# Faculty of Economics

## R300 Advanced Econometric Methods

### Aims and Objectives

This module serves as an introduction to fundamental econometric techniques at the graduate level. The goal is to prepare students for working on their Ph.D. Upon completion of the module students should be able to (i) interpret and understand econometric research of others and (ii) confidently use econometrics to analyse their own data.

### Prerequisites

Students are expected to be familiar with elementary concepts of probability and statistics at the level of
Casella, G.C. and R.L. Berger, *Statistical Inference*, Cengage Learning, 2008.
The course also makes use of matrix algebra, calculus (integration and differentiation), and optimization.

### Topics

This module consists of 27 hours of lectures, supplemented with 14 hours of classes. The chief aim of the classes is to go over the problem sets.

This module covers the following topics:
1. Estimation in parametric models
   1.1. Problem statement and efficiency bound
   1.2. Asymptotics
   1.3. Maximum likelihood
   1.4. Extended example: The classical linear regression model
2. Testing in parametric models
   2.1. Likelihood ratio test
   2.2. Size and power
   2.3. Other test procedures: Score test, Chi-square test and Wald test
   2.4. Extended example: The classical linear regression model
3. Estimation and testing in semiparametric models
   3.1. Moment conditions
   3.2. (Generalized) method of moments
   3.3. Optimal weighting and semiparametric efficiency
   3.4. Extended example: Instrumental variable estimation
   3.5. Optimality with conditional moment conditions
4. Introducing (weak) dependence
5. Nonparametric regression
   5.1. Kernel estimator
   5.2. Local polynomial estimator
   5.3. Illustration to problems in program evaluation

The short course *Stata for dissertations* is available for students and, although optional, is highly recommended.

**Assessment**

The examination for this module consists of a three-hour written exam.

**Readings**

Lecture slides and notes will be made available through Moodle.
No single textbook is followed. The topics dealt with are discussed in the following textbooks:

a. Arellano, M., *Panel Data Econometrics*, Oxford University Press
b. Davidson, R. and J.G. MacKinnon, *Estimation and Inference in Econometrics*
c. Hayashi, F., *Econometrics*, Princeton University Press
d. Wooldridge, J., Econometric Analysis of Cross Section and Panel Data, MIT Press