ECON*4700/6060 F14

Advanced Mathematical Economics
Mathematical Methods for Economics

0.50 Credit weight

General Course Information

Instructor: Brian Ferguson

Email brianfer@uoguelph.ca
Office Location MacKinnon 740
Office Hours TBA
Department/School Department of Economics and Finance

TA's N/A

Email N/A
Office Location N/A
Office Hours N/A

Class Schedule: Lectures: Tue., Thur. 11:30-12:50, MacKinnon 307
Lab: Wed. 2:30-3:20, MacKinnon 306

Pre-requisites: (ECON*3600 or ECON*3810), ECON*3710, ECON*3740

Course Description

Economics is a technical discipline which relies heavily on certain mathematical methods for the analysis of a range of problems and issues. It is important that economists be aware of the range of techniques available to them and have a decent grasp of what those techniques mean – i.e. that they do not simply apply them in a mechanical manner but rather understand what they are doing. Alfred Marshall, an economist at Cambridge in the late 19th and early 20th centuries said (in essence) that an economist should state a problem in words, translate it into mathematical terms, solve the math rigorously then translate the solution back into words. If he couldn't do the last step, the economist should burn the math.

Indicative Content

This is an advanced undergraduate course in mathematical economics, with selected applications. The first six weeks focuses on multivariate techniques and the second six weeks will deal with intertemporal analysis and optimal control theory. The first six weeks is a combined course with ECON*4700 and ECON*6060. The second part of the course is for ECON*4700 only.

Topics

Weeks 1&2: Review of Calculus and Optimization: Dixit Ch. 1-4; Hoy chs. 11, 12 & 13
Weeks 3&4: Comparative Statics: Dixit 5, 6, 8; Hoy Chs 14, Leonard & Long Ch 1
Week 5: Concave Programming: Dixit Ch. 7; Hoy Ch. 15, Leonard & Long Ch 1
Week 6: Integration and Uncertainty: Hoy Ch. 16, Dixit Ch. 9
Week 7: Differential Equations: Leonard & Long Ch 2
Week 8: The Maximum Principle: Leonard & Long Ch 4, Dixit Ch. 10
Weeks 9 – 12 Optimal Control Theory: Leonard & Long Chs 6 - 10.

Evaluation ECON*4700: There will be **two** in-class midterms worth 20% each, one on **Tuesday October 7** and one on **Thursday, Nov. 6**. The final exam, worth the remaining 60% of the course mark and covering the entire semester's work, will be written **Thursday December 11, 7-9 PM**. There will be **no deferred midterms**. If a student misses a midterm the weight will be shifted to the final exam.

Evaluation ECON*6060: There will be one final exam, which will be pass/fail, date TBA, during the 7th week of classes (i.e. the week of October 20).

Course Resources

Texts:

Texts:
A. K. Dixit: Optimization in Economic Theory Second Edition, Oxford University Press (1990)

Daniel Leonard and Ngo Van Long: Optimal Control Theory and Static Optimization in Economics Cambridge University Press 1992

M. Hoy, J. Livernois, C. McKenna, R. Rees, T. Stengos Mathematics for Economics 3d edition, MIT Press 2011

Course Policies

Grading Policies

https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-grds-proc.shtml

https://www.uoguelph.ca/registrar/calendars/graduate/2014-2015/genreg/genreg-as-gradeint.shtml

University Policies

Academic Consideration

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor in writing, with your name, id#, and e-mail contact. See the academic calendar for information on regulations and procedures for

Academic Consideration: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

https://www.uoguelph.ca/registrar/calendars/graduate/2014-2015/

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community, faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring.

University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy is detailed in the applicable Academic Calendar:

https://www.uoguelph.ca/registrar/calendars/undergraduate/2014-2015/

https://www.uoguelph.ca/registrar/calendars/graduate/2014-2015/

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Centre for Students with Disabilities as soon as possible.

For more information, contact CSD at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: http://www.uoguelph.ca/csd/

Course Evaluation Information

Please refer to: https://www.uoguelph.ca/economics/course-evaluation

Drop date

The last date to drop one-semester courses, without academic penalty, is October 31st, 2014**.** For regulations and procedures for Dropping Courses, see the Academic Calendar:

https://www.uoguelph.ca/registrar/calendars/undergraduate/2014-2015/

https://www.uoguelph.ca/registrar/calendars/graduate/2014-2015/

Course Learning Outcomes

Skills:

(a) ***Written Communication*****:** although this is a mathematical economics course, you will need to provide written commentaries on your steps, to explain your results, and to interpret your mathematical results in terms of economic theory and individual behavior.

(b) ***Numerical Problem Solving*****:** achieve a high level of numeracy skills

(c) ***Analytical Problem Solving*****:** become familiar with the various techniques for solving formal economic problems and learn the appropriate mathematical tools to apply to various economic problems.

Knowledge:

(a) ***Microeconomic Modelling*****: Apply** techniques of multivariate calculus, integral calculus and dynamical methods to a variety of microeconomic problems.

(b) ***Macroeconomic Modeling*****: Apply** calculus and dynamic methods to a variety of models such as models of economic growth and the business cycle.

(c) ***Mathematical Techniques*****:** be familiar with a variety of standard mathematical techniques used frequently in economics, such as constrained optimization and dynamic optimization.