

International Economics

Academic year 2024-2025

Econometrics I

EI035 - Autumn - 6 ECTS

Tuesday 10h15 - 12h00

Course Description

This is the first of the two compulsory econometrics courses for first year master students. It starts with discussing the basics of probability theory and statistical inference (point estimation, hypothesis testing, uncertainty quantification). It then proceeds to the Ordinary Least Squares (OLS) estimation of the linear regression model, whereby it introduces asymptotic analysis. Finally, the course discusses Maximum Likelihood (ML) estimation, as applied to the linear regression model as well as to other models, like models of binary and censored outcomes, sample selection models, duration models, etc. This includes a discussion of numerical optimization methods and asymptotic properties of ML obtained via extremum estimation theory. Assessment is based on two exams and bi-weekly problem sets. By analyzing foundational models and concepts in-depth and emphasizing the practical (numerical) implementation of inference procedures, the course allows students to easily apply their knowledge to non-standard settings, tailored to their application of interest.

> PROFESSOR

[Marko Mlikota](#)

[Office hours](#)

> ASSISTANT

Francesco Casalena

[Office hours](#)

IMPORTANT

Regular attendance is compulsory, and any absence must be promptly communicated to the teacher. In the event of missing more than two sessions, students are expected to provide well-documented justifications for unforeseeable circumstances (e.g. illness, accident, death of a relative), directly to the Direction of Studies. Failure to justify absences beyond two sessions will result in the assignment of code N.

Students are also reminded of the following legal rules:

The teacher owns the **copyright** on the material they created for this course. As such, any reproduction or distribution of this document, in whole or in part, as well as of any other material created by the teacher for the course, is prohibited unless permission is granted by the author.

Recording (as video or audio) a course without the consent of the teacher and other participants is strictly forbidden.

Syllabus

Pre-requisites

Knowledge of statistics, probability and matrix algebra is required. Students must have taken and passed the *Maths Bootcamp* for incoming MIE students. It is assumed that students have taken at least one undergraduate-level course in econometrics and one in probability and statistics.

Textbooks

The course will not follow one specific textbook. Lecture notes will be provided as well as suggested further reading (textbooks, papers).

Grading

The final grade will be based on three equally weighted components: i) a mid-term exam, ii) a final exam, iii) (bi-weekly) problem sets.

Tutorials

The lectures will mainly focus on econometric theory and discuss the applicability of methods, with occasional illustrations. Weekly review sessions will cover the solution of (theoretical and applied) problem set exercises and illustrate concepts discussed in class.

Problem set solutions are based on the software R, but students are welcome to use any software of their choice. While Stata may be a good choice for applying off-the-shelf methods, it is of limited use for methods specifically tailored to one's application as well as for simulation studies. More flexible software like R, Matlab, Python or Julia is more appropriate for most of the exercises in this course. Basics of R are discussed in the *Maths Bootcamp* for incoming MIE students. Also, a document with useful R-commands is available at <https://markomlikota.github.io/teaching/>, and the level of R required to solve the exercises will rise only slowly in the first weeks.