# Econometrics

# Winter term 2018/2019
# Syllabus and organizational information

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## Content of the course

This course teaches the basic concepts of econometrics. In particular, it focuses on estimating and testing theoretical hypotheses from economics and business administration using real world data. Therefore, econometrics is a central tool to conduct research in economics and business administration. But also other social sciences, engineering or medical studies use econometrics more and more frequently in order to test and compare their (potentially different) theories empirically. Working with data according to set rules and the ability to replicate estimation results ensures objectivity of the results. Hence, a correct application of econometric methods ensures the credibility of scientific results.
Central issues of interest for applied economic analysis are the investigation of production processes, supply and demand elasticities or the effect of political measures on the economy. This course explains how to estimate, interpret and evaluate these issues empirically. Moreover, we will discuss challenges and problems that arise when working with real world data.

## Preconditions

There are no formal requirements for this course, but large parts of the lecture build on basic concepts of statistics. These concepts will be repeated at the beginning of the course. It may be beneficial to repeat/study some of these concepts in more detail independently.

## Syllabus

- Introduction
- Part I: Recap probability theory
  - Topic 1: Making statements about a random variable
  - Topic 2: The relationship between two random variables

- Part II: The linear model
  - Topic 3: The bivariate linear regression model
  - Topic 4: The multivariate linear regression model
  - Topic 5: Introduction to hypothesis tests
  - Topic 6: Testing hypotheses for the OLS estimator
  - Topic 7: Model specification
- Part III: Extensions to the linear model
  - Topic 8: Criteria for good estimators
  - Topic 9: Cross-sectional data and heteroscedasticity
  - Topic 10: Violations of the exogeneity assumption
  - Topic 11: Instrumental variables

## References

- Relevant for the exam: Slides, handouts, exercise sheets
- Accompanying literature:
  - Stock, James H., und Mark W. Watson, Introduction to Econometrics, 2nd/3rd edition, Boston.
  - Wooldridge, Jeffrey, Introductory Econometrics - A Modern Approach, South-Western Cengage Learning, 4th edition, 2009.
- Basic statistics:
  - Mann, Prem S., Introductory Statistics, Wiley, 7th edition, 2010
- More advanced literature:
  - Angrist, Joshua D., und Jörn-Steffen Pischke, Mostly Harmless Econometrics, Princeton University Press, 2009.
  - Judge, George G. et al, Introduction to the Theory and Practice of Econometrics, Wiley, 2nd edition, 1988.
  - Greene, William H., 2008, Econometric Analysis, Prentice Hall, 2011.

## Examination

- In order to pass the course, you need to pass the exam. According to the examination rules, there will be two dates to write the exam in the winter term. Note that there will be no possibility to pass the exam in the summer term. Oral exams are only offered when having failed the exam three times.
- An online homework offers the possibility to obtain a bonus that will improve the grade by a maximum of one increment (e.g. from 2.0 to 1.7, except for 1.0). The bonus is granted if
  - the exam is passed,

  - at least 50% of the points are achieved in the homework,
  - the bonus is acquired in the same semester as the exam is passed.

  You will have one week in order to complete the homework. Note the following dates:

  - Homework will be available from Friday, December 14th, 2018, 0:01 am
  - Deadline to submit the homework on Thursday, December 20th, 2018, 23:59 pm

  Relevant for the homework is the material from parts I and II of the lecture and accompanying exercises.

- Relevant for the exam is all material from the lecture, including part III, and the exercises. Please note that examples and small tasks from the lecture that are not discussed in detail in the exercise sessions may be covered in the exam.

- Please make sure that you have access to L2P!:
  https://www3.elearning.rwth-aachen.de/ws18/18ws-184352
  If you do not have access, write an email to sabine.ott@rwth-aachen.de

- Via L2P we also offer E-Learning which provides an opportunity to train central material online. Please note that E-Learning covers a large part, but not all material that is relevant for the exam. E-Learning provides an opportunity to practice the format and style of the online homework.

## Structure of the course and contact

- The course consists of a lecture and exercise sessions

  - Lecture (Prof. Dr. Almut Balleer):
    Mondays, 10:30 - 12:00 (1090|321, Eph)
  - Exercise sessions (Dr. Hamzeh Arabzadeh):
    Group I: Wednesdays, 10:30-12:00 (1230|001, WK)
    Group II: Thursdays, 16:30-18:00 (1385|003, H03)

- Office hours

  - Prof. Dr. Almut Balleer via appointment by email
    (Email: balleer@ewifo.rwth-aachen.de)
  - Dr. Hamzeh Arabzadeh: Tuesdays 11:00 - 12:00
    (Email: hamzeh.arabzadeh@ewifo.rwth-aachen.de)

- **Please sign up for the office hours by email!** We urge you to ask questions concerning the exercise sheets in class, not in the office hours. Given the size of the class, we would otherwise run into capacity constraints and not everyone will benefit equally from the issues raised. There will be extra sessions addressing questions before the exams (dates to be announced).

## Preliminary Schedule

| Date | | Topic |
|---|---|---|
| 15.10.2018 | (Lc) | Organizational issues and introduction |
| 22.10.2018 | (Lc) | Topic 1 and 2: *Probability theory* |
| 24.10./25.10.2018 | (Ex) | Exercise session topics 1 and 2 |
| 29.10.2018 | (Lc) | Topic 3: *The bivariate linear regression model* |
| 31.10.2018 | (Ex) | Exercise session topic 3 |
| 01.11.2018 | (Ex) | No exercise (*All saints*) |
| 05.11.2018 | (Lc) | Topic 4: *The multivariate linear regression model* |
| 07./08.11.2018 | (Ex) | Exercise session topic 4 |
| 12.11.2018 | (Lc) | Topic 5: *Introduction to hypothesis tests* |
| 14./15.11.2018 | (Ex) | Exercise session topic 5 |
| 19.11.2018 | (Lc) | Topic 6: *Testing hypotheses for the OLS estimator* |
| 21./22.11.2018 | (Ex) | Exercise session topic 6 |
| 26.11.2018 | (Lc) | Topic 7: *Model specification* |
| 28./29.11.2018 | (Ex) | Exercise session topic 7 |
| 03.12.2018 | (Lc) | Topic 8: *Criteria for good estimators* |
| 05./06.12.2018 | (Ex) | Exercise session topic 8 |
| 10.12.2018 | (Lc) | Topic 9: *Cross-sectional data and heteroscedasticity* |
| 12./13.12.2018 | (Ex) | Exercise session topic 9 |
| 17.12.2018 | (Lc) | No lecture |
| 19./20.12.2018 | (Ex) | No exercise |
| 14.12.2018 | | **Start of the online homework** |
| 17.12.2018 | (Ex) | QA session about the online homework (10:30 – 12:00 Uhr) |
| 20.12.2018 | | **Submission deadline of the online homework** |
| 24.12.2018–04.01.2019: *christmas break* | | |
| 07.01.2019 | (Lc) | Topic 10: *Violations of the exogeneity assumption* |
| 09./10.01.2019 | (Ex) | Exercise session topic 10 |
| 14.01.2019 | (Lc) | Topic 11: *Instrumental variables* |
| 16./17.01.2019 | (Ex) | Exercise session topic 11 |
| 21.01.2019 | (Lc) | Summary and repetition |
| 23./24.01.2019 | (Ex) | No exercise |
| 28.01.2019 | (Lc) | No lecture |
| 30./31.01.2019 | (Ex) | No exercise |
| 12.02.2019 | | **first exam date** |
| 23.03.2019 | | **second exam date** |

Disclaimer: Assigned topics may change date. Please also note that the exam dates may still change: Check updates from the examination office!