ECONOMICS 200A:
Microeconomics

Fall 2021

Basic information

Lectures	Tu/Th 7:30-9:20, Econ 300
Instructor	Prof. Alexis Akira Toda
Office hours	Tu 14:00-15:00, Commons
Email	atoda@ucsd.edu
Webpage	`https://alexisakira.github.io/`
	(Go to `Teaching` → `Econ 200A`)
TA	Kelvin Leong, mleong@ucsd.edu

Course description

Carl Friedrich Gauss said mathematics is the queen of the sciences (and number theory is the queen of mathematics).[1] Paul Samuelson said economics is the queen of the social sciences.[2] Not surprisingly, modern economics is a highly mathematical subject.

The first 7.5 weeks of Econ 200A covers the following topics:

1. Mathematical economics (classical general equilibrium theory)

2. Dynamic programming (topics not covered in math camp)

3. Theory of power law (my favorite research topic)

Mathematical economics studies the mathematical foundations of economic theory in the approach known as the Arrow-Debreu model of general equilibrium. Partial equilibrium (things like demand and supply curves), which you have probably learned in college, considers each market separately. General equilibrium (GE for short), on the other hand, considers the economy as a whole, taking into account the interaction of all markets. Treating the economy as a whole allows economists to draw normative predictions such as efficiency.

The abstract theory of general equilibrium with complete markets (GE for short) was pioneered by Kenneth Arrow, Gerard Debreu, Lionel McKenzie, etc., in the 1950s. GE has strong normative predictions (e.g., efficiency) but few quantitative predictions (Sonnenschein-Mantel-Debreu theory, which will be briefly touched upon). The abstract theory of general equilibrium with incomplete markets (GEI for short) was pioneered by Peter Diamond, Oliver Hart, Darrell Duffie, John Geanakoplos, etc., in the 1970-1980s. It gave up most of the normative predictions without much gain in quantitative predictions. The *abstract* theory of both GE and GEI is matured and I do not recommend writing a dissertation on these topics. However, general equilibrium is now

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[1] `http://en.wikiquote.org/wiki/Carl_Friedrich_Gauss`
[2] Samuelson "Economics", 10th edition, preface.

applied everywhere—in macro, finance, trade, etc.—and there is a recent growing and fascinating literature that applies general equilibrium theory in specific contexts.

Due to the time constraint, this course covers only the abstract theory of general equilibrium with complete markets with a few applications in macro, finance, and trade.

Textbook

Lectures will be based on my lecture notes posted at my website. In addition, the following textbooks may be useful, though none of them are required.

Debreu (1959) Classic, concise description of the general equilibrium theory.

Mas-Colell et al. (1995) Standard graduate-level textbook.

Starr (2011) This book is written by UCSD Emeritus Professor Ross Starr, who has taught this course for many years before I took over. It does not contain many examples but is self-contained and pedagogic in that it proceeds from the easy and special case to the difficult and general case. An added bonus is an accessible proof of the Brouwer fixed point theorem.

Bewley (2007) This book is roughly at the same level as Starr (2011), but contains lots of examples and exercises and thus may complement your study.

The course will use a lot of math. Thorough familiarity with Math Camp (Econ 205) material is assumed. Relevant topics are basic linear algebra (but not much), calculus, convex analysis, and constrained optimization. For the last two topics, either Sundaram (1996) or my lecture notes for Econ 205 Mathematics for Economics (posted at my website) might be useful.

Preliminary course outline

1. Introduction

2. Definition of Arrow-Debreu model

3. Quasi-linear model: mathematical formulation of Bentham's "greatest happiness principle"

4. First and second welfare theorems: mathematical formulation of Smith's "invisible hand"

5. Existence of equilibrium (correspondences, maximum theorem, Brouwer and Kakutani fixed point theorems)

6. Computation and uniqueness of equilibrium

7. International trade

8. Finance

9. Theory of dynamic programming

10. Theory of power law

Assignments

There will be weekly assignments. Each assignment will be due the following week. I recommend you typeset your solution using LaTeX (resources are available on my website). You need to submit your assignments to Canvas in a PDF format.

Exam

There will be a midterm on the last day of the class (Tuesday November 9).

Grade

The weights are 40% assignments and 60% midterm on a 0-100 scale. In addition, if you find errors and typos in my lecture note, you will receive an extra credit of one point.

Questions

The best opportunity to ask questions is *during* the class, for two reasons. First, you can resolve your question immediately (assuming—well—I know the answer). Second, your classmates are likely to have similar questions, so they can benefit from questions being resolved and I benefit by saving time. So, don't be shy, please ask questions. If you have a question outside of class that cannot be resolved by a Google search or discussing with your classmates, you can show up during my office hour listed above (no appointment necessary).

References

Truman F. Bewley. *General Equilibriuim, Overlapping Generations Models, and Optimal Growth Theory.* Harvard University Press, Cambridge, MA, 2007.

Gerard Debreu. *Theory of Value.* Cowles Foundation Monograph 17. Yale University Press, New Haven, 1959.

Andreu Mas-Colell, Michael D. Whinston, and Jerry R. Green. *Microeconomic Theory.* Oxford University Press, Cambridge, Massachusetts, 1995.

Ross M. Starr. *General Equilibrium Theory: An Introduction.* Cambridge University Press, second edition, 2011.

Rangarajan K. Sundaram. *A First Course in Optimization Theory.* Cambridge University Press, NY, 1996.