

University of Waterloo
Department of Economics
ECON 471
Computational Economics
Fall 2018
MF 10:30-11:20 in ML-349
W 10:30-11:20 in PAS-1237

Quick Glance

Are you looking for an economics elective at the fourth year level?

ECON 471 Computational Economics may be the right choice for you. This is an applied policy-oriented course designed to give students an opportunity to explore interesting economic issues using a computational approach (not econometrics) to hone their policy analysis skills needed for job applications. Students will learn how to turn the abstract general equilibrium theory from microeconomics courses into a computable general equilibrium (CGE) model that can be solved for concrete numerical results used for policy evaluations. There are plenty of real-life policy applications such as taxation, environmental protection, minimum wages, agricultural price supports, and current trade deals NAFTA (North American Free Trade Agreement), CETA (Comprehensive Economic and Trade Agreement between Canada and the European Union) and CPTPP (Comprehensive and Progressive Trans-Pacific Partnership) between Canada and nine countries (Australia, Brunei, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore, Vietnam).

What this course is and is not

This is an applied policy course with its own tools and methodology designed for economics students. It is not a computer programming course and hence previous knowledge of computer programming such as FORTRAN, BASIC, C is not required. It is also not an econometrics course so previous knowledge of statistics, regressions, and econometrics software like STATA is not required either. However, like all other economics courses, it is essential that students have a good economics background and are willing to work hard throughout the term.

Instructor and T.A. Information

Instructor: Professor Trien Nguyen

Office: HH 202

Office Phone: 519-888-4567 X32794

Office Hours: MWF 9:30-10:20 & 11:30-11:50

Email: nguyen@uwaterloo.ca

T.A.: there is no T.A. for this course

Course Description

This course gives students an opportunity to explore economic theory using a numerical computational approach. The course focuses more on policy applications than theoretical analyses in theory courses. Students will see how the abstract general equilibrium theory covered in micro theory courses can be reformulated into a computable general equilibrium (CGE) model for policy evaluations in taxation, environmental protection, minimum wage, agricultural price support, and trade negotiations such as

NAFTA (North American Free Trade Agreement), CETA (Comprehensive Economic and Trade Agreement between Canada and the European Union) and CPTPP (Comprehensive and Progressive Trans-Pacific Partnership).

Students will learn to use the methodology of numerical modeling to construct applicable theoretical framework, formulate relevant policy questions, build an operational economic model, collect and assemble the data. They then use numerical methods and modeling software to find feasible solutions, interpret the results, draw conclusions, and make policy recommendations.

Required backgrounds include micro theory (ECON 201/301) plus calculus and matrix algebra (ECON 211). Knowledge of a programming language (FORTRAN, BASIC, C) is not required as students will use Windows GAMS and GTAP packages for course work. Instructions on these packages will be covered in class. Some familiarity with Windows and Excel would be helpful. In the past, Mac users (macOS 10 or higher) have been able to run these programs using Windows emulation.

Course Goals and Learning Outcomes

The goal is to help students develop hands-on skills and experience in computational economics for policy analysis such as taxation, trade, environment, and development. Upon completion of the course, students should be able to build and use basic computational economic models for policy evaluations in the course description above.

Required Texts

- Burfisher, Mary E. (2016). *Introduction to Computable General Equilibrium Models*, 2nd edition. New York: Cambridge University Press (available from UW Bookstore).
- Hertel, Thomas W., ed. (1997). [Global Trade Analysis – Modeling and Applications](#). New York: Cambridge University Press.
- GAMS (General Algebraic Modeling System) Documentation Center (2018). [GAMS User's Guide](#).

Course Requirements and Assessment

- There is no final exam in this course.
- Class attendance, active participation, weekly assignments, and tests account for 100% of the course mark.
- Mark breakdowns

Assignments	10% x 7	70%
Tests	10% x 2	20%
Attendance	5%	5%
Participation	5%	5%
- Class absence should be avoided as much as possible.
- No makeups will be given for missing classes, participation, assignments for whatever reasons.
- Students are responsible for all course work whether they attend classes or not.
- Participation requires class discussions on course-related matters. Students are encouraged and expected to provide feedbacks on questions and answers, follow-ups, and after-thoughts.

Course Topics

Topics might be changed to suit the class progress, student background and interests.

1. Introduction and overview

Get to know each other and give students a chance to ask questions about the course, concerns, expectations and requirements.

2. Building blocks (consumer and producer, social accounting matrix)
Review two basic building blocks of economic theory, namely, consumers on the demand side and producers on the supply side. Students must have seen these topics from microeconomic theory courses but it helps to have a refresher with concrete numerical examples. The social accounting matrix is an algebraic description of the national income accounting that students must have seen in first-year introductory economics.
3. General equilibrium and welfare analysis (exchange, production)
Review the basic general equilibrium and Pareto optimality theory in an applied policy context. Student will see how theoretical concepts of welfare measures such as compensating variations (CV) and equivalent variations (EV) are used in an applied policy context.
4. Benchmark data and calibration
Build a consistent benchmark data set representing a general equilibrium state of an economy from which the needed model parameters can be properly calibrated for subsequent policy analyses.
5. Counter-factual policy simulations
Counter-factual policy simulations now can be conducted to assess various policy scenarios, e.g., tax cut proposals, price controls, free trade agreements, and environmental protection.
6. Model-based policy conclusions
Translate experiment results into relevant model-based policy conclusions for discussions.

Course Policy

Attendance and Participation Policy

- The course is heavily built on lectures and class activities. Regular class attendance is required for a successful completion of the course.
- Incomplete class attendance: arriving late or leaving early more than 50% of the official class time will be counted as missing class in the attendance records.
- Incomplete class participation: being in class but not participating in class activities (e.g., study for other courses) will be counted as missing the entire class period in the attendance records.
- Inappropriate uses of computers and electronic devices which are unrelated to the course any time during class will be counted as missing the entire class period in the attendance records.

Course Postings on LEARN

- Course materials (e.g., assignments, readings, handouts) are posted on LEARN for a specified limited time during the term. As LEARN could be down without warnings, students should save course materials, especially those with time-sensitive deadlines, as soon as they are posted.
- Extensions of deadlines due to LEARN being down are rare.

Late Work

- Electronic submissions must be submitted on LEARN no later than **10:30** am on due dates (the computer will automatically reject late submissions).
- Likewise, hardcopies must be also submitted in class no later than **10:30** am on due dates.
- Late work will not be accepted and will be given a zero mark.

Group Work

- Group work is not allowed. While discussions of course materials are allowed for the sake of learning, students are expected to do course work (especially those having marks) on their own.

Marked Assignments

- Marked assignments and tests are returned in class and handed only to the students who wrote them (i.e., you can pick up your own course work only).
- Marked course work must be picked up in class within one calendar week after they are returned. Marked course work not picked up when they are returned are treated abandoned and no consideration will be given to unclaimed marked course work.

Information on Plagiarism Detection

- Alternative Option to Turnitin: students who do not wish to have their course work screened by Turnitin (see “If Using Turnitin in Your Course” below) should inform the instructor in writing or email no later than the end of the second week to arrange for an alternative option.

Electronic Device Policy

- Computers may be used for class-related activities only.
- Students are encouraged to take their own notes during lectures.
- Turn off all electronic devices including cell phones and photographic/digital devices.
- No audio recordings, video recordings or pictures may be taken in class.
- Inappropriate uses of computers and electronic devices unrelated to the course any time during class will be counted as missing the entire class period in the attendance records.

Fee Arrangement

- Students are responsible for all administrative matters of registration and fee arrangements with the Registrar’s Office.
- No accommodations will be given for loss of access to LEARN and academic consequences arising from any issue or dispute (including fees) with the Registrar’s Office.

Economics Department Deferred Final Exam Policy

- Students are responsible for all administrative matters of registration and fee arrangements with the Registrar’s Office.
- Deferrals of final examinations are not automatic upon the presentation of suitable medical verification. The department will use this documentation together with other information to determine whether accommodation is warranted.
- By university policy, students are required to write their final examinations as scheduled. In extenuating circumstances, students may request a deferred final exam. However, the following are not considered legitimate reasons for requesting a deferred exam:
 - Requesting more time to study
 - Travel arrangements during the final exam period
 - Illnesses that are not supported with proper documentation
 - Misreading the final exam schedule
 - A full or busy final exam schedule
- Details are posted on the [Economics Department Deferred Final Exam Policy](#) web site.
- Students who are sick (with proper documentation) and miss either (a) three assignments max or (b) one test max, or (c) ten classes max (three weeks) in a row must apply to the department for permission to write a deferred final exam to make up for the lost course work. This deferred final exam is scheduled by the department (usually during term breaks) without consideration of student travel plans. This deferred final exam will be prepared by the course instructor and will cover the entire term.

Tentative Schedule

Class	Date	Day	Room	Posted	Due	Return	Notes
01	Sep 07	fri	ML-349				get-to-know-you
02	Sep 10	mon	ML-349				
03	Sep 12	wed	PAS-1237				
04	Sep 14	fri	ML-349	as01 posted			
05	Sep 17	mon	ML-349				
06	Sep 19	wed	PAS-1237				last day to add
07	Sep 21	fri	ML-349	as02 posted	as01 due		
08	Sep 24	mon	ML-349			as01 return	
09	Sep 26	wed	PAS-1237				drop no penalty ends
10	Sep 28	fri	ML-349	as03 posted	as02 due		
11	Oct 01	mon	ML-349			as02 return	
12	Oct 03	wed	PAS-1237				
13	Oct 05	fri	ML-349		as03 due		
	Oct 08	mon					thanksgiving
	Oct 10	wed					study break
14	Oct 12	fri	ML-349			as03 return	follow wed schedule
15	Oct 15	mon	ML-349	test01			
16	Oct 17	wed	PAS-1237				
17	Oct 19	fri	ML-349				
18	Oct 22	mon	ML-349			test01 return	
19	Oct 24	wed	PAS-1237				
20	Oct 26	fri	ML-349	as04 posted			
21	Oct 29	mon	ML-349				
22	Oct 31	wed	PAS-1237				
23	Nov 02	fri	ML-349	as05 posted	as04 due		
24	Nov 05	mon	ML-349				daylight saving time
25	Nov 07	wed	PAS-1237				
26	Nov 09	fri	ML-349	as06 posted	as05 due	as04 return	
27	Nov 12	mon	ML-349				
28	Nov 14	wed	PAS-1237				
29	Nov 16	fri	ML-349	as07 posted	as06 due	as05 return	
30	Nov 19	mon	ML-349				drop with WD ends
31	Nov 21	wed	PAS-1237				
32	Nov 23	fri	ML-349		as07 due	as06 return	
33	Nov 26	mon	ML-349				
34	Nov 28	wed	PAS-1237				review
35	Nov 30	fri	ML-349			as07 return	review
36	Dec 03	mon	ML-349	test02			last class

Statements and Links to Be Included on All Course Outlines

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 and Discipline

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 [Office of 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. Check [the Office of Academic Integrity](#) for more information. 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](#).

Grievances and Appeals

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.

If You Are Using Turnitin® in Your Course

Turnitin.com: Text matching software (Turnitin®) will be used to screen assignments in this course. This is being done to verify that use of all material and sources in assignments is documented. Students will be given an option if they do not want to have their assignment screened by Turnitin®. In the first week of the term, details will be provided about arrangements and alternatives for the use of Turnitin® in this course. Note: students must be given a reasonable option if they do not want to have their assignment screened by Turnitin®. See [guidelines for instructors](#) for more information.

Optional Statements That May Be Included on Course Outlines

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 Tel 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. Tel 866-925-5454
- Grand River Hospital: Emergency care for mental health crisis. Tel 519-749-433 ext. 6880
- [Here 24/7](#): Mental Health and Crisis Service Team. Tel 844-437-3247
- [OK2BME](#): set of support services for lesbian, gay, bisexual, transgender or questioning teens in Waterloo. Tel 519-884-0000 ext. 213

Details are 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 are living and working on the traditional territory of the Attawandaron (also known as Neutral), Anishinaabe and Haudenosaunee peoples. The University of Waterloo is situated on the Haldimand Tract, the land promised to the Six Nations that includes 10 kilometres on each side of the Grand River. For more information about the purpose of territorial acknowledgements, please see the [CAUT Guide to Acknowledging Traditional Territory \(PDF\)](#).

Academic Freedom at the University of Waterloo

[Policy 33, Ethical Behaviour](#) states, as one of its general principles (Section 1):

“The University supports academic freedom for all members of the University community. Academic freedom carries with it the duty to use that freedom in a manner consistent with the scholarly obligation to base teaching and research on an honest and ethical quest for knowledge. In the context of this policy, 'academic freedom' refers to academic activities, including teaching and scholarship, as is articulated in the principles set out in the Memorandum of Agreement between the FAUW and the University of Waterloo, 1998 (Article 6). The academic environment which fosters free debate may from time to time include the presentation or discussion of unpopular opinions or controversial material. Such material shall be dealt with as openly, respectfully and sensitively as possible.”

This definition is repeated in Policies 70 and 71, and in the Memorandum of Agreement, Section 6.

Retention of Examination Papers and Course Work

- According to UW TL55 Record Retention Schedule, completed final examination papers and course work will be retained one year after last use (i.e., after the end of the term in which the work was submitted or after the resolution of any grade revision request or appeal).
- [Note to Students](#): Course work which the instructor attempts to return during the term (e.g., tests, assignments) but remains unclaimed when term grades become official in Quest may be destroyed earlier than one year (two terms) provided the students have been so advised on the course outline.