



Subject card

Subject name and code	FORECASTING AND SIMULATIONS, PG_00071074						
Field of study	Economic Analytics						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2027/2028		
Education level	second-cycle studies		Subject group		Specialty subject group Subject group related to scientific research in the field of study		
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	2		Language of instruction		English		
Semester of study	3		ECTS credits		5.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Department of Statistics and Econometrics -> Faculty of Management and Economics -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Aneta Sobiechowska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	45.0	0.0	0.0	75
	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	75		3.0		47.0	125
Subject objectives	preparing students for independent forecasting and simulation of complex socio-economic phenomena based on knowledge of analytical and econometric methods.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_W03] demonstrates in-depth knowledge of the applications of analytical methods and techniques for formulating and solving socio-economic problems.		knows and understands advanced econometric analysis methods in the context of studying and forecasting complex socio-economic phenomena.		[SW1] Assessment of factual knowledge		
	[K7_K01] is ready to critically evaluate his/her knowledge in economic analytics and seek expert opinions when facing difficulties in solving a problem independently.		is ready to assess the reliability of forecasts and simulation results, recognising model limitations and uncertainty		[SK5] Assessment of ability to solve problems that arise in practice		
	[K7_U04] is able to prepare and convincingly present the results of specialized analyses, providing in-depth interpretation during debates and meetings with various audiences.		is able to select appropriate methods and techniques for calculating forecasts of complex socio-economic phenomena and present the results in the form of a professional presentation with in-depth interpretation.		[SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task		

Subject contents	Course content – lecture 1. Introduction to the subject of forecasting and simulation - basic concepts 2. Assessment of the quality of forecasting models and forecasts 3. Adaptive forecasting methods review 4. Forecasting based on linear and non-linear trends, with seasonal fluctuations and without fluctuations 5. Other forecasting methods based on time series 6. Assumptions for forecasting based on econometric models 7. Forecasting based on cause-and-effect econometric models - conditional forecasts 8. The use of autoregressive models in forecasting 9. Forecasting in conditions of autocorrelation of the random component 10. Forecasting in conditions of instability of structural parameters 11. Forecasting based on multi-equation models 12. Qualitative data models in forecasting 13. Application of neural networks for forecasting		
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Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Assessment of the case study and the presentation.	60.0%	50.0%
	Written exam with a section of closed-ended questions.	60.0%	25.0%
	Written exam with a section of open-ended questions.	60.0%	25.0%
Recommended reading	Basic literature	1. Anderson, David R., Dennis J. Sweeney, and Thomas A. Williams. An introduction to management science: quantitative approaches to decision making. Cengage learning, 2019. 2. Montgomery, Douglas C., Cheryl L. Jennings, and Murat Kulahci. Introduction to time series analysis and forecasting. John Wiley & Sons, 2015	
	Supplementary literature	1. Box, George E. P., Gwilym M. Jenkins, Gregory C. Reinsel, and Greta M. Ljung. Time Series Analysis: Forecasting and Control. 5th ed., John Wiley & Sons, 2015. 2. Athanasopoulos, George, and Rob J. Hyndman. Forecasting: Principles and Practice. 2nd ed., OTexts, Melbourne, 2018.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	Based on monthly observations of cash in the vaults of monetary financial institutions of MFIs for the period from January 2017 to July 2020 (National Bank of Poland https://www.nbp.pl/home.aspx?f=/statystyka/statystyka.html), determine all possible expired forecasts and the expired forecast of phenomena for August 2020 using the following methods: naive method, simple moving average method with k smoothing constants of 3.4 and 5, respectively, weighted moving average method with k=3 smoothing constant and simple method of Brown's exponential smoothing with the smoothing constant =0.7 and the real time prediction h=1. Calculate the errors for the August 2020 forecast and the root mean square error of the expired forecasts. Find another forecasting model for this time series and compare it with previous models. Make an assessment.		
Practical activities within the subject	Not applicable		

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