

# Applied Econometrics

September 2024

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## Course Outline

### Module aims

This course investigates the main econometric methods as a tool for the quantitative analysis of economic and financial phenomena. The application of econometric models allows measuring variables that are not directly observable, studying their relationships and behaviour, testing and comparing alternative theories, as well as forecasting and simulating the effects of different policies. This course heavily emphasizes the importance of applications. A discussion of the main theoretical issues and a systematic analysis of econometric tools are intended as prerequisites for the investigation of a series of problems that are of particular relevance for economic and financial applications. For this reason, the theoretical lectures will be complemented by a systematic series of financial and economic applications in the electronic classroom, based on the use of both the R programming language and Python, through which the student will be in the position to autonomously develop econometric analysis, and perform empirical studies on financial and economic topics. At the end of the course, students will:

- learn methods for estimating causal effects using observational data
- learn to evaluate the regression analysis of others this means students will be able to read/understand empirical economics papers in other courses
- be able to be conversant with modern econometric theory and practice
- be able to prepare and independent empirical analysis using modern econometric techniques

### Course details and announcements:

The class meets on:

- Tuesday 8:30 - 11:30 (room G.142)
- Wednesday 08:30 - 11:30 (room G.252)

## Syllabus plan

I plan to cover most of chapters 1, 2, 3, 4, 5, 6, 7, 8 and 9 of Foundations of Econometrics.

- Models in Science.
- Regression Models. A chapter containing a brief review of regressions, along with a few reminders of things from statistics and probability theory that will be needed later

Working example: How to simulate an econometric model

- The Geometry of Linear Regression. In this chapter, statistical issues are set aside in order to discuss ordinary least squares as a purely formal procedure.

Working example: Estimating and Testing the Capital Asset Pricing Model

- The Statistical Properties of Ordinary Least Squares.

Working example: Explaining house prices

- Hypothesis Testing in Linear Regression Models. This chapter is devoted to inference. We develop tests for linear regressions.

Working example: The determinants of the stock return

- Confidence Intervals. Confidence intervals provide another way to conduct statistical inference. At a rather deep level, there is an equivalence between hypothesis tests and confidence intervals.

- Instrumental Variable Estimation. In econometric parlance, almost all economic variables are endogenous. Their endogeneity means that they cannot be used as explanatory variables in regression models estimated by least squares, and this is not something that asymptotic theory can get around. A new estimation method is needed, and we are led to the study of instrumental variables.

Working example: The Fulton Fish Market

- Generalized Least Squares and Related Topics. We continue the process of relaxing the restrictive classical assumptions by considering models in which the disturbances may have a more complicated specification, in particular by being heteroskedastic, or serially correlated, or both. In this chapter, we introduce some ideas related to time series that arise naturally from the study of serial correlation.

Working example: Food expenditure and income

## Reading

- Foundations of Econometrics, R. Davidson and J. MacKinnon, Oxford University Press, 2023

## Method of Evaluation

The day of the exam students must bring their own laptop with them (60 minutes battery autonomy). The laptop must be able to connect to the University Wi-Fi

The final exam is based on an online Blackboard test composed by three sections:

- A: Six True or False questions
- B: Six Multiple choice questions
- C: Six questions on a proposed empirical analysis, this section is focused on the empirical application of the econometric methods

Section A) counts 20%, section B) counts 20%, and section C) counts 60% respectively of the final grade.

## Web Page

The course webpage is on <http://monticini.eu/teaching/apecon/>

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