
<b>Type of the course:</b>	directional
<b>Course code:</b>	I2S1.0C
<b>Year:</b>	I
<b>Semester:</b>	1
<b>Form of the degree program:</b>	full-time
<b>Form of classes and number of hours per semester:</b>	15
Lecture	15
Classes	0
Laboratory	0
Project	0
<b>Number of ECTS credits:</b>	1
<b>Form of assessment:</b>	course completion assessment: pass
<b>Course language:</b>	English

<b>Course objective (CO)</b>	
<b>CO1</b>	Acquisition of knowledge about the idea of multi-criteria decisions.
<b>CO2</b>	Learning about selected methods of multi-criteria decision support.
<b>CO3</b>	Acquisition of knowledge in the selection of methods for decision-making problems.

<b>Prerequisites in terms of knowledge, skills and other competencies</b>	
<b>1</b>	Introduction to mathematics.
<b>2</b>	Discrete mathematics.
<b>3</b>	Structured programming.

<b>Learning outcomes (LO)</b>	
	In terms of knowledge:
<b>LO 1</b>	The student has structured knowledge in the field of decision-making methods in the multi-criteria space.
<b>LO 2</b>	The student has knowledge about the influence of the values of method variables on the generated results.
<b>LO 3</b>	The student has extensive knowledge in the selection of methods for making multi-criteria decisions.
	In terms of skills:
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	In terms of social competence:
<b>LO 4</b>	The student understands non-technical aspects of decision-making using multi-criteria reasoning methods.

<b>Course content</b>	
<b>Form of classes – lectures (L)</b>	
	Course content
<b>L1</b>	Introduction to single and multi-criteria optimization in designing and making decisions.

<b>L2</b>	Basic concepts in multi-criteria optimization: criteria, decision variables, parameters, inequality and equality constraints. characteristic points in a criterion space. Pareto Front.
<b>L3</b>	Selected methods of normalization, coding and scalarization in multi-criteria analyses.
<b>L4</b>	Selected multi-criteria evaluation methods using methods with outranking relationship analysis (ELECTRE family methods and others).
<b>L5</b>	Searching for a social compromise using the group analysis method. Multi-criteria reasoning using lexicographic methods and hierarchical. Analytic Hierarchy Process (AHP) method.
<b>L6</b>	Construction and operation of the "Integrated multi-criteria evaluation system", component methods, algorithms, examples of application.
<b>L7</b>	Construction of other methods: constrained criteria, global criterion, distance function, TOPSIS, utility function.

<b>Didactic methods</b>	
<b>1</b>	Conversational lecture.
<b>2</b>	Case studies.

<b>Assessment methods and criteria</b>		
<b>Assessment method symbol</b>	<b>Assessment method description</b>	<b>Passing threshold</b>
<b>A1</b>	Lecture credit: written - test with closed, multiple-choice and open-ended questions.	<b>51%</b>

<b>Required textbooks and other course materials</b>	
<b>1</b>	A.C. Coello, G.B. Lamont, D.A. Van Veldhuizen, Evolutionary Algorithms for Solving Multi-Objective Problems, Springer, 2007.
<b>2</b>	E. Triantaphyllou, Multi-Criteria Decision Making Methods: A Comparative Study, College of Engineering, Louisiana State University, Baton Rouge, Louisiana, U.S.A.
<b>3</b>	Multi-objective Optimization - Springer, <a href="https://www.google.pl/search?q=multicriterial+optimisation&amp;ie=utf-8&amp;oe=utf-8&amp;gws_rd=cr&amp;ei=V-zaVY6FKoW6swH36aOoBg">https://www.google.pl/search?q=multicriterial+optimisation&amp;ie=utf-8&amp;oe=utf-8&amp;gws_rd=cr&amp;ei=V-zaVY6FKoW6swH36aOoBg</a> .
<b>Recommended textbooks and other course materials</b>	
<b>1</b>	T. Satty, (1980) The Analytical Hierarchy Process. McGraw Hill, New York.
<b>2</b>	M. Velasquez, P. T. Hester, An Analysis of Multi-Criteria Decision Making Methods, International Journal of Operations Research Vol. 10, No. 2, 56-66 (2013)
<b>3</b>	J. Razmak, B. Aouni, Decision Support System and Multi-Criteria Decision Aid: A State of the Art and Perspectives, J. Multi-Crit. Decis. Anal. 22, 101-117 (2015)

<b>Student workload</b>	
<b>Form of activity</b>	<b>Average number of hours to complete the activity</b>
<b>Contact hours with the lecturer, including:</b>	<b>15</b>
<i>participation in lectures</i>	15
<b>Student's own work, including:</b>	<b>10</b>
<i>preparation for the exam</i>	10
<b>Total student workload</b>	<b>25</b>
<b>Total number of ECTS credits</b>	<b>1</b>

Learning outcomes matrix					
Learning outcome	Reference to learning outcomes defined for the master's program	Course objectives	Course content	Didactic methods	Assessment methods
LO 1	I2A_L06 +++	CO1	L1-L3	1, 2	A1
LO 2	I2A_L10 +++	CO2, CO3	L4-L7	1, 2	A1
LO 3	I2A_L08 ++	CO3	L4-L7	1, 2	A1
LO 4	I2A_L09 ++	CO2	L1-L7	1, 2	A1

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