Macroeconomics 1
ECON 712

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Course Objectives

This course is an introductory course to macroeconomic analysis for PhD students. It will start with a thorough review of the neoclassical growth model, the workhorse model of modern macroeconomics. We will study two key solution methods for this model, sequence methods and dynamic programming. Both of these are powerful methods for solving dynamic problems such as a firm's investment decision or a household's savings decision. Always building from microfoundations, we will then turn to applications that give an introduction to some of the central issues in modern macroeconomics. Topics to be covered include asset pricing, consumer theory, optimal policy, unemployment, and productivity and technical change. We will address questions such as "What explains the size of the excess return of equity over bonds?", "How can consumers insure against idiosyncratic shocks and what does this imply for macroeconomic variables and for inequality?", "What should the government tax to finance its expenditure?" and others. Although the course is mainly theoretical in nature, the model-based quantitative technique of calibration will also be introduced. We may also undertake a brief introduction to numerical analysis. The course serves as a base for the further study of macroeconomic analysis, and prepares you for Econ 713 (Macroeconomics 2). While we will not cover computational methods (much) in the course, studying them is highly complementary.

Where you can go from here: check this out:
`https://editorialexpress.com/conference/SED2018/program/SED2018.html` or
`https://docs.wixstatic.com/ugd/bf7db2_1b3690fc4dc944c29ce591567ad0b37e.pdf` or
`https://marketswithfrictions.com`.
From these examples and from the course content you can see that methods covered in the course are not just essential for doing and understanding research in macroeconomics, but also very useful for research in many other areas like labour economics, IO or development.

Administrative Issues

3 credits
2 lectures per week, Tue and Thu 10.05-11.25am in Arts 260, and online via Zoom. You will find the Zoom link in *mycourses*.
Note: All times refer to the Montreal time zone.

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Course delivery: Lectures will be delivered live on Tuesdays and Thursdays, 10:05am-11:25am. Each lecture (in-person as well as remote lectures) will be recorded and will be uploaded afterwards to *mycourses*. Thus, each student who cannot attend the live lecture (neither in-person nor remotely) can watch the recording later on *mycourses*.

   In-person lectures: Unless otherwise announced, the lectures are delivered in-person in Arts 260. Every registered student is welcome to attend in person. The room is part of a safely designed teaching hub, where physical distancing can be respected and strict hygienic rules are implemented to prevent the spread of Covid-19. In-person attendance is not required. Students can instead attend the live lecture remotely via Zoom. You will find the link on *mycourses*. Students attending remotely can ask live questions in the Zoom session, in the same way as students who attend in person.

   Remote lectures: In order to adjust to circumstances, the lecture mode can switch from in-person to remote lectures (and back) at any point during the term. A switch between modes will be announced as early as possible, and at the latest at 6pm on the evening preceding the lecture. Remote lectures will be accessible via the Zoom tab in *mycourses*.

   Both in-person and remote lectures will be recorded. The lecture mode (remotely or in-person) will be coordinated with ECON 709 to avoid conflicts in attendance.

Office hours: Thu noon-1pm via Zoom. On *mycourses,* I will provide a Doodle link that will allow you to sign up for a slot. You can then reach the office hours via this Zoom link: `https://mcgill.zoom.us/j/95215586903`. You will be in the waiting room until your time slot has come. If not all slots have been taken at 9pm of the evening preceding a week's office hours, you are welcome to sign up for an additional slot if needed. For appointments outside office hours, please email me.

Lecture Recordings: By enrolling in this course, you accept that lectures will be recorded. When attending a lecture "live" (remotely or in-person), your image, voice, and your name (or preferred name) may be recorded, and your instructor may call your name during the lecture. As such, this personal information will be disclosed to classmates, whether during the lecture or in viewing the recording. By attending a lecture "live", you consent to being recorded and you accept that personal information of this kind may be disclosed to others, whether during the lecture or when viewing the recording. If you are not comfortable being in a lecture that is recorded, you may decide to not attend "live". Students who do not attend the live lecture are able to watch the video recording of the lecture later in *mycourses*.

Requirements: This is the first course in macroeconomics in the program, and therefore only general familiarity with Masters-level macroeconomics and optimization techniques will be assumed. Dynamic programming will be introduced in the course, so it is NOT a prerequisite.

Textbook: There will not be a main textbook, but there are three main sources. In *Dynamic Economics*, MIT Press 2003, Jérôme Adda and Russell Cooper (AC) give an excellent treatment of dynamic programming that also conveys a lot of intuition. They also cover some applications. (ebook available at the library.)

The method and a vast array of macroeconomic applications are also covered in *Recursive Macroeconomic Theory* by Lars Ljungqvist and Thomas Sargent (LS), MIT Press 2018 (4th edition. ebook available at the library). (Key material is similar in the older editions; the newer ones contain more applications. You may also find these related notes by Sargent and Stachurski useful: `http://quant-econ.net/_static/pdfs/jl-quant-econ.pdf`)

A detailed technical treatment of dynamic programming with a few applications is given in *Recursive Methods in Economic Dynamics* by Nancy Stokey and Robert Lucas with Edward Prescott (SL), Harvard University Press 1989. (On reserve at the library.) This text is advisable for PhD students intending to work in macroeconomics or in other fields where dynamic programming is used.

In addition, we will rely on articles for some topics. I will also make rough lecture notes available.

Grading: Final exam (55%), midterm (35%), problem sets (10%).

The **midterm exam** will be made available through *mycourses* on October 26, 9am. You then have 48 hours to complete and upload your midterm exam to *mycourses* (until October 28, 9am). There will be no lecture on October 27. The midterm exam is a take-home exam, which follows the open-book format. That means that during the exam you will be allowed to consult resources as specified by the instructor, however you are not allowed to communicate with other people about any aspect of the exam. If you miss the midterm for medical reasons, its weight will be added to that of the final exam, if and only if you provide me with a valid medical note on or before Oct 30.

Final exam: The final exam will be made available through *mycourses* in the beginning of December (time and date *tba*, as determined by the university). After its release, you have 48 hours to complete and upload your final exam to *mycourses*. The final exam is a take-home exam, which follows the open-book format. That means that during the exam you will be allowed to consult resources as specified by the instructor, however you are not allowed to communicate with other people about any aspect of the exam.

Your electronic submission of the exams certifies that you have not, nor will you, consult with any other person about the exam, or any other subject related to it. Students who consult will be subject to disciplinary action as per the Student Code of Conduct.

Regrading: If you have any concerns regarding grading please get in touch with me. Mistakes in tallying scores would be corrected immediately. If you have other concerns about grading, please let me know. In such a case you must submit your entire exam for a regrade. Requests to regrade specific questions only will not be entertained.

Note: In the event of extraordinary circumstances beyond the University's control, the content and/or evaluation scheme in this course is subject to change.

Problem Sets: I aim to post a problem set on *mycourses* approximately weekly. Your solutions will be due one week later. Solutions should be submitted via *mycourses* in a single *pdf*

file. Random parts of each problem set will be graded. You are encouraged to work in groups of up to three students. (Hand in one solution per group.) No late problem sets will be accepted.

mycourses: I will use *mycourses* for posting relevant materials such as readings and problem sets and for making announcements. You should therefore regularly check the course's *mycourses* page.

Academic Integrity: McGill University values academic integrity. Therefore all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the code of student conduct and disciplinary procedures (see `http://www.mcgill.ca/integrity/` for more information). Note: According to Senate regulations, instructors are not permitted to make special arrangements for final exams. Please consult the Calendar, section 4.7.2.1, General University Information and Regulations at `www.mcgill.ca`.

Course Outline

This course outline is ambitious, so we might not be able to cover everything. Therefore, I maintain discretion regarding changes in this outline. The list of readings is not yet complete but the essentials, in particular the textbook chapters, are there. Where they do not stand alone, articles are complementary to the material discussed in the textbooks and in class.

1. Introduction (Lucas 1976)

2. Solving dynamic problems: Sequence Approach and Dynamic Programming (AC Ch. 2, 5, LS Ch. 3)

   (a) examples

   (b) theory

   (c) application to the neoclassical growth model

3. Asset Pricing (LS Ch. 13, Lucas (1978), Mehra and Prescott (1985))

   (a) theory

   (b) the equity premium puzzle

   (c) calibration

4. Introduction to Business Cycle analysis (Kydland and Prescott 1982, Prescott 1986, Plosser 1989, Mankiw 1989, Campbell 1994)

5. Consumption (AC Ch. 6, LS Ch. 16, 17, Aiyagari (1994), Huggett (1993))

   (a) precautionary savings

   (b) introduction to incomplete markets

   (c) inequality

6. Optimal Policy (LS Ch. 15, 20, Kydland and Prescott (1977), Chamley (1986))

   (a) taxes
   (b) time (in)consistency
   (c) the value of commitment

7. Unemployment (LS Ch. 6, Mortensen and Pissarides (1994), Shimer (2010))

   (a) frictions in search and matching in the labor market
   (b) unemployment over the business cycle

8. Productivity and technical change

   (a) embodied technical change (Greenwood, Hercowitz and Krusell (1997))
   (b) vintage capital (*tba*)
   (c) the productivity slowdown and subsequent acceleration (Greenwood and Yorukoglu (1997), Jovanovic (1997))

References

Aiyagari, S. R. (1994), 'Uninsured Idiosyncratic Risk and Aggregate Saving', *The Quarterly Journal of Economics* **109**(3), 659–684.

Campbell, J. Y. (1994), 'Inspecting the mechanism: An analytical approach to the stochastic growth model', *Journal of Monetary Economics* **33**, 463–506.

Chamley, C. (1986), 'Optimal Taxation of Capital Income in General Equilibrium with Infinite Lives', *Econometrica* **54**(3), 607–622.

Greenwood, J., Hercowitz, Z. and Krusell, P. (1997), 'Long-Run Implications of Investment-Specific Technological Change', *The American Economic Review* **87**(3), 342–362.

Greenwood, J. and Yorukoglu, M. (1997), '1974', *Carnegie-Rochester Confer. Series on Public Policy* **46**, 49–95.

Huggett, M. (1993), 'The Risk-Free Rate in Heterogeneous-Agent Incomplete-Insurance Economies', *Journal of Economic Dynamics and Control* **17**(5/6), 953–970.

Jovanovic, B. (1997), 'Learning and growth', *Advances in Economics and Econometrics: Theory and Applications: Seventh World Congress* .

Kydland, F. E. and Prescott, E. C. (1977), 'Rules Rather than Discretion: The Inconsistency of Optimal Plans', *The Journal of Political Economy* **85**(3), 473–492.

Kydland, F. and Prescott, E. (1982), 'Time to build and aggregate fluctuations', *Econometrica* **50**(6), 1345–1370.

Lucas, R. E. (1978), 'Asset Prices in an Exchange Economy', *Econometrica* **46**(6), 1429–1445.

Lucas, R. E. J. (1976), 'Econometric policy evaluation: a critique', *Carnegie-Rochester conference series on public policy* **1**(2), 19–46.

Mankiw, N. G. (1989), 'Real business cycles: A new keynesian perspective', *Journal of Economic Perspectives* **3**(3), 79–90.

Mehra, R. and Prescott, E. (1985), 'The Equity Risk Premium: A Puzzle', *Journal of Monetary Economics* **15**(2), 145–61.

Mortensen, D. T. and Pissarides, C. A. (1994), 'Job Creation and Job Destruction in the Theory of Unemployment', *The Review of Economic Studies* **61**(3), 397–415.

Plosser, C. (1989), 'Understanding real business cycles', *Journal of Economic Perspectives* **3**(3), 51–77.

Prescott, E. C. (1986), 'Theory ahead of business cycle measurement', *Federal Reserve Bank of Minneapolis Quarterly Review* pp. 9–22.

Shimer, R. (2010), *Labor Markets and Business Cycles*, Princeton University Press.