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

- Office: Room 434, 270 Bay State Road
- E-mail: miaoj@bu.edu
- Phone: 353-6675.
- 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.

- Stokey, N. and R.E. Lucas with E. Prescott, 1989, Recursive Methods in Economic Dynamics, Harvard University Press. (SLP)

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

- Adda, J. and R. Cooper, 2003, Dynamic Economics: Quantitative Methods and Applications, The MIT Press.
- Azariadis, Costas, 1993, Intertemporal Macroeconomics, Blackwell Publisher.
- Judd, K., 1998, Numerical Methods in Economics, Cambridge, MA: MIT Press
- Lundquist, Lars and Thomas J. Sargent, 2004, Recursive Macroeconomic Theory, 2nd edition, MIT Press.
- Miranda, M.J. and P.L. Fackler, 2002, Applied Computational Economics and Finance, MIT Press.

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

	Thursday	
Week 1	Jan 19	Dynamical system
Week 2	Jan 26	Dynamical system
Week 3	Feb 02	Dynamical system
Week 4	Feb 09	Finite-Horizon DP
Week 5	Feb 16	Infinite-Horizon DP
Week 6	Feb 23	Applications
Week 7	March 1	LQ Control
Week 8	March 8	Numerical Methods
Week 9	March 15	Spring Recess
Week 10	March 22	Numerical Methods
Week 11	March 29	Numerical Methods
Week 12	April 5	Presentation
Week 13	April 12	Presentation
Week 14	April 19	Presentation
Week 15	April 26	Presentation