

# 30C00200 Econometrics (6 cr)

## SYLLABUS

1<sup>st</sup> December 2021

Instructor's contact information	Course information
Name: Professor Timo Kuosmanen E-mail: <a href="mailto:timo.kuosmanen@aalto.fi">timo.kuosmanen@aalto.fi</a> Office hours: by appointment  Teaching assistants: Sheng Dai ( <a href="mailto:sheng.dai@aalto.fi">sheng.dai@aalto.fi</a> ), Iaroslav Kriuchkov ( <a href="mailto:iaroslav.kriuchkov@aalto.fi">iaroslav.kriuchkov@aalto.fi</a> ), Zhiqiang Liao ( <a href="mailto:zhiqiang.liao@aalto.fi">zhiqiang.liao@aalto.fi</a> ).	<b>Status of the course:</b> can be included as elective studies in various B.Sc. and M.Sc. programmes and in the minor in Quantitative Methods. Please check the current status at <a href="https://into.aalto.fi/">https://into.aalto.fi/</a> <b>Level of the Course:</b> Intermediate / Advanced <b>Academic Year and Period:</b> 2021-2022, III period <b>Location:</b> Online / hybrid <b>Language of Instruction:</b> English <b>Course web page:</b> <a href="https://mycourses.aalto.fi/course/view.php?id=31594">https://mycourses.aalto.fi/course/view.php?id=31594</a>

### 1. OVERVIEW

Econometrics is a branch of economics that aims to give empirical content to economic theory by applying statistical methods to real world data. This course focuses on the application of linear regression to economic data, its assumptions, and statistical significance tests of parameters and linear restrictions. We also extend the basic linear regression for modeling endogeneity, heteroskedasticity and autocorrelation. Time series and panel data models are considered towards the end of the course. All topics are examined by means of economic examples with actual empirical data.

### 2. PREREQUISITES

Participants should have mastered at least an introductory level statistics course (e.g., 30A02000 Tilastotieteen perusteet) and be familiar with fitting a regression line to data as well as the use of Excel.

### 3. LEARNING OUTCOMES

The main objective of the course is to obtain a basic understanding of the econometric methodology. The aim is to motivate the students to examine causal relationships between economic phenomena by using a linear regression model. The course focuses on least squares estimation of the model and related statistical inferences. The assumptions of least squares estimation will be critically investigated. We examine the violations of these assumptions and the possible ways to alleviate the assumptions. The emphasis of the course is in the empirical application of the least squares method and its extensions. The

economic interpretation of the estimated parameters of regression model and their statistical significance is given a special focus. After the course, students should have the skills to conduct basic empirical econometric analysis.

#### **4, LECTURES**

Due to the ongoing Covid-19 pandemic, the lectures are organized as video lectures, which are available through the course website

<https://mycourses.aalto.fi/course/view.php?id=31594>.

The video lessons will be added to the course website as they are recorded so that students can view them in their own pace. All video lessons are readily available on the course website.

To facilitate interaction, students are encouraged to submit a question to the professor as a part of the weekly assignments. Valid questions will contribute to the grade through the assignments. The answers to the most interesting questions (anonymized) will be posted to the course website on weekly basis.

If the Covid-19 situation permits safe onsite study at campus, the selected questions will be discussed on a weekly basis in a live Q&A session taking place on Wednesdays at 9:15-12:00, starting from 12<sup>th</sup> January. If necessary, the Q&A session will be held online through Teams or Zoom.

#### **5. ASSIGNMENTS**

Weekly homework assignments include both theoretical and empirical problems, and a question for the professor. The problems are mainly based on the lectures, but it may be useful to consult the textbooks indicated below and/or other (online) resources. Students may collaborate to solve homework assignments, but everyone needs to submit independently their own solutions for grading. The deadline for submitting the solutions for grading is 15:00 every Tuesday (before the start of the first exercise session). Solutions submitted after the deadline will not be graded. Detailed instructions for how to submit the solutions to the course assistant will be provided in the problem sets (to be published on the course website).

During the live exercise sessions (Tue, Wed), During the live exercise sessions, the teaching assistants will present the example solutions to assignments, discuss possible alternative ways of approaching the problem, and provide tips to solving the next problem sets.

Before the final exam, there will be an extra problem set that can be submitted for grading. Points earned from the extra problem set can be used to compensate any missing points from weekly homework assignments.

To solve the empirical problems, students are free to use any software preferred. See Lesson 1d) for the discussion of the main alternatives and their relative advantages and disadvantages.

#### **6. ASSESSMENT AND GRADING**

- Online exam 70%
- Homework assignments 30 %

The exam and the homework assignments will be based on the lectures and the course textbook.

The online exam will be organized through the course website. The exam includes both theoretical and empirical questions. To eliminate the possibility of cheating, in the empirical questions each student will be analyzing unique randomly generated data that are personalized using the student number.

The points earned from the online exam and homework assignments will be weighted as indicated above, and converted to the percentage scale. The following grading scale will be used:

excellent 5	= 90% - 100% of total points
very good 4	= 80% - 89% of total points
good 3	= 70% - 79% of total points
satisfactory 2	= 60% - 69% of total points
sufficient 1	= 50% - 59% of total points
failed 0	= less than 50% of total points

## 7. READINGS

Video lectures, lecture slides and additional materials will be provided through the course website (<https://mycourses.aalto.fi/course/view.php?id=31594&section=1>).

For the self-study and supporting material, the following text books are recommended:

Wooldridge, J.M.: *Introductory econometrics: A modern approach*.

Dougherty, C.: *Introduction to econometrics*.

Other intermediate econometrics textbooks book can also be used as supporting material.

## 8. PRELIMINARY SCHEDULE

### List of themes covered

- 1) Introduction to Econometrics
- 2) Linear regression model and the OLS estimator
- 3) Statistical properties of the OLS estimator
- 4) Statistical inference
- 5) Dummy variables
- 6) Model specification
- 7) Endogeneity
- 8) Instrumental variables
- 9) Heteroscedasticity and autocorrelation
- 10) Time series econometrics
- 11) Panel data models
- 12) Limited dependent variables and maximum likelihood

There will be 4-5 video lectures per each theme, usually 15-30 minutes long.

### Exercises and assignments

Problem set 1) due 18 Jan, Exercises Tue 18 and Wed 19 Jan  
Problem set 2) due 25 Jan, Exercises Tue 25 and Wed 26 Jan  
Problem set 3) due 1 Feb, Exercises Tue 1 and Wed 2 Feb  
Problem set 4) due 8 Feb, Exercises Tue 8 and Wed 9 Feb  
Problem set 5) due 15 Feb, Exercises Tue 15 and Wed 16 Feb  
Extra problem set: due 22 Feb

## 9. COURSE WORKLOAD

Lectures	36 h
Exercise sessions	16 h
Self-study and other independent work	108 h
Total	160 h

## 10. ETHICAL RULES

Aalto University Code of Academic Integrity and Handling Violations Thereof:

<https://into.aalto.fi/display/ensaannot/Aalto+University+Code+of+Academic+Integrity+and+Handling+Violations+Thereof>