



Course Syllabus – Updated December 15th 2022

ECON 457 A01

Computational Economics

CRN 21102

Winter Session, 2022-2023 (Second Term)

Instructor Name: Marco Cozzi

Delivery mode: Face to face

Lectures: Tuesday, Wednesday, Friday, 11:30am–12:20pm

Location: BEC Building, Room 363

Office Hours (via Zoom): Tuesday 9:00am-10:30am, TBC

Lab time: Thursday; 2:30pm-3:20pm (from Jan 19th, TBC).

Lab location: BEC Building, Room 180.

Teaching Assistant: TBA, [a] uvic.ca

TA Office Hours (via Zoom): TBA.

Course Delivery

The course will be delivered in person, subject to health guidelines set by UVIC and the PHO of British Columbia.

Course Description

This course is an introduction to computational methods and their use in economic analysis. Hence, this is a very technical course, for *mathematically inclined* students.

Steady advances in computer technology and numerical methods have changed the practice of economic science: computational skills are now an essential part of an economist's toolkit. The aim of the course is to expose students to some of the major themes and challenges of computational economics. This will involve problem-solving activities that require the numerical solution to a number of economic models. We will study in detail a number of economic applications, with a focus on the quantitative rather than qualitative analysis of an economic problem of interest. Students might also be engaged in critical assessments of computational economics research.

Note: Credit will be granted for only one of ECON 457, ECON 353.

Prerequisites: ECON 203 and 204; ECON 246 or STAT 261; ECON 350 or MATH 204; either MATH 208, or all of MATH 101, MATH 200, and MATH 110 or MATH 211; ECON 225 or equivalent; one of CSC 105, CSC 110, CSC 111.

Recommendations: ECON 351 is recommended.

Textbooks/Materials

Textbook: There is no required textbook for the course.

However, the book *Applied Computational Economics and Finance*, by M. Miranda and P. Fackler (MIT Press, 2002) is recommended.

The paperback edition is reasonably priced, and it is very useful for students wanting to specialize in this field. However, the exercises and examples included in the book rely on MATLAB, a programming language that we will not use. I checked, and I do not think that an electronic version is currently being sold.

A former UVic PhD student and I translated into Python all the codes that will be needed. Moreover, we included all the essential material in several Python notebooks that will be distributed during the term. For a more comprehensive treatment, please refer to the book.

An additional (optional) reading for students wanting to learn more is: *A Gentle Introduction to Effective Computing in Quantitative Research*, by H. Paarsch and K. Golyaev (MIT Press, 2016).

Software

Python is the required programming language for the course. In order to complete successfully this course, you *must* be able to run a version of Python 3.5 (or higher) on a computer you have easy (and frequent) access to.

There are three ways to do so. Using Anaconda is highly recommended, while the other two options might work as *temporary* fixes.

- Install Python and Jupyter with Anaconda, a free software which automatically links a number of packages and libraries we will heavily rely on:

<https://www.anaconda.com/products/individual>

Ideally, you should do this before the course will start. Given the class size, and the different operating systems the students use, I will not be in a position to provide help with the software installation (for example, I am not a Mac user). Please, do get in touch with the computer help desk instead (helpdesk@uvic.ca):

<https://www.uvic.ca/systems/services/contact/>

MS Windows users should be aware that, after the installation is complete, they might have to run Jupyter as an administrator (otherwise some features will not work). The Linux installations I tried (on Ubuntu/Lubuntu and CentOS) worked fine.

The other two *temporary* solutions are:

- UVic's computer help desk is suggesting to use the free online version of the JupyterLab environment (it's not a full installation, though, so some features are not supported):

<https://jupyter.org/try>

- Use the free web interface of Python and Jupyter maintained by Google (you only need a Google account, but the drawback is that some important features cannot be enabled):

<https://cybera.syzygy.ca/>

Course Content

Overview:

The goal of the course is to teach the students how to solve numerically different economic and statistical models. We will consider several applications that will span both micro and macroeconomic problems, and will require to apply appropriate numerical methods. Given the nature of computational work, this course is structured around a practical, “learning-by-doing” principle. Experiential learning is a key principle of this course. During the term, students will be asked to code and test their own computer programs. Although no prior extensive programming experience is required, proficiency in Python will become essential as the students tackle the assignments. Python is a free programming language, whose popularity has seen a spectacular increase in recent years. The availability of several reliable libraries, together with its top-notch plotting capabilities, make it a powerful tool and a valuable asset. Lab tutorials and exercises will initially focus on basic programming skills in Python, which will become more sophisticated as the term progresses. I strongly encourage the Econ 457 students to become proficient in Python: both the TA and myself will organize our teaching around it, and we will provide guidance and feedback on Python codes only. Given their fast rate of obsolescence, I will actively discourage the use of declining software (e.g., Gauss). One of the intended learning outcomes is to empower the students to analyze complex economic issues, being eventually able to provide a formal quantitative evaluation of (for example) policy reforms.

Lectures Outline (*Tentative Schedule*)

Topic	Chapter	Week	Due Dates
Introduction	1	1	
Programming Basics	1-2	2	
Linear Equations	2	3	Assignment 1
Macro Applications	-	4	
Non-Linear Equations	3	5	
Complementarity Problems	3	6	Assignment 2
Macro Applications		7	
Numerical Optimization	4	8	Assignment 3
Micro Applications	-	9	
Numerical Differentiation	5	9	
Numerical Integration	5	10	Assignment 4
Simulation	-	11	
Statistics Applications	-	12	Assignment 5
-	-	-	Classes end on April 6 th
457 Final Exam TBA – it will take place sometime between April 11 th -26 th 2023			

Grading Scheme

Assignments (5): 50% (five assignments submitted, best four marks kept, each worth 12.5%).
Final Exam (Take home): 50%.

Assignments: They are designed to allow the students to learn the course material in depth and prepare for the final exam. They will be posted on Brightspace and should be submitted in the dedicated assignment drop-boxes before their deadline. Students are encouraged to discuss with other classmates how to answer them. However, every student must submit their own work, independently written up, and list all people they worked with in the first page. During the term, there will be 5 assignments. All of them *must* be submitted. Failure to do so will affect negatively the final grade for the course (if there is no serious attempt at solving all problem sets, at least 10 points will be deducted). Answers must be submitted in specific file formats, and further details will be provided later in the course. The assignment with the lowest score will be discarded in the computation of the final grade. The other four will count 12.5% each. *Note:* if caught copying other students' answers, the assignment will receive a grade of 0, and will be counted directly in the overall grade for the course. In addition, the standard procedures pertaining Academic Integrity will also be initiated.

Assignments due dates: TBA. You should expect the deadlines for the assignments to be every other week. There may be some changes if necessary. *Note:* it is the student's responsibility to submit assignments in a timely fashion. In general, there will be no flexibility on when the assignments are due (or on how they have to be submitted).

Midterm: There is no midterm exam for this course.

Final exam: It will be a take-home exam, taking place in the April examination period: it will be handled via Brightspace. From the moment it will be circulated, the students will have at most two days to answer it. It will cover the material presented in the whole course. It will be open-book, but you will be asked to work by yourselves on each question. UVic's rules about cheating and plagiarism apply also to take-home exams. The print-outs of the codes used to generate the results will have to be submitted, and students might be asked to briefly explain them in a dedicated Zoom meeting. Unless agreed otherwise, the final exam scheduled by the University will be the day when the answers have to be submitted.

Answers must be submitted in a specific format, and further details will be provided later in the course. Without formal documented illness or affliction, no extensions will be granted on the final exam. If the final exam is submitted late, points will be deducted per minute past the due date/time.

Grade concerns should be brought to the instructor as soon as possible. The grades of each assessment component are final after one week of being distributed.

Students requesting to view their final exams must do so in writing, and must request it within one week of the grades being posted.

Mandatory Course Components: Submitting all assignments is mandatory. Also, failure to taking the final exam will result in a grade of N regardless of the cumulative percentage on the course. N is a failing grade and factors into GPA as a value of 0.

This course uses the standard Department of Economics grading scale:

A+	A	A-	B+	B	B-	C+	C	D	F or N
90-100	85-89	80-84	77-79	73-76	70-72	65-69	60-64	50-59	0-49

Students should review the University's more detailed [summary of grading](#).

Brightspace and Zoom

- Brightspace and Zoom are used extensively for the course. All students are expected to be fully functional with these systems.
- All course materials will be posted on Brightspace.
- All announcements will be posted on Brightspace. Students are advised to check it frequently.
- For support with technical issues, please get in touch with the Computer Help Desk: helpdesk@uvic.ca

E-mail: [@uvic.ca](mailto:mcozzi)

- You should contact me by email primarily on matters that relate to your personal participation, e.g. you have a medical condition that prevents you from taking an exam. General administrative matters, such as the arrangement and the format for the assignments or exams, will not be addressed via e-mail.
- E-mail is a terribly inefficient way of communicating regarding course material. Any clarifying questions about the syllabus and/or course content have to be asked before/during/after class, or during the online office hours. E-mails to me should be limited to missed assessment and personal concerns.
- If you contact me at my UVic e-mail address, please include your legal name (the name in the university records), student number and course title in the subject of your e-mail. Without such information, it is sometimes hard for the instructor to understand the nature of your queries. Please avoid inappropriate nicknames, e-mail id's and signatures. Text message lingo should not be used.

Copyright

All course content and materials are made available by instructors for educational purposes and for the exclusive use of students registered in their class. The material is protected under copyright law, even if not marked with a ©. **Any further use or distribution of materials to others requires the written permission of the instructor**, except under fair dealing or another exception in the Copyright Act. Violations may result in disciplinary action under the Resolution of Non-Academic Misconduct Allegations policy (AC1300).

Course Experience Survey (CES)

I value your feedback on this course. Towards the end of term you will have the opportunity to complete a confidential course experience survey (CES) regarding your learning experience. The survey is vital to providing feedback to me regarding the course and my teaching, as well as to help the department improve the overall program for students in the future. When it is time for you to complete the survey, you will receive an email inviting you to do so. If you do not receive an email invitation, you can go directly to <http://ces.uvic.ca>. You will need to use your UVic NetLink ID to access the survey, which can be done on your laptop, tablet or mobile device. I will remind you nearer the time, but please be thinking about this important activity, especially the following three questions, during the course.

1. What strengths did your instructor demonstrate that helped you learn in this course?
2. Please provide specific suggestions as to how the instructor could have helped you learn more effectively.
3. Please provide specific suggestions as to how this course could be improved.

Course Policies

This course adheres to the [Undergraduate Course Policies](#) of the Department of Economics that deal with the following issues:

- Academic concessions
- Academic integrity (plagiarism and cheating)
- Attendance
- Grading
- Inclusivity and diversity
- Late adds
- Late assignments
- Repeating courses
- Review of an assigned grade
- Sexualized violence prevention and response
- Students with a disability
- Term assignments and debarment from examinations
- Travel plans
- Waitlists

The following policies are explicitly included because of their importance.

Examinations

Attendance at all scheduled examinations is mandatory. Consideration for missed examinations will be given only on the basis of documented illness, accident or family affliction, and for no other reasons. In the event of a missed final examination, students are advised to follow the procedures outlined in the University Calendar.

Students are advised not to make work or travel plans until after the examination timetable has been finalized. Students who wish to finalize their travel plans early should book flights that depart after the end of the examination period. There will be no special accommodation if travel plans conflict with the examination.

University Policy on Human Rights, Equity and Fairness

The University is committed to promoting, providing and protecting a positive, supportive and safe learning and working environment for all its members.

Waitlist Policies

- Instructors have no discretion to admit waitlisted students or raise the cap on the course.
- Students on the waitlist should discuss with the instructor how to ensure they are not behind with coursework in the event they are admitted.
- Registered students who do not show up in the first seven calendar days from the start of the course may be dropped from the course.
- Registered students who decide not to take the course are responsible for dropping the course, and are urged to do so promptly out of courtesy toward waitlisted students.
- Waitlist offers cease after the last date for adding courses irrespective of published waitlists.

Classroom Etiquette

Behave politely and professionally. Do not create negative externalities. Do not disturb or distract your fellow students or the instructor.

Academic Integrity

Academic integrity requires commitment to the values of honesty, trust, fairness, respect, and responsibility. Students are expected to observe the same standards of scholarly integrity as their academic and professional counterparts. A student who is found to have engaged in unethical academic behaviour, including the practices described in the [Policy on Academic Integrity](#) in the University Calendar, is subject to penalty by the University.

Review [What is Plagiarism](#) for the definition of plagiarism. No form of plagiarism will be tolerated in this course. *Note:* Submitted work may be checked using plagiarism detection software.

Student Code of Conduct

The Humanities, Science, and Social Sciences Faculties have adopted this [Student code of conduct](#).

Educational Technology involving storage outside Canada

To the best of my knowledge, Zoom might store some personal information outside of Canada. If you are not comfortable with your personal information being stored outside of Canada, please speak to me within the first week of class about using an alternative (such as using an alias or nickname). Otherwise, by continuing in this course, you agree to the use of the educational technology in the course and the storage of personal information outside of Canada.

Accessibility & Health Resources

Centre for Accessible Learning

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, you are free to approach me. However, you must register with the [Centre for Accessible Learning](#) (CAL) for formal arrangements to be made. The CAL staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations. The sooner you let us know your needs the quicker we can assist you in achieving your learning goals in this course.

[Health Services](#) - University Health Services (UHS) provides a full service primary health clinic for students, and coordinates healthy student and campus initiatives.

[Support Connect](#) - a 24/7 mental health support service for students
Toll-free (calls from North America): 1-844-773-1427
International collect calls: 1-250-999-7621

[Counselling Services](#) - Counselling Services can help you make the most of your university experience. They offer free professional, confidential, inclusive support to currently registered UVic students.

[Elders' Voices](#) - The Office of Indigenous Academic and Community Engagement (IACE) has the privilege of assembling a group of Elders from local communities to guide students, staff, faculty and administration in Indigenous ways of knowing and being.

Repeating Courses

Be aware of the policy regarding the repeating of courses; see University Calendar. In order to request permission to attempt this course for the third time, you must follow the instructions provided under the Repeating Courses policy on the Economics website. Failure to obtain permission will result in deregistration from the course.

Territorial Acknowledgement

We acknowledge and respect the ləkʷəŋən peoples on whose traditional territory the university stands and the Songhees, Esquimalt and WSÁNEĆ peoples whose historical relationships with the land continue to this day.