EC 744: Economic Dynamics

Prof. Jianjun Miao

Spring 2012

Schedule  Thursday 5:30-8:00pm at SSW 315.

Office Hours  Tuesday 11:00-12:30pm and Wednesday 2:00-3:30pm, or by appointment

Contact

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- Homepage: http://people.bu.edu/miaoj

Course Overview  This course introduces the theory and application of dynamic optimization and equilibrium analysis in discrete time. It aims at providing necessary techniques for graduate students to analyze economic dynamics. The topics focus on analyzing and solving discrete-time dynamic programming problems in economics and finance. We will put more emphasis on applications by solving many economic examples such as consumption/savings, investment, optimal growth, industry dynamics, job search, recursive utility, portfolio choice, and asset pricing. We will also study computational methods because they become important in economics and finance. We will focus on the discrete state space method (value function iteration) and the projection method. The best way to learn computational methods is learning-by-doing. Thus, students are expected to complete a computation project.
Course Web Site  The class material (syllabus, lecture notes, announcements, problem sets, additional readings) will be posted on Boston University Blackboard 8. Use your BU username and Kerberos password.

Textbooks  Teaching will be based mostly on my book and my lecture notes. My incomplete book can be downloaded from http://people.bu.edu/miaoj/DynamicsI.pdf. I will produce lecture notes that will be made available on the course web site. The following textbook is required, which can be purchased from internet bookstores such as Amazon or Barnes&Nobel.


The following books are highly recommended. You may find them from internet bookstores.

- Azariadis, Costas, 1993, Intertemporal Macroeconomics, Blackwell Publisher.

Course Requirements and Grades  Class attendance is required. Students are required to read textbooks before each class, and are expected to actively participate in classes. The final course performance is based on the following weights:

- Class participation: 10%.
- Homework: 30%
• Computation project: 30%
• Presentation: 30%

**IMPORTANT**  It is your responsibility to plan your travel around exams dates. In particular, the date of the final exam is determined by the Registrar and cannot be changed for any reason. All exams are required. If you miss an exam without an acceptable excuse, you will receive a grade of zero. The only exceptions will be for a verified family emergency or for an illness or injury that is confirmed by the University Medical Clinic or other doctor. If you miss an exam for a legitimate reason, you will take a makeup exam.

**Academic Conduct**  It is your responsibility to know and understand the provisions of the CAS Academic Conduct Code (http://www.bu.edu/cas/academics/programs/conductcode.html). Cases of suspected academic misconduct will be referred to the Dean’s Office. Any student found guilty of cheating on an exam in this course will receive a minimum penalty of a zero grade for that exam.
COURSE OUTLINE

1 Deterministic Difference Equations
   • Scalar Linear Equations
   • Linear Systems
   • Nonlinear Systems

2 Stochastic Difference Equations
   • Linear Systems
   • Nonlinear Systems
   • Dynare

3 Markov Processes
   • Markov Chains
   • Markov Processes
   • Transition function
   • Stationary distribution

4 Markov Decision Process Model
   • Setup
   • Examples
5 Finite-Horizon Dynamic Programming
- Bellman equation
- Maximum Principle

6 Infinite-Horizon Dynamic Programming
- Bellman equation
- Maximum Principle
- Euler equations

7 Applications
- Option exercise
- Consumption/saving
- Investment

8 LQ Models
- Bellman equation
- Euler equation
- Policy function

9 Control under Partial Information
- Filters
- Control
10 Numerical Methods

- Numerical integration
- Discretizing AR(1)
- Interpolation
- Perturbation methods
- Projection methods
- Numerical DP
Schedule

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