

Interdisciplinary Programs

Academic year 2025-2026

Advanced Quantitative Methods

MINT009 - Spring - 6 ECTS

Course Description

Building on the compulsory course "Statistical Literacy", this course introduces the fundamentals of econometrics. It discusses OLS regressions and the basics of panel data techniques, which are commonly used by social scientists to answer real world questions. The emphasis lies on understanding the assumptions behind these methods, on developing the skills to read and understand quantitative academic papers, and on analyzing interesting datasets using statistical software.

> 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

The course is an introduction to the collection of statistical tools and techniques that social scientists refer to as “econometrics”. Statisticians in different fields, such as economics, biology, and political science, developed the techniques. An economist wrote the main reference we will be using, but the techniques are similar across disciplines, and they can, therefore, be applied in a wider range of social sciences. I will cover the theory and some of their applications in class, while the weekly review sessions will focus on the problems encountered in the lectures, on assignments, and on computer skills.

Prerequisites

The level of this course is higher than “*Statistical Literacy*”, so only students who had a 5 or more on their individual exam (or had a waiver) should consider taking this course.

You will need the basics of linear algebra. If you would like to prepare before the class starts, consult the reference provided in the book list below. This is optional, not necessary.

We will be using Stata as the statistical software package. You will have to develop a level of comfort in using Stata in order to complete your assignments satisfactorily.

Reading

The main textbook: Wooldridge, J. (2018), *Introductory Econometrics: A Modern Approach*, 7th edition.

Background statistical material: Agresti, A. and B. Finlay *Statistical Methods for the Social Sciences* (2009), 4th edition.

Grading

The grade will be based on three problem sets (1/3), an exam (1/3) and a term paper (1/3).

- Problem set 1, deadline around mid-March (end of week 4)
- Problem set 2, deadline around early April (end of week 7)
- Problem set 3, deadline around early May (end of week 11)
- Exam, around end-May (second-last week)
- Term paper, deadline around early June (end of first week after semester)

Problem Sets: You should form groups of four people and submit only one final copy of a particular problem set for the entire group. You should e-mail the TA about the composition of your group by the end of the second week of classes. Answers to the problem sets and the computer programs should be e-mailed to the TA before the deadline; late problem sets will not be accepted.

Homework: The homework will be posted at the start of each new topic, so you can do the exercises while studying. We will post the answers at the end of each topic. You do not have to submit the answers, but I strongly advise you to do the exercises, as these will help you to keep up with the material and to prepare for the exams and problem sets.

Term Paper: I will provide more details shortly before the Easter break (including whether it is individual or per two).

Outline

The dates are tentative and listed only for planning purposes. The slides and readings will be available on Moodle one week before each lecture.

TOPIC I: CONDUCTING AN EMPIRICAL ANALYSIS

After providing an overview of the course, the first lecture introduces causality and the notion of *ceteris paribus*. We then discuss in detail the different steps to conduct an empirical analysis, from defining the research question, to collecting the data and analyzing it.

LECTURES 1-2

- Required readings:
 - o Wooldridge, chapter 1.
- Optional readings:
 - o Beegle, K., J. De Weerd, J. Friedman and J. Gibson (2012). Methods of household consumption measurement through surveys: Experimental results from Tanzania. *Journal of development Economics*, 98(1), 3-18.
 - o Das, J., J. Hammer and C. Sánchez-Paramo (2012). The impact of recall periods on reported morbidity and health seeking behavior. *Journal of Development Economics*, 98(1), 76-88.
 - o Gibson, J. (2002). Why does the Engel method work? Food demand, economies of size and household survey methods. *Oxford Bulletin of Economics and Statistics*, 64(4), 341-359.
 - o Gonzalez-Ocantos, E., C. K. De Jonge, C. Meléndez, J. Osorio and D.W. Nickerson (2012). Vote buying and social desirability bias: Experimental evidence from Nicaragua. *American Journal of Political Science*, 56(1): 202-217.
 - o Tversky, A. and D. Kahneman (1981). The Framing of Decisions and the Psychology of Choice. *Science*, 211(4481): 453-458.
- Assignments:
 - o Homework – Topic 1 (optional, but strongly recommended)

TOPIC II: SIMPLE REGRESSION ANALYSIS

We discuss simple regression analysis in detail. This topic is crucial, as it provides the basis for the remainder of the course: It introduces the main concepts and theory behind regression analysis. For the ease of studying, I follow the textbook closely. Try to read as much as possible of the required readings before the lecture.

LECTURES 3-4

- Required readings:
 - o Wooldridge, chapter 2, section 2.1 until 2.6.
- Optional readings:
 - o Agresti and Finlay, chapters 4-8.
- Assignments:
 - o Homework – Topic 2 (optional, but strongly recommended)
 - p Problem Set 1 (compulsory)

TOPIC III: MULTIPLE REGRESSION ANALYSIS

We extend the basic concepts of simple regression analysis to allow for multiple regression analysis. We then move on to testing hypotheses about population parameters, which is the most important tool within regression analysis. Finally, we have a quick discussion about asymptotics and some further issues, such as data scaling, the functional form and the selection of regressors.

LECTURES 4-7

- Required readings:
 - o Wooldridge, chapter 3, section 3.1 until 3.5.
 - o Wooldridge, chapter 4, section 4.1 until 4.4, and 4.5a.
 - o Wooldridge, chapter 6, section 6.1, 6.2b/c, 6.3
- Optional readings:
 - o Wooldridge, chapter 5 (more elaborated than what we cover).
- Assignments:
 - o Homework – Topic 3 (optional, but strongly recommended)
 - o Problem set 2 (compulsory)

TOPIC IV: QUALITATIVE INFORMATION, HETEROSKEDASTICITY AND DATA ISSUES

LECTURES 8-9

- Required readings:
 - o Wooldridge, chapter 7, section 7.1 until 7.5 (apart from 7.2a).
- Optional readings:
 - o Wooldridge, chapter 9, section 9.6 (LAD).
- Assignment:
 - o Homework – Topic 4 (optional, but strongly recommended)

TOPIC V: PANEL DATA METHODS

LECTURES 10-11

- Required readings:
 - o Wooldridge, chapter 13, section 13.1, 13.2 (not 13.2a, 13.2b), 13.3, 13.4.
 - o Wooldridge, chapter 14, section 14.1.
- Optional readings:
 - o Wooldridge, chapter 13, section 13.2a, 13.2b, 13.5.
 - o Wooldridge, chapter 14, section 14.2.
- Assignment:
 - o Homework – Topic 5 (optional, but strongly recommended)
 - o Problem set 3 (compulsory)

TOPIC VI: AN INTRODUCTION TO IMPACT EVALUATION

LECTURE 12

- Optional readings:
 - Gertler, P., S. Martinez, P. Premand, L. Rawlings, and C. Vermeersch (2016). *Impact Evaluation in Practice*, second edition. Washington, DC: Inter- American Development Bank and World Bank.

LECTURE 13: FINAL EXAM