Type and level of studies: PhD	
Title of the study program: Statistics	
Subject title: Time Series Analysis 1-D	
Subject code: DAVS	
Number of ECTS: 9	
Subject status (Compulsory / Elective): Elective	
Teacher/s (Name, last name): Zorica, Mladenović	

Number of active teaching lessons:				Other lessons 0
Lectures: 3	**Practice classes**: 0	**Other forms of teaching**: 0	**Study research work**: 3	

Prerequisite: None

Subject objective:
This course considers time series methods that are used in macroeconometric modeling and modeling of financial time series. Special focus is given to unit root methods, since unit roots are often found in economic time series. To derive reliable economic conclusions based on applied methods, it is necessary to learn how to take care of specific features of economic time series.

Subject outcome (gained knowledge):
Students have adopted theoretical principles of time series modeling. Students have gained knowledge of deriving main theoretical results. Students are trained to adequately describe time-series dynamics of unit root economic data.

Subject content/structure:
Unit roots in univariate linear time series. Functional central limit theorem. Asymptotic properties of estimators in models with unit root time series. Unit root tests. Structural breaks and unit root tests. Fractional integration. Univariate non-linear time series models. Threshold autoregressive models. Smooth transition autoregressive models. Non-linearity testing. Univariate and multivariate volatility models: basic specifications and modifications. Volatility forecasting. Multivariate linear unit root time series models. Cointegrated vector autoregressive model: testing and determination of number of cointegrating vectors. Structural vector autoregressive model: estimation of structural relations. Impulse response function and variance error decomposition.

Teaching methods: Key theoretical results are covered during lectures. Within study reseach work practical problems are solved and empirical modeling is performed.

Grading (maximum number of points 100)			
Pre-examination obligations	**Points**	**Final exam**	*Points*
Activities during lectures	20	**Written exam**	60
Practice lessons		**Oral exam**	
Colloquium/a	20	....	
Semester papers			

Literature:

No.	Author	Title	Publisher	Year
1.	Hamilton, J.D.	Time Series Analysis	Princeton University Press	1994.
2.	Johansen, S.	Likelihood-based Inference in Cointegrated VAR Models	Oxford University Press	1995.
3.	Lutkepohl, H. and Kratzig, M.	Applied Time Series Analysis	Cambridge University Press	2004.
4.	Mills, T.C. and Markellos, R.N.	The Econometric Modelling of Financial Time Series	Cambridge University Press, 3rd ed.	2008.
5.	Tsay, R.S.	Analysis of Financial Time Series	Wiley, 3rd ed.	2010.