Econ 3040
Fall 2022
Prof. Daniele Coen-Pirani

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Syllabus for

Macro Theory 1

Objectives of the Course
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This course is the first half of the first-year graduate sequence in macroeconomic theory. The class has several objectives. First, we will introduce the workhorse model used in macroeconomics, i.e. the neo-classical growth model. We will study deterministic and stochastic versions of this model. Second, we will study the mathematical tools needed to construct and solve (analytically and numerically) this model as well as other types of dynamic models, such as models of search. These tools include dynamic optimization, difference equations, linearization methods, dynamic programming, etc. The third objective is to use these concepts and tools to discuss a few "classic" macro topics in fiscal and monetary theory and in the theory of business cycles.

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Readings
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The main reference for the class are my handouts and slides. The handouts will cover every topic of the class. Below I list a number of useful graduate macro textbooks that you might want to consult to complement the handouts. They are all good books but they organize the material differently and some emphasize different topics from the one we will focus on. Keep in mind that macroeconomics is an extensive field and that this first-semester macro class is an introduction to the field.

- Jianjun Miao's *Economic Dynamics in Discrete Time*, MIT Press, Second Edition. Explains in detail difference equations and standard models in macro.

- Acemoglu Daron, *Introduction to Modern Economic Growth*, Princeton University Press, 2009. A very comprehensive book, confers both discrete and continuous time methods. It is typically used in the second-semester macro class so you might want to purchase it now.

- Ljungquist, Lars and Sargent Thomas, *Recursive Macroeconomic Theory*, MIT Press, 2004. Useful reference book on many macro topics.

- Stokey, Nancy, Robert Lucas, with Edward Prescott, *Recursive Methods in Economic Dynamics*, Harvard University Press, 1989. This is a useful reference book on dynamic programming and recursive equilibria.

- DeJong, David and Chetan Dave, *Structural Macroeconometrics*, Princeton University Press, Second Edition 2011. This is a useful book on linearization solution methods and estimation of dynamic models.

- Heer Burkhard and Maussner Alfred, *Dynamic General Equilibrium Modelling. Computational Methods and Applications*, Springer, 2005. A useful book about solving a variety of macro models with detailed step-by-step instructions and computer codes.

- Jordi Gali, *Monetary Policy, Inflation and the Business Cycle*, Princeton University Press, 2015. This is a good textbook on New Keynesian models of monetary policy.

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Programming language

The programming software used throughout the course is Matlab. You can download it for free from the University of Pittsburgh's software download page (at my.pitt.edu). Some of the homework assignment will require you to do some coding in Matlab. If you prefer to use other software (e.g. Python, Julia, etc), instead of Matlab, feel free to do so.

Schedule

We will meet on Tuesdays and Thursdays, 10:30am-11:45am in room 4940, for in-person lectures. In addition, Ruiyu Zhu, the course's TA, will hold weekly recitation sessions on Friday, 10:30am-11:45am in room 4900. During the recitations you will review the solutions to the assignments or cover topics related to the ones covered in class. Attendance to lectures and recitations is mandatory and expected. If you cannot attend a lecture or a recitation, you need to contact me and Ruiyu ahead of time and provide a valid excuse. Lack of consistent attendance might lead you to a failing grade in the class.

Grading and Homeworks

There will be a mid-term (40% of grade; tentatively scheduled for Thursday, October 6th) and a final exam (40% of grade; the week of December 12th); weekly homeworks (15% of grade); class participation (5% of grade). Homeworks will be assigned on Friday and will generally be due the following Friday by 9am on Canvas.

Office, Teaching Assistant, Web Site

My office is 4710, e-mail `coen@pitt.edu`. The best way to contact me is by e-mail. My office hours will be on Tuesdays and Thursdays 2-3pm in my office or by appointment at other times. The teaching assistant for the class is Ruiyu Zhu. His e-mail is `ruz63@pitt.edu`. His office hours will be on Thursdays, 3–5pm in conference room 4119. His office number is 4512. The course has a Canvas page where you will find classroom slides, handouts, assignments, etc.

Topics Covered in the Class

- **Introduction, measurement in macroeconomics, and stylized facts**.

- **Solow's growth model**.

- **Deterministic difference equations.**

- **Deterministic consumption-savings problems.**

- **Deterministic neo-classical growth model.**

- – Planning problem and welfare theorems
- – Linearization around the steady state
- – Fiscal policy in the neo-classical growth model

- **Monopolistic Competition**

- **Markov chains and stochastic difference equations.**

- **Dynamic programming.**

  - – Applications of dynamic programming

- **Neoclassical growth model with uncertainty.**

  - – The real business cycle model

- **Search and matching models of unemployment.**

- **The Aiyagary model.**