Faculty of Economics and Business Administration

COURSE (MODULE) DESCRIPTION

Course title	Code
Time Series Analysis	

Staff	Department
Coordinator(s): Assoc. Prof. Dr. Algirdas Bartkus **Other(s):**	Department of Quantitative Methods and Modelling, Faculty of Economics and Business Administration

Study cycle	Course type
First (Bachelor's)	Elective

Form of implementation	Period of implementation	Language of instruction
Lectures and seminars	Spring semester	English

Requirements for student			
Prerequisites: Mathematical Methods, Statistical Theory, Economic Principles II, Economic Theory II		**Additional requirements (if any):** none	
Number of ECTS credits	**Student's workload**	**Contact hours**	**Individual work**
5	133	48	85

Purpose of the course and competences developed		
Principal goals are: a) to form the analytical skills in time series econometrics and b) to acquire necessary programming knowledge and skills in **R** language. The main skills, that are trained under this program: empirical modelling and forecasting of macroeconomic processes; application of time series techniques for macroeconomic analysis; programming in **R**.		
Learning outcomes (learning outcomes of the programme)	**Teaching methods**	**Assessment methods**
The ability to read and understand time series literature. (1.2) The ability to design and to conduct appropriate econometric analysis of time series data. (2.2) The ability to write R code for any discussed time series model. (3.4) The ability to work in teams delivering an empirical project (4.1)	Detailed and careful, step-by-step explanation of the material during the lectures and seminars, self-study of theoretical material and accomplishment of empirical project under the supervision of lecturer.	Open questions during the exams and empirical project.

Course themes	**Contact / Individual work: time and assignments**								
	Lectures	Tutorials	Seminars	Practical classes	Laboratory works	Practice	**Total contact hours**	**Independent work**	**Assignments**
Univariate stationary processes (autoregressive (AR) processes; moving average (MA) processes; mixed (ARMA) processes; estimation of AR, MA and ARMA models; forecasting; modifications of ARMA models)	8		4				**12**	**20**	Reading of scientific literature, solving of problems at home and during the seminars and accom-
Vector autoregression (the reduced form standard	8		4				**12**	**20**	

VAR and structural A and AB type VAR models; VMA(∞) representation of VAR process and stability condition; choosing of lag length and inclusion of additional variables into VAR; Granger causality and direct Granger procedure; identification of structural A and AB type VAR; impulse-response analysis; forecast error variance decomposition; Blanchard-Quah type structural VAR model, forecasting)									plishment of empirical project.
Nonstationary processes (random walk; random walk with a drift; random walk with a noise; stochastic and deterministic trends; removing the stochastic trend and differencing; trend stationary processes; trends and univariate decompositions; Granger and Newbold on spurious regression; unit roots and Dickey-Fuller tests; Elliott, Rothenberg and Stock, Phillips-Perron, Schmidt and Phillips, Kwiatkowski-Phillips-Schmidt-Shin unit root tests)	8		4				**12**	**20**	
Cointegration (cointegration and common trends; vector error correction model; stability of VAR and cointegration; Engle-Granger methodology; Johansens procedure; ADL approach)	8		4				**12**	**25**	
Total	**32**		**16**				**48**	**85**	

Assessment strategy	Share in %	Time of assessment	Assessment criteria
Intermediate test	30	In the middle of semester	Students will be asked to solve several empirical and theoretical problems. Evaluation will take into account accuracy and completeness of the answers.
Empirical group project	20	In the end of semester	Technical aspects of the analysis are of the main importance. The particular details will be disputed during lectures and practical classes.
Final exam	50	During the exams session	Students will be asked to solve several empirical and theoretical problems. Evaluation will take into account accuracy and completeness of the answers.

Author	Published in	Title	Issue No. or Volume	Publishing house or Internet site
Compulsory literature				
Enders, Walter	2014	Applied Econometric Times Series	4th ed.	John Wiley & Sons, Inc.
Lütkepohl, Helmut Krätzig, Markus (eds.)	2004	Applied Time Series Econometrics		Cambridge University Press
Kirchgässner, Gebhard Wolters, Jürgen	2008	Introduction to Modern Time Series Analysis		Springer-Verlag
Supplementary literature				
Juselius, Katerina	2006	The Cointegrated VAR Model: Methodology and Applications		Oxford University Press
Banerjee, Anindya Dolado, Juan J. Galbraith, John W. Hendry, David	1993	Co-Integration, Error Correction, and the Econometric Analysis of Non-Stationary Data		Oxford University Press
Maddala, G. S. Kim, In-Moo	1998	Unit Roots, Cointegration and Structural Change		Cambridge University Press
Cryer, Jonathan D. Chan, Kung-Sik	2008	Time Series Analysis: With Applications in R	2nd ed.	Springer-Verlag
Pfaff, Bernhard	2010	Analysis of Integrated and Cointegrated Time Series with R	2nd ed.	Springer-Verlag
Hamilton, James D.	1994	Time Series Analysis		Princeton University Press