

# Econ 7020: Macroeconomic Theory I

University of Colorado, Boulder - Fall 2016

Mon-Wed, 9:30am-10:45am, Economics 119

Instructor: Giacomo Rondina

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Syllabus - Version 1.0

## DESCRIPTION OF THE COURSE

The objective of this course is to get you acquainted with the techniques that researchers use to develop and study models of dynamic aggregate economies. At the center stage of the class we will place the Neoclassical Growth Model. We will use such framework to apply the dynamic techniques that we learn to formulate theoretical answers to important macroeconomic questions, and to understand the implications that the theory has for econometric practice. The focus of the class will be in developing skills for writing and analyzing theoretical models to discuss important economic issues, with the discipline and the insight offered by economic theory in general equilibrium.

## COURSE ORGANIZATION

I will hold the lectures on Mondays and Wednesdays from 9:30am to 10:45am in Economics 119. Minghui and Brian (our TA's) will hold weekly recitation sessions, dates and times TBD. I will hold office hours on *Mondays* from 1:30pm to 3:00pm in Economics 14A. Please check with Minghui and Brian about their office hours. If you have questions/comments/doubts, you are strongly encouraged to stop by. If you cannot make it at the scheduled time, I will be happy to set up an appointment at a time convenient for both of us.

Problem sets will be regularly assigned on the material covered in class. I strongly encourage you to work in study groups on the assignments; however, the responsibility for the content of the homework remains individual and I expect you to turn in your own version of the answer. I will announce in class and by email when each assignment is due. Late assignments will not be accepted. Of the  $n$  problem sets assigned, only  $n - 1$  will count towards your final grade; the one with the lowest grade will be dropped.

There will be two exams in the quarter: a midterm exam and a final exam. The tentative dates are as follows

- Midterm Exam, tentative date Monday October 17<sup>th</sup>, time and location TBD.
- Final Exam, tentative date Thursday December 15<sup>th</sup>, time and location TBD.

Your final grade in the class will be determined as a weighted average of your grade in the problem sets (20%), your grade in the midterm (40%) and your grade in the final exam (40%).

#### TEXTBOOKS AND LECTURE NOTES

The main textbook for the class is Ljungqvist and Sargent, *Recursive Macroeconomic Theory*, 3rd edition, MIT press, 2012 (the 2nd edition is fine too). Most of the material covered in class can be found in this textbook in one form or another. In the exposition of the first half of the material I will follow closely Rody Manuelli's *Lectures Notes on Discrete Time Economics: The Growth Model*. You can download these notes at the class website <https://sites.google.com/site/rondinagiacomo/teaching>.

For the material on Dynamic Programming I will instead follow the exposition in Stockey and Lucas (1989), *Recursive Methods in Economic Dynamics*, Harvard University Press, 1989. In addition, references about specific topics will be provided during the lectures and posted in the class website.

Additional references that are good to have are *Economic Growth*, by Barro and Sala-i-Martin, MIT Press (1998), and *Introduction to Modern Economic Growth*, by Daron Acemoglu, Princeton (1st Ed).

#### UNIVERSITY POLICIES

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**1. Dynamic Methods (I)**

- (a) Convex Constrained Optimization and the Kuhn-Tucker Theorem
- (b) Application: Two-Period Economy
  - i. Two-Period Consumer's Problem: Substitution, Income and Wealth Effects
  - ii. General Equilibrium: A Pure Exchange Economy
  - iii. General Equilibrium: A Production Economy
- (c) Optimization with Infinite Horizon

**2. The Neo-Classical Growth Model (Ramsey-Cass-Koopmans)**

- (a) The Planner's Problem
  - i. Steady State Analysis
  - ii. Dynamic Analysis
  - iii. Permanent and Temporary Shocks
- (b) Applications
  - i. Constant Saving Rate (the Solow model)
  - ii. Population Growth and Technological Change
  - iii. Endogenous Growth (AK Model)
- (c) Competitive Equilibrium, First and Second Welfare Theorem
- (d) Applications
  - i. Human Capital
  - ii. Non-distortionary Taxes and the Ricardian Equivalence
  - iii. Distortionary Taxes: Steady State Analysis
- (e) Heterogeneity and Aggregation

**3. Dynamic Methods (II)**

- (a) Mathematical Preliminaries
  - i. Complete Metric Spaces.
  - ii. The Contraction Mapping Theorem and Blackwell's Sufficient Conditions.
  - iii. The Theorem of the Maximum.
- (b) Dynamic Programming
  - i. Existence of a Value Function: the Principle of Optimality.
  - ii. Characterization of a Value Function: Monotonicity, Concavity and Differentiability.
  - iii. Stochastic Dynamic Programming.

- (c) Application: Search and Matching Models
  - i. McCall's Search Model of Unemployment
  - ii. Diamond-Mortensen-Pissarides Matching Model
  - iii. Kyiotaki-Wright Search Model of Money

#### 4. **Markets**

- (a) Complete Markets
  - i. Arrow-Debreu Economy
  - ii. Sequential Trading
  - iii. Recursive Competitive Equilibrium
- (b) Asset Pricing
  - i. Lucas-Tree Model
  - ii. Equity Premium Puzzle
- (c) Incomplete Markets: Overlapping Generations Models