

University of Waterloo
Department of Economics
Economics 600: Mathematics for Graduate Students in Economics
Fall 2021

Instructor: Thomas Parker

Email: tmparker@uwaterloo.ca

Office/Office Hours: virtually, see below.

Lecture Time/Location: August 23 to September 3, held remotely

Course Objective: This course is a review of the basic mathematical tools that incoming masters and doctoral students need for their core economics and econometrics courses.

Suggested Reading: There is no recommended text, and the course will follow notes that are posted online. Online resources that cover similar material include:

- Osborne, M., [Mathematical methods for economic theory: a tutorial](#) and
- Hansen, B. [Introduction to Econometrics, Vol. 1](#) (Chapter 1)

Schedule: We will cover the following topics. The focus will be on the special tools each broad topic that are used most often in economic and econometric analysis.

1. Mathematical Basics: Sets, functions, logic and methods of proof
2. Linear algebra: Vector spaces, matrices and rules for their use
3. Calculus: Differentiation rules, Taylor expansions, implicit differentiation, integration
4. Convexity: Convex sets, convex functions and quasiconvex functions
5. Optimization: Unconstrained and constrained optimization, convexity, the envelope theorem
6. Probability theory: Random variables, basic probability, special distributions

The material will be delivered in video lectures posted each weekday from August 23 to September 3. They will be available on the course Learn website (at <http://learn.uwaterloo.ca>). Course notes and the course outline are available at <https://arts.uwaterloo.ca/~tmparker/econ600.html>. You should plan on spending at least four hours each day engaged with the material. There are many topics to review and not much time to do it.

Office Hours: This course is designed so that it can be completed asynchronously — you can complete the entire course without needing to meet for class at any specific time. However, in case you need to ask further questions about the material, there will be office hours at 9am EDT (UTC-4 hours) on the Tuesdays, Wednesdays and Thursdays of the two weeks of class, held electronically (meeting details will be provided on the Learn site at the beginning of the course). Send me an email if you need to talk but are unable to attend at those times.

Evaluation: Your course mark will be calculated on the basis of six assignments. Four of the assignments will be posted every few weekdays on the course Learn site. Two comprehensive assignments covering all previous material will also be posted at the end of each of the two weeks. Assignments will be submitted electronically (and can be repeated) so you will have immediate feedback about your progress through the course.

Assignments will have *suggested* due dates, usually about two days after they are assigned, because the course topics build on each other from beginning to end. You are strongly encouraged to finish assignments by their suggested due dates. However, due to the challenges of attending courses electronically and completing assignments remotely, your final course mark will be computed based on your assignment marks as they stand by noon EDT on September 7, 2021.

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](#).

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.