

ISEG - School of Economics & Management

Time Series

Masters in Actuarial Science

2nd Semester 2014/15

Instructor:

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Office Hours: by appointment

Program: the Time Series course is organized in nine chapters:

- **Chapter 1:** Introduction to time series. Fundamental concepts.
- **Chapter 2:** Stationary time series models: ARMA models
- **Chapter 3:** Box Jenkins methodology: model identification, estimation and diagnostic checking
- **Chapter 4:** Nonstationary time series models: ARIMA models and unit root testing
- **Chapter 5:** Forecasting using ARIMA models
- **Chapter 6:** Seasonality and SARIMA models
- **Chapter 7:** Volatility time series models: GARCH models
- **Chapter 8:** Forecasting with exponential smoothing methods
- **Chapter 9:** Introduction to Vector Time Series Models (if time permits)

Assessment: The final grade is based on the final written exam.

Class rearrangements: There will be no lectures on 16, 18, 23 and 25 March. These lectures will be replaced on 8, 15, 22 and 29 April always at 8:00 am.

Main objectives of the course: on completion of this course, the student should be able to:

- Recognize and understand completely the main econometric models used in the analysis of macroeconomic and financial time series.
- Understand the theoretical reasoning which led to the development of the most important univariate and multivariate models.
- Be familiar with the use of econometric software to carry out time series analysis.
- Develop critical thinking about empirical work with time series data.
- Be able to develop an adequate and complete forecasting study of different sets of financial/macroeconomic variables and formulate statistical hypotheses of interest. Understand the limitations of the econometric methodology applied in the study.
- Understand, at least intuitively, time series models at the frontier research of time series analysis.

Main bibliography:

- Enders, W. (2009). Applied Econometric Time Series, Wiley.
- Tsay, R. S. (2005). Analysis of Financial Time Series, Wiley.
- Mills, T. C. (1991). Time series techniques for economists. Cambridge University Press.
- Wei, W. W. S. (2005). Time series analysis: univariate and multivariate methods, Pearson.
- Costa, A. A. (1998). Notes on pragmatic forecasting procedures and exponential smoothing, CEMAPRE working paper.

Complementary bibliography:

If at some point you need **simpler and more intuitive** reading, the following chapters may be a good start (**DOES NOT REPLACE MAIN BIBLIOGRAPHY!**):

- Wooldridge, J.M. (2011). Introductory Econometrics: A Modern Approach, chapters 10, 11, 12 e 18, Cengage Learning.
- Verbeek, M. (2012). A guide to Modern Econometrics, chapters 4, 8 e 9, Wiley.

If you would like to **KNOW MORE beyond** the material covered in this course, I recommend the reading (some/all!) of the following books:

- Banerjee, A., J.J. Dolado, J.W. Galbraith, e D.F. Hendry (1993). Co-integration, Error Correction and the Econometric Analysis of Non-Stationary Data. Oxford: Oxford University Press.
- Box, G. E. P., G. M. Jenkins, e G. C. Reinsel (2008). Time Series Analysis: Forecasting and Control, Wiley Series in Probability and Statistics.
- Brockwell, P. J., e R. A. Davis (1989). Time Series: Theory and Methods, Springer.

- Commandeur, J. J. F. e Koopman, S. J. (2007). An Introduction to State Space Time Series Analysis, Oxford University Press.
- Favero, C.A. (2001). Applied Macroeconometrics, Oxford University Press.
- Franses, P. H., e D. van Dijk (2003). Non-linear time series models in empirical finance, Cambridge University Press.
- Hamilton, J. (1994). Time Series Analysis, Princeton University Press.
- Harvey, A. C. (1991). Forecasting, structural time series models and the Kalman filter, Cambridge University Press.
- Juselius, K. (2006). The Cointegrated VAR Model: Theory and Applications, Oxford University Press.
- Johansen, S. (1995). Likelihood-Based Inference in Cointegrated Vector Autoregressive Models, Oxford University Press.
- Lütkepohl, H. (2005). New Introduction to Multiple Time Series Analysis, Springer.
- Maddala, G.S. and I.-M. Kim (1999). Unit Roots, Cointegration, and Structural Change, Cambridge University Press.