University of Gdańsk

Subject card

Subject name and code	Modeling and Optimization of Economic Processes, PG_00200039		
Field of study	Economics		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2027/2028
Education level	Master's studies	Subject group	Obligatory subject group in the field of study Optional subject group Subject group related to scientific research in the field of study
Mode of study	part-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	3	ECTS credits	3.0
Learning profile	academic	Assessment form	credit
Conducting unit	Department of Logistics -> Faculty of Economics -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Cezary Mańkowski, prof. UG	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	0.0	18.0	0.0	12.0	0.0	30

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	30	0.0	45.0	75

Subject objectives	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_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 the processes taking place in enterprises and economic organizations, knows the methods and tools for modeling and optimizing economic processes, preparing a model/project of a selected logistics process	[SW4] test/exam - oral or written [SW1] oral statement/ conversation/discussion [SW2] presentation/project/paper/ report
[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 [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 preparing a model/project of a selected logistics process.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

Subject contents

1 Modelling of economic processes as a research method
Realism, evidentialism, processualism, relationalism, systemism, as ontological foundations of of modelling. The modelling system. Modelling process.

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.

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.

4 Economic process modelling tools.
Sankey diagram. Aris Easy Design. Aris Express. Aris Architect&Designer.
Model of the designed economic process. Model of the currently implemented business process.
Model of the improved business process. 6.

5.Optimisation theory
Optimisation versus sub-optimisation. Decision process in economics. Decision-making models. Examples of models.
6. Components of a decision model. Stages in the construction of a decision model. Example of construction of an optimization model.

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.

8 Examples of linear programming models
Optimal selection of the production assortment. Linear programming in integers. Other possible constraints in linear programming. Zaga

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
project	51.0%	30.0%
written test	51.0%	70.0%
active participation in classes (possibility of earning extra points)	0.0%	0.0%

Recommended reading	Basic literature	1) R. Gabryelczyk: Aris w modelowaniu procesów biznesu. Difin. Warszawa 2006 2) C. Mańkowski: Modelowanie procesów logistycznych. Wyd. Uniwersytetu Gdańskiego, Gdańsk 2020 3) C. Mańkowski: Ontological foundations for business logistic process modeling. "Railway Transport and Logistics" 2007, no. 2, p. 30-38. Artykuł jest dostępny Tutaj 4) L. Reszka: Decyzje menadżerskie w logistyce. Wyd. Uniwersytetu Gdańskiego, Gdańsk 2019 5) J. W. Wiśniewski: Instrumenty decyzyjne przedsiębiorcy. Instytut Wydawniczy, GRAVIS, Toruń 2002. 6) Badania operacyjne w przykładach i zadaniach. Red. K. Kukuła, Wydawnictwo Naukowe PWN, Warszawa 2014 7) Portale: www.ariscommunity.com; www.idef.com; www.zachman.com
	Supplementary literature	1) C. Mańkowski: Synergia w logistyce. Wyd. Uniw. Gdańskiego, Gdańsk 2009, ISBN 978-83-7326-674-2 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 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 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 5) L. Reszka: Solver jako narzędzie rozwiazywania 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 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
	eResources addresses	
Example issues/ example questions/ tasks being completed	-	
Work placement	Not applicable	

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