ECON 421: Econometric Theory, Fall 2021

Instructor: Tom Parker
Course material on the course website and Learn
Office Hours: Wednesdays, 9am - 10am Waterloo time (except 2021-10-13), held virtually — see course website for details
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Course Objectives

This course is an introduction to statistical estimation and inference for models that economists commonly encounter in empirical data analysis. We will begin with a review of some mathematics that make it easier to discuss the rest of the topics in the course. Next we will examine the asymptotic (or "large-sample") properties of the least squares and instrumental variables estimators for linear models and associated inference methods. Finally, we will discuss estimation and inference methods for some nonlinear models.

Reading

Lecture slides will be provided, and won't precisely match any single reference. However, you should read along with one of the two references listed below:

- B. E. Hansen (2021+). Econometrics. Forthcoming at Princeton University Press.
- J. M. Wooldridge (2010). *Econometric Analysis of Cross Section and Panel Data*, MIT Press.

Hansen is available in electronic form from his website — follow the link in the list above. Either edition of Wooldridge should be fine. The chapters and sections listed in the schedule below refer to the second edition. If you read the first edition, you will need to find the sections that match the lectures since they're not always the same.

Course schedule

Video lectures will be posted in the first few days of each week. This schedule may change slightly.

In the "Reading" column, H = Hansen, W = Wooldridge.

Week	Topic	Reading	Quiz / HW	Grade weight
1	Review of linear models and some algebra	H §2.1-2.5, 2.15-2.21, Appendix A.1-A.4		
2	Least squares estimation mechanics and finite-sample properties	H Ch. 3	Quiz 1	10%
3	Finite-sample properties of the least squares estimator	H §4.1-4.22	HW 1	15%
4	Normal regression and asymptotic theory introduction	H Ch. 5 and 6		
5	Large-sample properties of least squares estimates	W §4.1-4.2 or H §7.1-7.7, 7.11-7.18	Quiz 2	10%

Week	Topic	Reading	Quiz / HW	Grade weight
6	Instrumental variables estimators	W §5.1-5.2 or H §12.1-12.12, 12.15-12.18		
7	IV continued	same as last week, notes	HW 2	15%
8	Maximum likelihood estimation	W §13.1-13.4		
9	Inference with maximum likelihood estimates	W §13.5-13.7	Quiz 3	10%
10	Nonlinear model examples: binary, unordered/ordered and fractional response models	W §15.1-15.6, 15.7.1-15.7.3, 16.2.1-16.2.3, 16.3.1-16.3.3, 18.6	HW 3	15%
11	Basic time-series models	notes, H §14.19-14.39	Quiz 4	10%
12	Dynamic econometric models	notes, H §14.40-14.45	HW 4	15%

Evaluation

Your course mark will be made up of homework and quiz marks. Homework will be completed in rotating assigned groups of two or three people and submitted on the Learn site in a dropbox. Group assignments and a description of best practices for completing assignments will be distributed when the first assignment is posted on the course website. You will have two weeks to complete all homework assignments. No exceptions will be made for late or missed assignments. Quizzes are to be completed individually. You will have 48 hours to complete each quiz (they will be assigned on Wednesdays and due on Fridays).

1. Four quizzes worth 10% each
2. Four group assignments worth 15% each

Other administrative details:

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 offenses 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.

Note for students with disabilities

AccessAbility Services, located in Needles Hall, Room 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 AccessAbility Services 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

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.