

MSE Unipi: Time Series Econometrics (247PP) Syllabus 2019-2020

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Office hours:

Friday: 10:30-11:30

Lecture times and locations

Thursday: 15:45-17:15 (F2)

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Course Description

Time Series Econometrics is aimed at students who wish to gain a working knowledge of the modern methods used in macroeconomics and to some extent in finance.

By the end of the course, students will have gained a good understanding of time series econometrics ranging from classic tools such as linear stationary processes (ARMA, VAR) to techniques that have recently entered the macroeconomist toolbox (Bayesian and high dimensional estimation).

Prerequisite

Students need to be familiar with econometric theory at the level of Advanced Econometrics (246PP).

Textbook and Readings

The main reference for this courses is:

- Brockwell, Peter J. and Richard A. Davis, Introduction to Time Series and Forecasting, Springer, 2002

However, especially for some of the topics, other references are going to be useful:

- Enders, Walter. Applied econometric time series. John Wiley & Sons, 2008
- Hamilton, James D. , Time Series Analysis, Princeton University Press, 2005

Software and Programming

The emphasis of the course is on methods and the analysis of data sets. The best way to understand time series concepts is to write computer programs implementing algorithms and estimation techniques discussed in class. Beside the didactic value, in practice modern time series methods require solid computational skills. The language used in this course is [Julia](#).

Exams

The final grade depends on an in class final, several homework assignments, and class participation. Homework assignments are compulsory for successfully completing the course, and they will be valid for one academic year. The final grade is calculated as a weighted average according to the following weighting scheme:

Homework	50%
Class Participation	15%
Comprehensive final	35%
Total	100%

Attendance

It is expected that all students attend the lectures, be up to date with their readings and be prepared to participate fully in class. If you have problems mastering the material covered in class, please ask questions in class or during office hours.

Cheating and other forms of dishonesty

I have no tolerance for cheating. I regard academic dishonesty as a very serious offense. Students caught cheating during exams will fail the class and will be reported to the appropriate officer of the college.

Course Outline

1. From Cross-Section to Time Series: asymptotic theory under serial correlation
2. Stationary Process
 - (a) Linear processes

- (b) The Wold representation theorem
 - (c) ARMA processes: estimation, and forecasting
 - (d) ARIMA models for non-stationary time series
3. Multivariate Time Series
- (a) Vector Auto-Regressions (VAR)
 - (b) Structural VARs: identification
 - (c) Impulse responses
 - (d) Applications: Fiscal multiplier; Monetary Policy multiplier.
4. The Bayesian paradigm
- (a) Likelihood, prior, and posterior
 - (b) Bayesian computations
 - (c) Applications: Bayesian VAR
5. State-Space Models
- (a) Linear State-Space models
 - (b) The Kalman filter
6. Factor models and High Dimensional Econometrics
- (a) Principal components
 - (b) Dynamic factor models
 - (c) Machine Learning methods for time series
 - (d) Application: forecasting with large datasets