ECON413: Dynamic Stochastic General Equilibrium Modeling

Mon/Wed/Fri 13:00-13:50, Chancellors 121

CONTACT

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Office Hours: Wed/Fri 9-10:30 or by appointment (please e-mail at least one day in advance)

BOOKS

- (Required) Hamilton, J. D. (1994): Time Series Analysis, Princeton, NJ: Princeton University Press.
- (Required) McCandless, George (2008): *The ABCs of RBCs: An Introduction to Dynamic Macroeconomic Models*. (Cambridge, MA: Harvard University Press)
- (Optional) DeJong, David and Chetan Dave (2011): Structural Macroeconometrics (Princeton, NJ: Princeton University Press)

DESCRIPTION

This course combines calculus, statistics, economic theory, and programming to answer macroeconomic questions. Macroeconomic models range from the reduced-form to the structural. This course familiarizes students with vector autoregressions (VARs) that are useful for establishing facts from data. We will then explore the application of dynamic stochastic general equilibrium (DSGE) models, which are the workhorse models of central banks and other macroeconomic policy institutions, to understand those facts.

This course fulfills the COLL 400 capstone experience. As such, it will require you to take initiative in synthesis and critical analysis, to solve problems in applied and academic settings, to create original material or original scholarship, and to communicate effectively with a diversity of audiences. The assignments that satisfy these requirements are listed below.

PREREQUISITES

This course builds on the theory and tools developed in Intermediate Micro/Macro (ECON 303 and 304), Time Series (ECON 408), Calculus I and II (MATH 111/112 or equivalents), and computational problem solving (CSCI 141). Using VARs require a good understanding of estimating simultaneous equation models and time-series econometrics. Applying DSGE models requires taking derivatives and integrals as well as programming the solutions to the models in MATLAB.

COMPUTING

In addition to theoretical tools, modern macroeconomics often requires extensive computational expertise to solve and simulate models. At several points during the semester, we will integrate the use of MATLAB, which is the most commonly-used computing environment in macroeconomics. Throughout the semester, you may want a guide for learning MATLAB so here are a few options:

- Gilat, Amos (2010): *MATLAB: An Introduction with Applications*, 4th ed. (Hoboken, NJ: John Wiley & Sons)
- Miranda, Mario J. and Paul L. Fackler (2002): *Applied Computational Economics and Finance*. (Cambridge, MA: The MIT Press)
- Pratap, Rudra (2009): *Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers*. (New York, NY: Oxford University Press)
- Judd, Ken (1998): *Numerical Methods in Economics*. (Cambridge, MA: The MIT Press)

There are also countless tutorials and publicly available MATLAB scripts (including my own). W&M has a campus-wide MATLAB license. For instructions, please visit
https://www.wm.edu/offices/it/services/software/licensedsoftware/ .

ASSIGNMENTS

- In total, there are 3 problem sets on theory and application, making up 15% of your course grade.
- There are 5 writing assignments worth 60% of the course grade.
    1. There is a brainstorming session (5%),
    2. a mock referee report on a working paper (5%),
    3. a non-technical article (e.g., The Economist) intended for a disparate audience (10%),
    4. a technical literature review and one-page research proposal (15%),
    5. and a final paper with original material (25%).

    The main goal is to build up to the final paper gradually in a manageable way where rewriting is an important part of the process. Ideally, the writing assignments after the brainstorming session will all revolve around the same research question.
- There are 2 presentations worth 25% of the course grade.
    1. You will motivate and present the findings of a published paper (10%)
    2. and present your final paper as a work in progress (15%).

All assignments must be typeset in LaTeX, and some of the assignments will require MATLAB. All assignments must be turned in on time on the due date by 5pm. Late work is *not* accepted.

GRADES

The classes will be a mixture of lecture, discussion, presentations, and data/MATLAB demonstrations. The grading scheme follows:

Activity	Points	Percent
Problem Sets (3)	150	15%
Writing Assignments (5)	600	60%
Presentations (2)	250	25%

There are 1000 possible points in this class. You can miss the next highest grade by a single point. If you want to appeal any grading, please contact me no later than one week from the date I post your score. The following table indicates the minimum number of points needed to guarantee a certain grade.

Grade	Minimum Points	%	Grade	Minimum Points	%
A	920	92	C	700	70
A-	880	88	C-	670	67
B+	850	85	D+	640	64
B	800	80	D	580	58
B-	770	77	D-	550	55
C+	740	74	F	<550	<55

HONOR CODE

I expect everyone to follow the Honor Code. Please see your student handbook for details. "As a member of the William and Mary community, I pledge on my honor not to lie, cheat, or steal, either in my academic or personal life. I understand that such acts violate the Honor Code and undermine the community of trust, of which we are all stewards." Financial and economic crises are precipitated by breeches of trust, so you must understand this is not only very important to me but also to our entire society. I will not hesitate to punish violators of the Honor Code.

STUDENT ACCESSIBILITY SERVICES

It is the policy of The College of William & Mary to accommodate students with disabilities and qualifying diagnosed conditions in accordance with federal and state laws. Any student who feels s/he may need an accommodation based on the impact of a learning, psychiatric, physical or chronic health diagnosis should be referred to Student Accessibility Services (SAS) staff at 757-221-2509 or at sas@wm.edu. SAS staff will work with you to determine if accommodations are warranted, and if so, to help you obtain an official letter of accommodation. For more information please see www.wm.edu/sas.

Tentative Course Outline

1. Part 1: Reduced-form dynamic models
    (a) Hamilton Ch. 1: Difference Equations
    (b) Hamilton Ch. 3.4: Autoregressive Processes
    (c) Hamilton Ch. 11: Vector Autoregressions
    (d) My notes: VAR with Cholesky Decomposition identification
    (e) Christiano et al. (JPE, 2005), "Nominal Rigidities and the Dynamic Effects of a Shock to Monetary Policy"
    (f) Blanchard and Perotti (QJE, 2002), "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending"
2. Part 2: Structural dynamic models
    (a) McCandless Ch. 3: Basic Dynamic General Equilibrium Model
    (b) McCandless Ch. 4: Recursive Deterministic Models
    (c) McCandless Ch. 5: Recursive Stochastic Models
3. Optional
    (a) DeJong and Dave Ch. 6: Removing Trends and Isolating Cycles
    (b) DeJong and Dave Ch. 8: State-Space Representations
    (c) DeJong and Dave Ch. 11: Calibration
    (d) DeJong and Dave Ch. 12: Matching Moments

Due dates of graded items:

1. Brainstorming session (2-3 topics, 2-3 papers each)
    - Wed Sep 8: Discuss topics, ask prof questions, define terms
    - Fri Sep 10, 1pm: Turn it in
2. Non-technical article (500-750 words)
    - Wed Sep 15: Discuss topics, ask prof questions
    - Mon Sep 20, 1pm: Turn it in
    - Wed Sep 22: Read out loud, then Q&A
3. Problem set #1
    - Fri Oct 1: Ask prof questions
    - Mon Oct 4, 1pm: Turn it in

4. Presentation of published paper (15 minutes)
    - Oct 11-15
5. Mock referee report
    - Wed Oct 20: Ask prof questions
    - Mon Oct 25, 1pm: Turn it in
6. Problem set $\#2$
    - Fri Nov 5: Ask prof questions
    - Mon Nov 8, 1pm: Turn it in
7. Literature Review
    - Wed Nov 12: Ask prof questions
    - Mon Nov 15, 1pm: Turn it in
8. Presentation of final paper (25 minutes)
    - Mon Nov 29: Ask prof questions
    - Presentations: Dec 1-8
9. Problem set $\#3$, Fri Dec 10
10. Final Paper, Fri, Dec 17, 5pm