

# ECON 7346-1: QUANTITATIVE MACROECONOMICS

## FALL 2019

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## TIME AND LOCATION

Mondays and Wednesdays, 11.30-1.00pm, M-212

## PREREQUISITES

Micro- and Macroeconomic Theory sequence (7341-7344).

## COMMUNICATION

Email is the preferred means of communication, please allow up to 24 hours to get a response.

Course materials and current grades will be posted on Blackboard. Blackboard will also be used to make general course announcements.

Office hours are on Wednesday mornings, 9-11am. Questions and discussions of all kinds are encouraged. In case of a time conflict, alternative appointment may be arranged by email.

## COURSE DESCRIPTION

The objective of this course is to help you gain proficiency at working with quantitative models in modern macroeconomics. The course naturally follows the first year macro sequence (7342-7344). Some of the topics will be covered again, other ones will be new. We will try to calibrate the curriculum and speed of the course to optimize your learning.

We will focus on canonical models in several different subfields of macro. These models typically require you to use numerical methods in order to characterize equilibrium allocations and prices. Emphasis will be placed on writing your own code rather than using “blackbox” software.

An important part of the course (and perhaps its main value-added relative to the first year sequence) will be mapping theoretical models to the data. You will need to get proficient at processing the datasets commonly used in macroeconomics. We will talk about linking the model variables to real-world objects and identification of “structural parameters” in the model.

I consider competency in Matlab to be a necessary condition for doing research in quantitative macro. While this may be enough (barely) to go through the basic curriculum of this course, I will also encourage you to learn a low-level programming language such as Fortran or C. This involves a certain investment of time, stress and effort, but you will find that it is well worth it.

## TEXTBOOKS

There is no required textbook for this course. You should get accustomed to working with many different sources and finding the information you need efficiently. Here are some useful references:

- Judd, Kenneth L. (1998): *Numerical Methods in Economics*, MIT Press.
- Heer, Burkhard and Alfred Maussner (2004): *Dynamic General Equilibrium Modeling*, Springer.
- Miranda, Mario J. and Paul L. Fackler (2002): *Applied Computational Economics and Finance*, MIT Press.
- Adda, Jerome and Russell Cooper (2003): *Dynamic Economics. Quantitative Methods and Applications*, MIT Press.
- Stachurski, John (2009): *Economic Dynamics. Theory and Computation*, MIT Press.
- Marimon, Ramon, and Andrew Scott (1998): *Computational Methods for the Study of Dynamic Economies*, Oxford University Press.
- Cooley, Thomas F. (1995): *Frontiers of Business Cycle Research*, Princeton University Press.
- Kehoe, Timothy J. and Edward C. Prescott (2007): *Great Depressions of the Twentieth Century*, Federal Reserve Bank of Minneapolis.
- Press, William H., Saul A. Teukolsky, William T. Vetterling, and Brian P. Flannery (1992): *Numerical Recipes in Fortran 77: The Art of Scientific Computing, Second Edition*, Cambridge University Press. (available for free at [www.nrbook.com/a/bookfpdf.php](http://www.nrbook.com/a/bookfpdf.php))
- Press, William H., Saul A. Teukolsky, William T. Vetterling, and Brian P. Flannery (1992): *Numerical Recipes in Fortran 90: The Art of Parallel Scientific Computing, Second Edition*, Cambridge University Press. (available for free at [www.nrbook.com/a/book90pdf.php](http://www.nrbook.com/a/book90pdf.php))

## USEFUL LINKS

Here is a (non-exhaustive) list of fantastic resources for learning computational macro:

- Víctor Ríos-Rull's course: <http://www.sas.upenn.edu/~vr0j/econ8185-12/index.html>
- David Wiczer's course: [http://sites.google.com/site/davidwiczer/teaching/numerical\\_methods](http://sites.google.com/site/davidwiczer/teaching/numerical_methods)
- Makoto Nakajima's notes: <http://sites.google.com/site/makotonakajima/notes>
- Stachurski and Sargent's Quantitative Economics Lectures: <http://lectures.quantecon.org/>

## COURSE REQUIREMENTS

Participation in this course only makes sense if it is complemented with significant learning-by-doing. You will therefore be required to complete several homework assignments throughout the semester. To achieve the passing grade, you will need to:

1. Submit homework assignments consisting of source codes and a rough summary of results.
2. Make an in-class presentation of your results for one of the assignments (around 15 minutes).
3. Replicate the quantitative results of one canonical paper in the field of macro that interests you, and propose your own research that builds on this framework. Submit it in the form of a formal report. We may also hold in-class presentations of your research proposals.

For those who decide to audit the class, I strongly encourage you to attempt the homeworks anyway. At the very least, as a courtesy to other course participants, you will be asked to make an in-class presentation as well. If you are an upper-year student, your presentation may be about your own research, as long as it relates to one of the homework assignments and you focus on its quantitative component.

## COURSE POLICIES

This course will strictly observe the University's deadlines regarding withdrawals.

There is no extra credit available in this course beyond the grading schemes described above. Participants who have experienced unusual circumstances (such as an accident, crime or other occurrence of *force majeure*) are requested to contact the instructor as soon as possible. An official proof from the doctor or police will be required in order to make special arrangements.

The course will follow the standard grading scale (93-100: A, 90-92: A-, 87-89: B+, and so on), but it may be adjusted to the distribution of scores at the end of the semester.

**Students with Disabilities:** The University of Houston System complies with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, pertaining to the provision of reasonable academic adjustments/auxiliary aids for students with a disability. In accordance with Section 504 and ADA guidelines, the University of Houston strives to provide reasonable academic adjustments/auxiliary aids to students who request and require them. Students seeking accommodation in this course should contact the instructor after obtaining the appropriate documentation through the UH Center for Students with Disabilities.

**Counseling and Psychological Services:** Counseling and Psychological Services (CAPS) can help students who are having difficulties managing stress, adjusting to college, or feeling sad and hopeless. You can reach CAPS ([www.uh.edu/caps](http://www.uh.edu/caps)) by calling 713-743-5454 during and after business hours for routine appointments or if you or somebody you know is in crisis. No appointment is necessary for the "Let's Talk" program, a drop-in consultation service at convenient locations and hours around campus. [http://www.uh.edu/caps/outreach/lets\\_talk.html](http://www.uh.edu/caps/outreach/lets_talk.html)

## COURSE OUTLINE (TENTATIVE)

1. Review of programming/numerical methods in macro
  - spaced throughout the course, rather than in one go
2. Growth accounting and the neoclassical growth model
3. Business cycle accounting
4. Life cycle models
5. Search and matching in labor markets
6. Heterogeneous agent models with a stationary distribution
7. Heterogeneous agent models with aggregate fluctuations
8. Models with endogenous default
9. Calibration of macro models and global optimization
10. Parallel computing
  - spaced throughout the course, rather than in one go