Course Overview  This course introduces the theory and application of quantitative methods in economics and finance. It aims at providing necessary techniques for graduate students to analyze economic dynamics. The topics focus on analyzing and solving discrete-time difference equations and 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, RBC models, 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.

Textbooks  Teaching will be based mostly on my book.


Related materials can be downloaded from https://sites.google.com/site/jianjunmiaobook/. I will produce lecture notes that will be made available on the Blackboard course website when necessary. The following textbook is the classic, 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 OUTLINE**

1 **Deterministic Difference Equations**
   - Scalar Linear Equations
   - Linear Systems
   - Nonlinear Systems
   - Chapter 1

2 **Stochastic Difference Equations**
   - Linear Systems
   - Nonlinear Systems
   - Dynare
   - Chapter 2
3 LQ Models

- Bellman equation
- Euler equation
- Policy analysis
- Chapter 9

4 DSGE Solution and Estimation

- RBC models
- Bayesian methods
- Dynare
- Chapters 14-15

5 Dynamic New Keynesian Models

- A Basic DNK model
- Monetary policy design
- Chapter 19