Exchange programme Vrije Universiteit Amsterdam

Vrije Universiteit Amsterdam - Exchange programme Vrije Universiteit Amsterdam - 2024-2025

Exchange

Vrije Universiteit Amsterdam offers many English-taught courses in a variety of subjects, ranging from arts & culture and social sciences, neurosciences and computer science, to economics and business administration.

The International Office is responsible for course approval and course registration for exchange students. For details about course registration, requirements, credits, semesters and so on, please [visit the exchange programmes webpages](#).

Computational Methods in Econometrics

Course Code	E_MFAE_CME
Credits	6
Period	P1
Course Level	300
Language Of Tuition	English
Faculty	School of Business and Economics
Course Coordinator	dr. M. Friedrich
Examiner	dr. M. Friedrich
Teaching Staff	dr. M. Friedrich, mr. M.H.C. Nientker
Teaching method(s)	Computer lab, Study Group, Lecture

Course Objective

In statistics and econometrics, we often base our test statistics and confidence intervals on quantities with unknown distributions. The typical solution to deal with this is to either derive the finite sample distribution through hard analytical work, or derive its limiting distribution and use it as an approximation. In this course, we will study how to perform tests using alternative ways based on computer simulation. The main examples of these methods are Monte-Carlo testing and bootstrap, which can lead to much more accurate inferences than the traditional methods in certain situations.

The main goal of this course is twofold: (1) to understand the theory behind Monte-Carlo and bootstrap methods and (2) to be able to apply them in practice using your computer.

Course Content

In this course, we discuss numerical and simulation-based estimation methods and their use in econometrics and data science. We start with a small recap of statistics (in particular, estimators, test statistics and their distributions). In the second part, we discuss the assumptions made for these results and introduce a new simulation-based hypothesis testing method called Monte Carlo testing. In the third part, we move to a more complex setting where less assumptions are made, and we discuss the foundations of bootstrap testing. We illustrate how these methods are used in practice for a variety of econometric models including nonlinear models, models allowing for heteroskedasticity and autocorrelation.

Additional Information Teaching Methods

Lectures (4 hours per week) to introduce the new methods and concepts; Work groups (2 hours per week) to work on exercises and, later in the course, to work on homework assignments.

Method of Assessment

- Written exam
- Assignments

Literature

The course uses lecture notes that are available on Canvas.

The following books can serve as additional material to help you study (optional):

- Russell Davidson & James G. MacKinnon - Bootstrap Methods in Econometrics.
- Joel L. Horowitz - The Bootstrap.
- A.C. Davison & D.V. Hinkley - Bootstrap Methods and their Applications.

Additional Information Target Audience

This course is part of the **technical track** of the minor Applied Econometrics. To follow this course you should be following a bachelor in econometrics or a study with equivalent statistics background.

Recommended background knowledge

- Introductory courses in Econometrics and Statistics;
- Basic programming skills: some familiarity with one of [Python, MATLAB, R]