

**Subject card**

<b>Subject name and code</b>	Modeling and Optimization of Economic Processes, PG_00200039						
<b>Field of study</b>	Economics						
<b>Date of commencement of studies</b>	October 2026	<b>Academic year of realisation of subject</b>			2027/2028		
<b>Education level</b>	Master's studies	<b>Subject group</b>			Obligatory subject group in the field of study Optional subject group Subject group related to scientific research in the field of study		
<b>Mode of study</b>	part-time studies	<b>Mode of delivery</b>			at the university		
<b>Year of study</b>	2	<b>Language of instruction</b>			Polish		
<b>Semester of study</b>	3	<b>ECTS credits</b>			3.0		
<b>Learning profile</b>	academic	<b>Assessment form</b>			credit		
<b>Conducting unit</b>	Department of Logistics -> Faculty of Economics -> Rector						
<b>Name and surname of lecturer (lecturers)</b>	<b>Subject supervisor</b>		dr hab. Cezary Mańkowski				
	<b>Teachers</b>						
<b>Lesson types</b>	<b>Lesson type</b>	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	<b>Number of study hours</b>	0.0	18.0	0.0	12.0	0.0	30
	E-learning hours included: 0.0						
<b>Learning activity and number of study hours</b>	<b>Learning activity</b>	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	<b>Number of study hours</b>	30		0.0		45.0	75
<b>Subject objectives</b>	Realisation of learning outcomes in terms of knowledge, skills and social competences relating to the modelling and optimisation of economic processes						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[EKONMU2_K03] inspires and organises preparation of economic and social projects, following the idea of sustainable development, reconciling legal, economic, ecological, political and social requirements	The student inspires and organises the preparation of economic and social projects in terms of modelling and optimisation of economic processes.	[SK1] oral statement/conversation/discussion [SK2] presentation/project/paper/report [SK4] test/exam - oral or written [SK8] observation of student's independent or team work
	[EKONMU2_U13] can manage teamwork as well as interact and work in a team (including in an international environment) assuming a leading role in it	The student is able to lead a team and to interact and work in a team (including in an international environment), taking a leading role in it.	[SU1] oral statement/conversation/discussion [SU2] presentation/project/paper/report [SU4] test/exam - oral or written [SU8] observation of student's independent or team work
	[EKONMU2_U04] can forecast and model complex economic and social processes using quantitative and qualitative methods and tools developed by economic sciences (including statistics and econometrics)	The student is able to model and optimise complex economic processes using advanced methods and tools developed by the economic sciences. If necessary, the student consults them with the teacher.	[SU1] oral statement/conversation/discussion [SU2] presentation/project/paper/report [SU4] test/exam - oral or written [SU8] observation of student's independent or team work
[EKONMU2_W08] has an in-depth knowledge of processes occurring in enterprises and economic organisations and with related areas, as well as of processes of change in public institutions; knows methods of research on the regularities governing these changes, taking into account the influence of external stakeholders on them	The student has in-depth knowledge of processes taking place in enterprises and economic organisations and at the interface with related areas, as well as of processes of change in public institutions, and knows methods and tools for modelling and optimising economic processes, taking into account the influence of external stakeholders on them.	[SW4] test/exam - oral or written [SW1] oral statement/conversation/discussion [SW2] presentation/project/paper/report	
Subject contents	<p>1 Modelling of economic processes as a research method Realism, evidentialism, processualism, relationalism, systemism, as ontological foundations of modelling. The modelling system. Modelling process.</p> <p>2. Architectures and methods of economic process modelling. Architectures of economic processes (IDEF, ARIS, CIM OSA, Zachman's framework). Modelling methods (UML, BPMN, EPC, BPEL, WSDL). 3.</p> <p>3. Business process as an object of modelling and optimisation. Structure of the economic process. The extended structure of the economic process. Events, activities, resources, relationships. Attributes of the economic process and its components.</p> <p>4 Economic process modelling tools. Sankey diagram. Aris Easy Design. Aris Express. Aris Architect&amp;Designer. Model of the designed economic process. Model of the currently implemented business process. Model of the improved business process. 6.</p> <p>5. Optimisation theory Optimisation versus sub-optimisation. Decision process in economics. Decision-making models. Examples of models.</p> <p>6. Components of a decision model. Stages in the construction of a decision model. Example of construction of an optimization model.</p> <p>7. Theory of linear programming. Features of linear programming models. The essence and algorithm of application of the SOLVER tool. Linear programming as an implementation of the rationality principle.</p> <p>8 Examples of linear programming models Optimal selection of the production assortment. Linear programming in integers. Other possible constraints in linear programming. Zaga</p>		
Prerequisites and co-requisites	Acquired learning outcomes in knowledge and skills from the subjects: Instrumentarium of Economic Research and Managerial Economics.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	active participation in classes (possibility of earning extra points)	0.0%	0.0%
	project	51.0%	30.0%
	written test	51.0%	70.0%

Recommended reading	Basic literature	<p>1) R. Gabryelczyk: Aris w modelowaniu procesów biznesu. Diffin. Warszawa 2006</p> <p>2) C. Mańkowski: Modelowanie procesów logistycznych. Wyd. Uniwersytetu Gdańskiego, Gdańsk 2020</p> <p>3) C. Mańkowski: Ontological foundations for business logistic process modeling. "Railway Transport and Logistics" 2007, no. 2, p. 30-38. Artykuł jest dostępny <a href="#">Tutaj</a></p> <p>4) L. Reszka: Decyzje menadżerskie w logistyce. Wyd. Uniwersytetu Gdańskiego, Gdańsk 2019</p> <p>5) J. W. Wiśniewski: Instrumenty decyzyjne przedsiębiorcy. Instytut Wydawniczy, GRAVIS, Toruń 2002.</p> <p>6) Badania operacyjne w przykładach i zadaniach. Red. K. Kukuła, Wydawnictwo Naukowe PWN, Warszawa 2014</p> <p>7) Portale: <a href="http://www.ariscommunity.com">www.ariscommunity.com</a>; <a href="http://www.idef.com">www.idef.com</a>; <a href="http://www.zachman.com">www.zachman.com</a></p>
	Supplementary literature	<p>1) C. Mańkowski: Synergia w logistyce. Wyd. Uniw. Gdańskiego, Gdańsk 2009, ISBN 978-83-7326-674-2</p> <p>2) L. Reszka: Koniunkcja logistyki i optymalizacji [W:] Acta Universitatis Nicolai Copernici. Nauki Humanistyczno-Społeczne, Zeszyt 407. Zarządzanie XXXIX Wydawnictwo Uniwersytetu Mikołaja Kopernika. Toruń 2012, ISSN 1689-8966, ISSN 0860-1232, s. 109-118</p> <p>3) L. Reszka: Modelowanie procesu optymalizacyjnego w logistyce przedsiębiorstwa [W:] M. Chaberek, L. Reszka (red.): Modelowanie procesów i systemów logistycznych, cz. XII. Zeszyty Naukowe Uniwersytetu Gdańskiego. Ekonomika Transportu i Logistyka, nr 46 Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2013, ISSN 0208-4821, s. 101-111</p> <p>4) L. Reszka: Optymalizacja harmonogramu wymiany sprzętu jako zadanie logistyczne [W:] M. Chaberek, L. Reszka (red.): Modelowanie procesów i systemów logistycznych, cz. XI. Zeszyty Naukowe Uniwersytetu Gdańskiego. Ekonomika Transportu i Logistyka, nr 42 Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2012, ISSN 0208-4821, s. 189-196</p> <p>5) L. Reszka: Solver jako narzędzie rozwiązywania logistycznych problemów optymalizacyjnych [W:] Roczniki Naukowe Wyższej Szkoły Bankowej w Toruniu, nr 10 (10) 2011, Wyższa Szkoła Bankowa w Toruniu, Toruń 2011, ISSN 1643-8175, s. 321-336</p> <p>6) L. Reszka: Optymalizacja hurtowej sieci dystrybucyjnej jako zadanie logistyczne. [W:] D. Rucinska (red.): Studia nad transportem i logistyka. Zeszyty Naukowe Uniwersytetu Gdańskiego. Ekonomika Transportu Lądowego, nr 25, Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2003, ISSN 0208-4821, s. 219-225</p>
	eResources addresses	
Example issues/ example questions/ tasks being completed	-	
Work placement	Not applicable	

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