

Econ 283: Advanced Macroeconomics II

Duke University
Summer – 2012

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Office Hours: By appointment
Class: M–F 9:30–10:45 – Link at Perkins Library, Seminar Room 4

Course Description: Most of dynamic models that are the workhorse of modern macroeconomics do not have closed-form solutions and only the most basic versions can be studied with paper and pencil methods. In this course you will learn how to compute dynamic general equilibrium models. Specifically, you will learn basics of numerical analysis, several computational tools for conducting numerical analysis of dynamic general equilibrium models widely used in macroeconomics, and you will be introduced to models taught in the first sequence of Ph.D. macro courses. Even though this course uses examples from the macroeconomic literature, all the computational tools and numerical methods presented in this class can be applied in all areas of economics, including financial economics, industrial organization, labor economics, among others.

Prerequisites: Economics 283 is designed for Master students in economics. Even though no prior knowledge of numerical methods or programming is assumed, it is strongly recommended that students are familiar with the material covered in Econ 210.

Books: The course is not based on any one text, but will make reference to the items listed below.

- Cooley, Thomas F., ed. (1995) *Frontiers of Business Cycle Research*, Princeton, NJ: Princeton University Press.
- Heer, Burkhard and Alfred Maussner (2008) *Dynamic General Equilibrium Modeling*, Springer.
- Judd, Kenneth (1998) *Numerical Methods in Economics*, Cambridge, MA: MIT Press.
- Ljungqvist, Lars and Thomas Sargent (2004) *Recursive Macroeconomic Theory*, MIT Press.

Course Promises: This course makes a set of promises to you (assuming you fulfill the expectations below). By the end of the class, you should be able:

1. To conduct numerical analysis of dynamic general equilibrium models widely used in macroeconomics.
2. To become proficient in Matlab.
3. To develop your skills in reading analytically journal articles.

Critical Thinking Goal: One important goal of this class is to sharpen your critical thinking skills. Critical thinking can be defined as reasoned, reflective thinking using appropriate methods and standards of evaluation for the express purpose of forming a conclusion regarding what to believe. Thinking and writing go hand in hand. It will be important to not only identify alternative positions, but to understand and communicate the implications of those positions. The process of analyzing, evaluation, and constructing knowledge is done through the writing process. It is not possible to consider yourself an effective critical thinker unless you can effectively communicate your reasoning.

Course Expectations: This course will only fulfill these promises if you promise the following in return:

1. **To attend class.** This course will largely rely on learning-by-doing. For this format to succeed, you must be present and on time. You will receive points for participation and attendance in this course. You are allowed to miss four classes, and if you miss five classes or more you will fail the course.
2. **To read the assigned materials.** The literature and background material we read will provide us with the common ground upon which we will base our conversations. Without that common ground, our conversations will lose some of their richness. We will have weekly electronic discussions to ensure that you are keeping up with the reading, and to help stimulate discussion.
3. **To be attentive and participate in class.** This course will largely rely on learning-by-doing. Students should participate by actively doing the proposed exercises, and by collaborating with their fellow classmates.
4. **To complete the required assignments in a timely fashion.** The assignments provide you with opportunities to put in practice the tools that we have discussed in class. Turning in your work on time will help you keep on track. Assignments

turned in late will be accepted, but I will deduct $20\% \times \text{Days Late}$ from the assignment's final grade

Computational Requirements : To learn the techniques and tools you will be required to do some coding in class. You will need:

- **A laptop**, if you don't own one you can borrow one from the Economics department or Perkins library, see <http://library.duke.edu/services/borrow/borrowing.html>
- **Matlab**, if you don't have your own copy you can access Matlab from the interactive cluster. To do so you need to make sure that you have an account at the Economics department. For information on how to access to the interactive cluster check <http://dialog.econ.duke.edu/help/>

Assignments: There will be a weekly **problem set** which will require you to apply the material we covered in class. You are encouraged to work on your assigned problems in groups. But each student must submit her/his own written assignment.

Each Friday, two students will research and offer an **in-class presentation** on a journal article. Your presentation must state clearly the question it is trying to address, the model used to answer the question, and the computational tools that the authors use to characterize the properties of their artificial economy.

We will discuss several journal articles using the class webpage **electronic forum**. You must submit a comment or a question at least once per week while we run the discussion, but you are free to post as many times as you want. Every time you post, you will earn points, and the posts will be graded according to their level of quality.

Grading: The grades will be determined as follows:

Problem set:	40%
In-class presentations/participation and attendance:	30%
Electronic discussion:	30%

Honor code: As members of Duke University you have committed to abide by the Duke Community Standard. I will assume that no student will submit the work of others as of his or her own. Cheating, plagiarism, and violations of the University's honor code will be reported to the department chair, and may result in failure of the assignment or the course, or expulsion from the University.

Special arrangements: Let me know if you have a disability that may require some modifications on the class requirements. Visit the Student Disability Access Office for more information.

Course Outline:

Week 1 Introduction MATLAB, and Numerical Methods

Readings: Lecture notes, Judd (1998) Chapter 4

Week 2 Introduction to stochastic general equilibrium model

1. Basic one-period stochastic general equilibrium model
2. Asset Pricing in a General Equilibrium Model

Readings: Lecture notes, Ljungqvist and Sargent (2004) Chapters 8

Application: Mehra and Prescott (1985) "The Equity Premium: A Puzzle"

Presentation: R. Barro "Rare disasters and asset markets in the twentieth century"

Week 3 – 4 Perturbation Methods

1. Representative agent general equilibrium model
2. First-order approximation
3. Using Dynare to solve general equilibrium models
4. Second-order approximation

Readings: Lecture notes, Heer and Maussner (2008) Chapter 2

Application: R. King and S. Rebelo (1999) "Resuscitating Real Business Cycles"
Handbook of Macroeconomics.

Presentations:

M. Baxter and R. King "Fiscal Policy in General Equilibrium"

N. Jaimovich and S. Rebelo "Can News about the Future Drive the Business Cycle?"

Week 5 Discrete State Space Methods

1. Introduction to Dynamic Programming
2. Value function iteration: Non-stochastic case
3. Value function iteration: Stochastic case
4. Policy function iteration

Readings: Lecture notes, Heer and Maussner (2008) Chapter 4,
Ljungqvist and Sargent (2004) Chapter 3

Application:

R. Aiyagari (1994) "Uninsured Idiosyncratic Risk and Aggregate Saving"

Presentation:

M. Aguiar and G. Gopinath "Emerging Market Business Cycles: The Cycle Is the Trend"

Week 6 Parameterized Expectations

1. Approximation of functions using polynomials
2. Stochastic Parameterized Expectations

Readings: Lecture notes, Heer and Maussner (2008) Chapter 5

Application:

Irreversible Investment and Equilibrium Business Cycles

Presentation:

R. Rouwenhorst "Asset Pricing Implications of Equilibrium Business Cycle Models"