

Macroeconomic Theory I

Economics 608
Mon/Wed 1:10-2:40

Module 1 (Fall 2015)
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 at the graduate level. The course covers the Real Business Cycle (RBC) class of models, though the tools are applicable to the New Keynesian class of models as well. The unifying characteristic of both classes of models, and all models in modern macroeconomic research, 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 Professors Cathy Zhang and Soojin Kim, respectively, will utilize these basic concepts to study 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 courses will provide you the training necessary to analyze how firms and consumers respond in a dynamic setting to market incentives and the effects of macroeconomic policy on wages, interest rates, and welfare.

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 supplement the course material:

- [W06] Dynamic Programming by Randall Wright (Penn manuscript, 2006). These notes are available at the following link: http://www.matthew-hoelle.com/1/75/resources/document_585_1.pdf
- [H14] A Short Course in Real Analysis: Slides by Matthew Hoelle (Purdue manuscript, 2014). These notes are available at the following link: http://www.matthew-hoelle.com/1/75/resources/document_721_1.pdf
- [WT] Welfare Theorems Practice Problems: http://www.matthew-hoelle.com/1/75/resources/document_713_1.pdf
- [KT] Kuhn-Tucker Practice Problems: http://www.matthew-hoelle.com/1/75/resources/document_714_1.pdf
- [DP] Dynamic Programming Practice Problems: http://www.matthew-hoelle.com/1/75/resources/document_715_1.pdf

Course structure (14 lectures)

The course will contain 14 lectures with a Final Exam taking place during the final meeting period (Monday, October 19).

Date	Topic	References
August 24	Course Introduction; Neoclassical Growth Model (Planner's Problem)	
August 26	Neoclassical Growth Model (Continuous time)	
August 31	Neoclassical Growth Model (Equilibrium)	
September 2	Real Analysis (general metric spaces)	H14 , study all slides before class
September 9	Arrow-Debreu Equilibrium (ADE)	SL89 , Chapter 3 WT
September 14	Welfare Theorems	SL89 , Section 15.2 WT
September 16	Kuhn-Tucker Conditions; Euler Equations	KT
September 21	Sequence of Markets Equilibrium (SME)	KT
September 23	Dynamic Programming I: Correspondences	W06 AC03 , Chapter 2 SL89 , Chapter 3 DP
September 28	Dynamic Programming II: Blackwell	W06 AC03 , Chapter 2 SL89 , Chapter 3 DP
September 30	Recursive Competitive Equilibrium (RCE)	AC03 , Chapter 5 SL89 , Chapter 5
October 5	RCE (taxation and population growth)	AC03 , Chapter 5 SL89 , Chapter 5
October 7	RCE Applications 1	
October 12	OCTOBER BREAK: No Class	
October 14	RCE Applications 2	
October 19	FINAL EXAM (in class)	

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) *Practice problems*

The practice problems [WT], [KT], and [DP] are available on my website at the links contained above.

Students are expected to complete the practice problems. The practice problems will not be collected nor graded.

2) *Quizzes*

There will be 3 unannounced “pop” quizzes given during the semester.

- Quiz 1: Growth Models will cover the 3 lectures of August 24, August 26, and August 31.
- Quiz 2: Welfare Theorems will cover the 3 lectures of September 2, September 9, and September 14 (including Welfare Theorems Practice Problems).
- Quiz 3: Kuhn-Tucker will cover the 2 lectures of September 16 and September 21 (including Kuhn-Tucker Practice Problems).

3) *RCE Applications*

On October 5, students will be assigned to groups and given a RCE Application to solve. The group presentations will take place on October 7 and October 14.

Each member of the group receives the same grade.

4) *Final Exam*

During the final meeting period (Monday, October 19), 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 Final Exam will focus on material since Quiz 3, but will still be a cumulative exam covering the material from all lectures.

Questions and Solutions for the Final Exams from the previous 3 years of Econ 608 (2012-2014) can be found on my website.

Assessment

Quizzes	37.5% (12.5% for each quiz)
RCE Applications	12.5%
Final Exam	50%