



## Subject card

Subject name and code	Time Series Analysis, PG_00049886						
Field of study	Economic Analytics						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2021/2022		
Education level	second-cycle studies	Subject group			Obligatory subject group in the field of study 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	1	Language of instruction			Polish		
Semester of study	2	ECTS credits			3.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Katedra Statystyki i Ekonometrii -> Faculty of Management and Economics						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Michał Pietrzak				
	Teachers		dr hab. Michał Pietrzak				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	0.0	0.0	60
	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	60		4.0		11.0	75
Subject objectives	<p>The first aim of teaching the subject is to provide students with knowledge about the properties of stochastic processes and potential models for this type of processes. The second goal of teaching the subject is for students to develop the skills of correct modeling and forecasting of this type of data in the form of time series.</p> <p>Within the framework of two main goals, a number of detailed goals will be implemented in the form of presenting the definition and properties of stochastic processes models (AR, MA, ARMA, ARIMA) and the presentation of methods for forecasting time series.</p>						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_W10] has an in-depth knowledge of quantitative methods to describe and analyse socio-economic processes using information technology		The student is able to construct an analytical model to describe the selected time series		[SW3] Assessment of knowledge contained in written work and projects		
	[K7_U08] has the ability to implement analytical methods to independently propose solutions to economic problems and verify their effectiveness		The student is able to apply the R and Statistica statistical packages to correctly estimate the selected time series model. The student is able to use the estimated model for the forecast and assess the accuracy of the forecast.		[SU4] Assessment of ability to use methods and tools		

Subject contents	<ul style="list-style-type: none"> <li>• The classical time series analysis (seasonality, trend, cyclical fluctuations)</li> <li>• The models of exponential smoothing</li> <li>• Holt's and Winter's models</li> <li>• Stochastic processes and time series.</li> <li>• Characteristics of stochastic processes.</li> <li>• Autocorrelation functions. and spectrum functions</li> <li>• Checking stationarity of time series</li> <li>• The autoregression processes (AR).</li> <li>• The moving average processes (MA).</li> <li>• Mixed processes (ARMA).</li> <li>• Non-stationary mixed autoregression-moving average (ARIMA) processes</li> <li>• The Identification and estimation of stochastic process models.</li> <li>• Testing and forecasting time series.</li> </ul>											
Prerequisites and co-requisites	Probability theory, mathematical statistics, econometrics											
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="448 535 794 573">Subject passing criteria</th> <th data-bbox="794 535 1141 573">Passing threshold</th> <th data-bbox="1141 535 1487 573">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 573 794 607">colloquium of the laboratory</td> <td data-bbox="794 573 1141 607">60.0%</td> <td data-bbox="1141 573 1487 607">50.0%</td> </tr> <tr> <td data-bbox="448 607 794 640">colloquium of the lecture</td> <td data-bbox="794 607 1141 640">60.0%</td> <td data-bbox="1141 607 1487 640">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	colloquium of the laboratory	60.0%	50.0%	colloquium of the lecture	60.0%	50.0%
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Recommended reading	Basic literature	<p>T. Kufel, Ekonometria. Rozwiązywanie problemów z wykorzystaniem programu GRET, PWN, 2022</p> <p>M. Bernardelli, A. Decewicz, E. Tomczyk , Ekonometria i badania operacyjne, PWN, 2021</p> <p>B. Borkowski, H. Dudek, W. Szczęsny Ekonometria Wybrane zagadnienia, PWN, 2017</p>										
	Supplementary literature	<p>M. Osińska, Ekonometria współczesna, TNOiK, 2007</p> <p>Kot S.M., Sokołowski A., Jakubowski J. Statystyka, Difin, Warszawa, 2007</p> <p>Box G.E.P. i Jenkins G.M. Analiza szeregów czasowych PWN, Warszawa, 1983</p>										
	eResources addresses											
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> <li>1. What is the stochastic process and time series?</li> <li>2. What is the time series stationarity?</li> <li>3. When is the AR (1) autoregression process stationary?</li> <li>4. What are the consequences of the parameter należności receivable for the ranges (0; 1) and (-1; 0)</li> <li>5. How do you define the AR (3) function?</li> <li>6. How do we define the moving average function MA (2)?</li> <li>7. Provide a stationary condition for the ARMA process (p; q)</li> <li>8. In what situations do we use the generalized ARIMA model for time series modeling?</li> </ol>											
Work placement	Not applicable											