

**UNIVERSITY OF WATERLOO**  
**Department of Economics**  
**Course Outline**

**ECON 311 Section 001**  
**Mathematical Economics**  
**Fall 2016**  
**MW 14:30-15:50, PHY 235**

**Instructor Information**

Instructor: L-A Busch  
Office: HH 127  
Office Phone: 519-888-4567 x 35229  
Office Hours: T: 13:00-14:00; W: 13:00-14:00  
Email: lbusch@uwaterloo.ca

**Notes on contacting the instructor**

When sending email, please use your official uwaterloo account and have ECON 311 in the subject line. It is generally a good idea to have a signature line that includes your full name and student ID. Also note that just because email is free and easy to send does not mean it is free and easy to answer. Do not expect immediate answers. Please treat email correspondence as a somewhat formal venue of communication. Please check first if your answer is not easily found in this document or on LEARN.

**Course Description**

This is the second course in the sequence presenting the core topics in mathematical techniques required for undergraduate students in economics. It builds and expands on the material of Econ 211. The course predominantly deals with multi-variate calculus and optimization. An introduction to some methods applicable to dynamic problems rounds out the material.

**Course Goals and Learning Outcomes**

The objectives of this course are for students to (a) learn to apply appropriate mathematical techniques used to address economic problems; (b) to be able to interpret the output of these techniques and develop the associated economic intuition; (c) relate results in their mathematical form to those in their diagrammatic and verbal form.

**Prerequisites**

Econ 201, Econ 202, Econ 211 (or equivalent MATH courses). Level at least 3A.

**Textbook:**

No formal textbook is required.

## Other References:

Lecture material will be drawn from multiple sources. Of particular use will be the Econ 211 text by Hoy, M., Livernois, J., McKenna, C., Rees, R., and Stengos, T., *Mathematics for Economists*, Third Edition, The MIT Press 2011 (previous editions can also be used). Another excellent book that has more of a focus on the Mathematics but is accessible to economics students is Simon and Blume, *Mathematics for Economists*, Norton (1994). It is slightly more advanced and a good reference.

## Evaluation

Assessment	Date of Evaluation (if known)	Weighting
Assignments	TBA	20%
Quiz #1	October 5, in class	15%
Quiz #2	October 26, in class	25%
Quiz #3	November 16, in class	15%
Quiz #4	December 5, in class	25%

## Quizzes

Quizzes are held during regular class times at the beginning of class. Quiz 1 and 3 will be approximately 20 Minutes, and a lecture will follow the quiz. Quiz 2 and 4 are approximately 40 minutes, and will also be followed by some class activities. There are no “make-up” quizzes. If you miss a quiz for acceptable reasons the weight will be transferred in equal parts to the remaining quizzes. If you miss more than 2 quizzes you will fail the course.

## Assignments

Approximately every second lecture with about a week turn-around time. Assignments will be posted on LEARN and solutions will be posted on LEARN after the due date. Assignments will be due at the beginning of class on their due date. No late assignments will be accepted.

**Note: 1) There is no class on September 19. 2) There is no final exam in the examination period.**

## Course Outline

1. **Review of functions and derivatives of one variable; Integration**
2. **Functions of n variables:**
  - a. Euclidian Spaces and Functions of n variables
  - b. Differentiation and Differentials
  - c. Curvature properties
  - d. Select other properties of economic importance

**3. Optimization (static):**

- a. Unconstrained
- b. Constrained
- c. Concave programming: Kuhn-Tucker conditions
- d. Comparative statics

**4. Dynamic Methods:**

- a. Discrete time
- b. Continuous time
- c. Optimal Control

**The fine print:**

1. There will be no adjustments to the above grading scheme. Especially not for an individual student.
2. Assignments are due at the beginning of class. Late assignments are not accepted.
3. Quizzes are in class and start within the first 5 minutes. No additional time is available if you are late.
4. Students are encouraged to discuss their questions about or problems with the course and course material with me in person during office hours, or after class for shorter clarifications. Group consultations are welcomed and we can book appointments and a room for larger study groups.
5. Classes are in essence a private interaction of instructor and students. Consequently no audio or video recordings are permitted without the explicit consent of all participants. University regulations prohibit the use of photographic devices in class.
6. There are no “make-up” quizzes. See grading scheme above.

## University and Faculty Statements

### Cross-listed course

Please note that a cross-listed course will count in all respective averages no matter under which rubric it has been taken. For example, a PHIL/PSCI cross-list will count in a Philosophy major average, even if the course was taken under the Political Science rubric.

### 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.