GENEVA GRADUATE INSTITUTE

INSTITUT DE HAUTES ÉTUDES INTERNATIONALES ET DU DÉVELOPPEMENT

GRADUATE INSTITUTE OF INTERNATIONAL AND DEVELOPMENT STUDIES

International Economics

Academic year 2026-2027

Topics in Econometrics

EI137 - Autumn - 6 ECTS

Wednesday 10h15 - 12h00

Course Description

This course discusses further topics in econometrics, building on the foundational concepts introduced in two compulsory econometrics courses for master students. First, it introduces Bayesian inference and applies it to cross-sectional linear regressions (Ridge- and Lasso-estimation), to panel data models (correlated random effects) and to univariate time series models. Thereby, it also discusses model selection and numerical sampling methods. Second, the course treats multivariate and nonlinear time series models (incl. vector autoregressions, dynamic factor models and models with time-varying parameters). Third, the course introduces Machine Learning methods and nonparametric estimation. This encompasses Kernel Smoothing Methods, Regression Trees and Random Forests, Neural Networks and Classification Analysis. Assessment is based on three problem sets and an individual project, where students apply a method from the course (or from Econometrics I or II) to their application of interest.

PROFESSOR

Marko Mlikota

Office hours

ASSISTANT

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.

A note on using **generative AI**:

Students are encouraged to use AI in a responsible manner. They must comply with the Institute's Rules and Good Practices for Ethical Use of Artificial Intelligence in Academic Work.

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. Also, they must have taken the Master-level courses “Econometrics I” (EI035) and “Econometrics II” (EI062).

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 problem sets (each weighed 10% for the final grade) and on an individual project (weighed 70%). In case fewer problem sets are given (e.g. two), they will still each count for 10% of the grade, while the individual project counts for the remaining fraction.

Other

The lectures will discuss the theory behind the methods, with the goal to provide a thorough understanding for work in applied economics rather than in econometric theory. In problem sets, students apply some of the methods studied in class, whereby the focus is on numerical implementation. In the individual project, students apply a method of their choice (among the ones learned in the course or in Econometrics I or II) to a setting of their choice, whereby the idea is to obtain a draft of the methodological-empirical part of a project (e.g. Master thesis).

Since this course is open to PhD students, who are absent in some weeks due to courses at the Study Center Gerzensee, no lectures will be held during these Gerzensee-weeks (see https://www.szgerzensee.ch/programs/beginning-doctoral-program for the dates). We will compensate for this by having more than the usual two 45min-slots in the remaining weeks (we might have 8 weeks à 3x45min (roughly), or we might have 1 week à 2x45min and 6 weeks à 4x45min).

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, Julia, Matlab or Python is more appropriate for most of the exercises in this course. Tutorials on R and Julia are available at https://markomlikota.github.io/software/.