

Macroeconomic Theory I

Economics 608

Tues/Thurs 1:10 – 2:40

Module 1 (Fall 2013)

Rawls 2079

Purdue University
Krannert School of Management
Department of Economics

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Prerequisites

None

Course description

The course will introduce the major mathematical tools and the theoretical foundations required for macroeconomic analysis. The course covers the models and methodologies of the Real Business Cycle (RBC) school of macroeconomic thought. The primary characteristic of RBC models is that they are ‘micro-founded’. This means that the equilibrium characterizations of price and welfare effects are derived from the fundamentals of individual preferences, firm technologies, and institutional structures.

This course focuses on deterministic models with homogeneous agents, where the canonical model to be considered is the neoclassical growth model. The course will introduce the mathematical preliminaries (notably dynamic programming), the properties of the deterministic models, and the recursive competitive equilibrium concept. Econ 611 (Module 2) and Econ 612 (Module 3), which are taught by Professor Cathy Zhang and Soojin Kim, respectively, will build off of these basic concepts and present material on stochastic models with heterogeneous agents (both with and without complete markets), search theory, monetary theory, growth theory, and models with information and commitment frictions.

All together, the first year macroeconomic core will train you to formally analyze how firms and consumers allocate resources in a competitive setting and how the allocation and prices (wages and interest rates) respond to changes in policy and institutions.

Learning outcomes

- Acquire the necessary mathematical tools to be able to analyze micro-founded models of production and savings.
- Use the tools of dynamic programming to characterize the solutions to recursive constrained optimization problems.
- Apply the concept of a Recursive Competitive Equilibrium to a variety of macroeconomic settings.

Course materials

There is no mandatory course textbook, but the following texts are excellent reference sources. They are both at the Reserve Desk in the Roland G. Parrish Library of Economics and Management (2nd floor of Krannert).

- [SL89] Recursive Methods in Economic Dynamics by Nancy L. Stokey and Robert E. Lucas with Edward C. Prescott (Harvard University Press, Cambridge, Mass., 1989).
- [AC03] Dynamic Economics: Quantitative Methods and Applications by Jerome Adda and Russell Cooper (MIT Press, Cambridge, Mass., 2003); also available in online format from the Purdue Libraries “Ebrary” resource.

The following materials have been collected over the years and have proven useful for the course material, especially if your background in mathematics (specifically real analysis) or classical economic theory (as in an undergraduate Intermediate Microeconomics course) is incomplete.

- [R76] Principles of Mathematical Analysis, Third Edition by Walter Rudin (McGraw-Hill, New York, 1976).
This classic text can be found online.
- [D59] Theory of Value: An Axiomatic Analysis of Economic Equilibrium by Gerard Debreu (Yale University Press, New Haven, 1959).
This classic text can be found here: <http://cowles.econ.yale.edu/P/cm/m17/>
- [S03] Mathematics for Economists (Math Camp) by Sankar Mukhopadhyay (Penn manuscript, 2003).
These notes can be found at the bottom of my teaching page:
<http://www.matthew-hoelle.com/teaching.html>
- [W06] Dynamic Programming by Randall Wright (Penn manuscript, 2006).
These notes are at: http://www.matthew-hoelle.com/1/75/resources/document_585_1.pdf
- [H13] General Equilibrium Models by Matthew Hoelle (Purdue manuscript, 2013).
These notes are available on the lower-right hand side of my teaching page:
<http://www.matthew-hoelle.com/teaching.html>

Course structure (14 lectures)

The course will contain 14 lectures with a Final Exam taking place during the final meeting period (Thursday, October 10).

Date	Topic	References
August 20	Course Introduction; Neoclassical Growth Model	D59 , Chapter 1
August 22	Basic Topology	R76 , Chapters 2-4 S03 , Chapters 2, 5, 6, 8
August 27	Normed Vector Spaces	SL89 , Chapter 3
August 29	First and Second Basic Welfare Theorems	SL89 , Section 15.2
September 3	Extreme Value Theorem	
September 5	Kuhn-Tucker Conditions	H13 , Sections 1.1-1.2
September 10	Euler Equations	
September 12	Sequence of Markets Equilibrium (SME)	
September 17	Sequence of Markets Equilibrium Easy (SMEE)	
September 19	Dynamic Programming I: Correspondences	H13 , Section 1.3 W06 AC03 , Chapter 2 SL89 , Chapter 3
September 24	Dynamic Programming II: Blackwell	W06 AC03 , Chapter 2 SL89 , Chapter 3
September 26	Dynamic Programming III: Envelope Theorem	W06 AC03 , Chapter 2 SL89 , Chapter 4
October 1	Recursive Competitive Equilibrium (RCE)	AC03 , Chapter 5 SL89 , Chapter 5
October 3	RCE Applications	
October 8	October Break Holiday: No Class	
October 10	Final Exam (in class)	
October 15	No class meeting (Module 2 begins on October 16)	

Methodology

The course will be based on a series of lectures. The lectures are comprehensive, but can be supplemented by the reference texts cited above. The lectures are supported by:

1) Exercises and quizzes

At the end of every lecture, I will assign several short exercises to be completed at home. At the beginning of the following lecture, students will turn in their solutions to the assigned exercises. Occasionally, I may use 'pop' quizzes to confirm that students are reviewing lectures notes.

Each exercise is graded on a 5-point scale based on correctness, with partial credit given as a strictly increasing function of effort. Quizzes (unannounced, closed notes, closed books) will contain 1-2 questions, each worth 5 points. Quiz questions will ask students to reproduce an equation, theorem, or result from the previous lecture. Make-up quizzes will not be given.

Solutions to all exercises will be posted on the class webpage located at www.matthew-hoelle.com/teaching.html.

2) Final Exam

During the final meeting period (Thursday, October 10), a Final Exam will be given (closed notes, closed books). The exam will cover all the material covered in the 14 lectures. Students are permitted 80 minutes to complete the exam. A make-up exam will not be given.

The exam breakdown is as follows:

2/3 weight: Deterministic Growth Model

- See Econ 608 Fall 2012 Final Exam, Question 1 for a typical question and answer.
- Also, consider the exercise applications distributed on October 1 (and discussed in class on October 3).

1/3 weight: Potpourri

- One possibility is Dynamic Programming.
- A second possibility is First Basic Welfare Theorem.
- A third possibility is Second Basic Welfare Theorem.
- A fourth possibility is Extreme Value Theorem.
- A fifth possibility is Kuhn-Tucker Theorem.

Assessment

Exercises and Quizzes	50%
Final Exam	50%