

ECON 621: Econometrics I

Fall 2021

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Course description

The course presents the basic theory of econometrics. It covers all aspects of linear regression models with exogenous and endogenous regressors. We will cover models with either cross-sectional or time series data. For that purpose, we will give an introduction to univariate time series econometrics with the objective of modeling the autocorrelation of the residuals and defining stationarity in the context of multiple regression models.

The theory is presented in class and the applications using R is presented online. More details will be provided during the first week of class. The students are required to use R for the applications and the assignment must be produced using Markdown. You will be trained in the first week on how to create documents with Markdown and throughout the term on how to use R.

Textbook

The three textbooks are available for free. The first is used for the probability theory:

- Hansen, Bruce E., *Probability and Statistics for Economists*, available on his [website](#). (**Prob**)

The second is the main textbook for the econometric theory:

- Hansen, Bruce E., *Econometrics*, available on his [website](#). (**Econ**)

The third one is a guide on how to use R in econometrics. You will also be provided with notes on how to use R.

- Kleiber, C. and Zeileis, A., *Applied Econometrics with R*, Springer, 2008, available online using the following [link](#).

Topics:

1. Probability Theory
Reference: For this first part, you have to review Section 6: Probability Theory of ECON600 by yourself. We will start the course with the assumption that the material covered in this section is well understood.
2. A review of Sampling Theory
*Reference: Chapter 6 of **Prob**. We also assume that Section 6: Probability Theory of ECON600 is well understood.*
3. The ordinary least squares (OLS) method
*Reference: Chapters 2 and 3 of **Econ**.*
4. Small sample properties of OLS
*Reference: Chapters 4 and 5 of **Econ**.*
5. Large sample properties of OLS
*Reference: Chapters 6 and 7 of **Econ**.*
6. Hypothesis Testing
*Reference: Chapters 8 and 9 of **Econ**.*
7. Bootstrap methods
*Reference: Chapter 10 of **Econ**.*
8. Instrumental Variables
*Reference: Chapters 11 and 12 of **Econ**.*
9. Generalized Method of Moments
*Reference: Chapter 13 of **Econ**.*
10. An introduction to time series econometrics
*Reference: Chapters 14 and 16 of **Econ**.*
11. Difference in Differences
*Reference: Chapter 10 of **Econ**.*

Evaluation

Assignments (between four and six): 60%

Take home exam: 40%

The assignments are a mixture of theory questions, empirical and simulation studies. The take home exam is a small empirical project that may include a simulation study. You have 48 hours to complete it.

Policies on exams and assignments

Assignments must be handed in before the date and time written on the question sheet. Assignment must be done individually. You are welcome to discuss with your classmates, but I expect each copy to be unique.

For the take home exam, you are not allowed to communicate with your classmates.

Academic Integrity

Academic Integrity

In order to maintain a culture of academic integrity, members of the University of Waterloo are expected to promote honesty, trust, fairness, respect and responsibility. See the [UWaterloo Academic Integrity](#) webpage and the Arts [Academic Integrity](#) webpage for more information.

Discipline

A student is expected to know what constitutes academic integrity, to avoid committing academic offences, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about “rules” for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. When misconduct has been found to have occurred, disciplinary penalties will be imposed under [Policy 71 – Student Discipline](#). For information on categories of offences and types of penalties, students should refer to Policy 71 - Student Discipline. For typical penalties check [Guidelines for the Assessment of Penalties](#).

Grievance

A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read [Policy 70 - Student Petitions and Grievances](#), Section 4. When in doubt, please be certain to contact the department’s administrative assistant who will provide further assistance.

Appeals

A decision made or penalty imposed under Policy 70 - Student Petitions and Grievances (other than a petition) or Policy 71 - Student Discipline may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to [Policy 72 - Student Appeals](#).

Accommodation for Students with Disabilities

Note for students with disabilities

The [AccessAbility Services office](#), located on the first floor of the Needles Hall extension (1401), collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the AS office at the beginning of each academic term.

Mental Health Support

All of us need a support system. The faculty and staff in Arts encourage students to seek out mental health supports if they are needed.

On Campus

- Counselling Services: counselling.services@uwaterloo.ca, 519-888-4567 ext 32655
- [MATES](#): one-to-one peer support program offered by Federation of Students (FEDS) and Counselling Services
- Health Services Emergency service: located across the creek from Student Life Centre

Off campus, 24/7

- [Good2Talk](#): Free confidential help line for post-secondary students. Phone: 1-866-925-5454
- Grand River Hospital: Emergency care for mental health crisis. Phone: 519-749-433 ext. 6880
- [Here 24/7](#): Mental Health and Crisis Service Team. Phone: 1-844-437-3247

- [OK2BME](#): set of support services for lesbian, gay, bisexual, transgender or questioning teens in Waterloo. Phone: 519-884-0000 extension 213

Full details can be found online at the Faculty of ARTS [website](#). Download [UWaterloo and regional mental health resources \(PDF\)](#). Download the [WatSafe](#) app to your phone to quickly access mental health support information

Territorial Acknowledgement

We acknowledge that we live and work on the traditional territory of the Attawandaron (Neutral), Anishinaabeg and Haudenosaunee peoples. The University of Waterloo is situated on the Haldimand Tract, the land promised to the Six Nations that includes ten kilometers on each side of the Grand River.