Course ID 009284

Time Series Analysis *MATH 38032*

Credit rating 10
ECTS credits 5

Unit coordinator: Georgi Boshnakov

Semester 2

School of Mathematics
Undergraduate ***Level 3***

FHEQ level ' Last part of a Bachelors'

Marketing course unit overview
This course unit covers a variety of concepts and models useful for empirical analysis of time series data.

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Aims
To introduce the basic concepts of the analysis of time series, with emphasis on financial and economic data.

Learning outcomes
On successful completion of this course unit students will
- have understanding of the basic time series concepts;
- be able to build models to time series data and critically assess them using a variety of methods for exploration of time series data, identification and model selection.
- Future topics requiring this course unit

None

Syllabus
- Introduction and examples of economic and financial time series, asset returns. Basic models: white noise, random walk, AR(1), MA(1). [2]
- Stationary time series. Autocovariance and autocorrelation functions. Linear Prediction. Yule-Walker equations. Estimation of autocorrelation and partial autocorrelation functions. [3]
- Models for stationary time series - autoregressive (AR) models, moving average (MA) models, autoregressive moving average (ARMA) models. Seasonal ARMA models. Properties, estimation and model building. Diagnostic checking. [6]

- Non-stationary time series. Non-stationarity in variance - logarithmic and power transformations. Non-stationarity in mean. Determinisitic trends. Integrated time series. ARIMA and seasonal ARIMA models. Modelling seasonality and trend with ARIMA models. [4]
- Filtering, exponential smoothing, seasonal adjustments. [2]
- Non-linear models - threshold AR, bilinear models. Cointegration. [2]
- Multivariate time series. Stationarity, autocorrelation and crosscorrelation. Multivariate autoregressive model. Markov property. Representation of univariate autoregressive models in Markov form. [3]

Assessment methods

End of semester examination: two hours weighting 100%

Feedback methods

Tutorials will provide an opportunity for students' work to be discussed and provide feedback on their understanding.

Requisites

MATH20701	Probability 2	Pre-Requisite	Compulsory
MATH20802	Statistical Methods	Pre-Requisite	Compulsory

Students are not permitted to take more than one of MATH38032 or MATH48082 for credit in the same or different undergraduate year. Students are not permitted to take MATH48082 and MATH68082 for credit in an undergraduate programme and then a postgraduate programme.

Available as free choice? N

Recommended reading

- Cryer, Jonathan D and Chan, Kung-Sik. Time Series Analysis with Applications in R. Second edition. Springer, 2008.
- Mills, Terence C. The Econometric Modelling of Financial Time Series. Second edition. Cambridge University Press, 1999.
- Shumway, Robert H and Stoffer, David S. Time Series Analysis and Its Application: With R Examples. Second edition. Springer, 2006.
- Cowpertwait, Paul SP and Metcalfe, Andrew V. Introductory Time Series with R. Springer, 2009.

Scheduled activity hours

Lectures	22
Tutorials	11

Independent study hours 67 hours