Overview: This is a graduate course in the second year macroeconomics field. I will teach the first half until fall break and Chris Sims the second half (Chris will provide a separate reading list). My part of the course will partly focus on substance and partly on tools. In terms of substance, we will be concerned with the role of income and wealth distribution (or more generally heterogeneity) in the macroeconomy. We will first cover some theories aiming to explain why income and wealth are so unequally distributed and why inequality has increased over time in many developed countries, and then explore the implications of income and wealth heterogeneity for macroeconomic dynamics and macroeconomic policy. The models we cover have implications for both cross-sectional data and for time series behavior of an economy as a whole. At the beginning of the course we will cover a number of tools, namely continuous time methods that are useful for macroeconomics, particularly for analyzing models where the relevant state variable is a distribution. These include Hamiltonians, Stochastic Calculus, Hamilton-Jacobi-Bellman equations, and Kolmogorov Forward Equations. Rather than presenting an in-depth technical derivation of the methods from first principles, my aim is to provide you with a “cookbook” for you to use these methods in your own research and then to cover a few applications.

Organization: The class meets on Mondays and Wednesdays from 10:40am to 12:10pm. A preliminary syllabus is attached. I will add papers throughout the course. All lecture slides are available from my website http://www.princeton.edu/~moll/notes.htm.

Grading: Your course grade will be based on a few problem sets (20% of the grade) and either a take-home final or a term paper (80% of the grade). On a given problem set you can get one of the following grades: 0, 3, 4 and 5 (read: if you don’t do the problem sets it will cost you 20% of the grade). You can choose between either writing a term paper or a take-home final.

- Term paper: final paper due on day before take-home final handed out (TBD). One-page proposal due on December 11. Your choice of paper should be consistent with your interests. The written project should be on an original research idea, necessarily related to the course’s topics (including Chris’ part). Descriptions or reviews of the literature are acceptable but not as ambitious. In any case, your idea should be expressed in the context of the relevant literature. Only one idea per project, please!
- Take-home final: at the end of January, at date set by registrar (TBD), covering both Chris’ and my part of the course.

1. Deterministic Continuous Time Methods

1.A Methods:

Lecture Notes: Hamiltonians and Phase Diagrams

Acemoglu (2010), Chapter 7 “Review of the Theory of Optimal Control” in “Introduction to Modern Economic Growth”

1.B Applications:

Lecture Notes: Neoclassical Growth Model in Continuous Time


Acemoglu (2010), Chapter 8 “The Neoclassical Growth Model” in “Introduction to Modern Economic Growth”
Lecture Notes: “New Keynesian Model in Continuous Time” (useful for HANK papers in Section 3.D)

Additional readings


2. Stochastic Continuous Time Methods, Modeling Distributions

2.A Methods:

Lecture Notes: Stochastic Calculus, Hamilton-Jacobi-Bellman Equations, Kolmogorov Forward Equations, Finite Difference Methods

Codes for finite difference solution to HJB and KF equations:
http://www.princeton.edu/~moll/HACTproject.htm


    - slightly simplified version: http://elaine.ihs.ac.at/~mreiter/simplesims.pdf

2.B Applications:


3. Income and Wealth Distribution in Macroeconomics

3.A Prerequisites (Not Taught)


3.B Resources for numerical solution of discrete-time heterogeneous agent models (not taught)


Gianluca Violante’s lecture notes and codes: 
Macroeconomic Theory I: https://sites.google.com/a/nyu.edu/glviolante/teaching/macrotheory
Quantitative Macroeconomics: https://sites.google.com/a/nyu.edu/glviolante/teaching/quantmacro15

3.B Empirical Evidence


3.C Theories of Income and Wealth Inequality


3.D Macroeconomic Implications of Income and Wealth Heterogeneity


Reiter (2009b), “Approximate and Almost-Exact Aggregation in Dynamic Stochastic Heterogeneous-Agent Models”


Additional readings


3.E Inequality and Growth


4. Firm Heterogeneity

4.A Methods: Stopping time problems

Stokey (2008), Chapter 6 “Exercising an Option” from “The Economics of Inaction: Stochastic Control Models with Fixed Costs”


4.B Theories of Firm Size Distribution


4.C Macroeconomic Implications of Firm Heterogeneity


Additional readings on firm heterogeneity


Khan and Thomas (2008), “Idiosyncratic shocks and the role of nonconvexities in plant and aggregate investment dynamics” Econometrica