

Mathematics for Graduate Students in Economics

Course Outline (Fall 2019)

Instructor: Thomas Parker

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Lecture Time/Location: August 19-24 and August 26-30

Tutorial Instructor: Andrés Arcila-Vasquez (aaarcilavasquez@uwaterloo.ca)

Tutorials:

Course Objective: This course is a review of the basic mathematical background that incoming masters and doctoral students will need for their core economics and econometrics courses. Most topics should be a review but if they are not, they should be an introduction to the basic tools that will be used in theory classes that begin in the fall term.

Suggested Reading: There is no recommended text. However, if you would like to review some material before you start the course (the pace will be quick), the course will resemble parts of these sources:

- Osborne, M., [Mathematical methods for economic theory: a tutorial](#), or
- Simon, C.P. and L. Blume, *Mathematics for Economists*
- Diez, D.M., C.D. Barr and M. Çetinkaya-Rundel, [OpenIntro Statistics](#) (Chapters 2-3), or
- Hogg, R.V., J. McKean and A.T. Craig, *Introduction to Mathematical Statistics* (Chapters 1-4)

Schedule: We will cover the following topics. The material we cover in each area is not meant to be comprehensive, rather it will be focused on the special tools from each that are used most often in economic and econometric analysis.

1. Mathematical Basics: Sets, functions, logic and methods of proof (1 day)
2. Linear algebra: Some properties of vectors and matrices and rules for their use (1.5 days)
3. Calculus: Differentiation rules, Taylor expansions, implicit differentiation, integration (1.5 days)
4. Convexity: Convex sets, concave and convex functions, quasiconcavity and quasiconvexity (1 day)
5. Optimization: Unconstrained optimization, constrained optimization, convexity, the envelope theorem (3 days)
6. Probability theory: Random variables, conditioning, special distributions (1 day)

Evaluation: There will be near-daily assignments. Assignments and all other relevant material will be available on the course website, <http://arts.uwaterloo.ca/~tmparker/teaching/600/econ600.html>. There are two exams: on August 24, 10am-noon and August 30, 1-3pm. The course will be graded on a pass/fail basis.

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.