Syllabus

The main objective of the course is to introduce tools of applied macroeconomics. The emphasis is on econometric and computation techniques. Since the best way to learn tools is to practice them, you will be required to do a number of extensive exercises.

The reading list is not designed to be comprehensive. Instead, it contains a few influential references for selected topics plus a selection of leading-edge treatment of the topics. You are expected to read the papers for discussion in advance and come prepared to discuss them.

Note that I will not provide problem set solutions or extensive comments on individual problem sets. Basically, I will just make sure you did it. As a part of the regular homework assignments, I will also require you to write computer projects. The computer projects may be done in small groups (no more than three students per group), but each homework must be submitted individually. The programming language I use is MATLAB. You can use any language you like (GAUSS, FORTRAN90, C++, etc.), but I will give you assistance with MATLAB code only.

Grade:

- 15% = Three referee reports (four pages, 1.5 spaced).
- 45% = Weekly homework assignments. Grading is check, check plus, check minus. Acceptable homework must have both report and code. The code should be self-contained so that anyone can run it. You should plan that each homework assignment takes about a day or more to complete. For each assignment, homework with the fastest code (in Matlab) receives a 50% premium.
- 40% = Project (replicate a paper or own idea). Deadline is May 12. No exceptions. Code must be provided with the project. Possible papers for replication (other papers are subject to instructor’s approval):
  - Klenow and Willis, JME 2007.
  - Bernanke and Mihov, QJE 1998.
  - Dotsey, King, Wolman, QJE 1999.
  - Beaudry and Portier, AER 2006.
  - Stock and Watson, JASA 2002.
  - Cooper and Haltiwanger, REStud 2006.
Prerequisites: first year graduate sequence in econometrics and macroeconomics.


Recommended textbooks

Tentative topics
Introduction:
1. Univariate time series
   a. ARIMA, estimation, lag selection,
   b. Spectrum, filters, trend-cycle decompositions
2. Vector autoregressions
   a. Estimation and inference
   b. Impulse response, confidence intervals
   c. Variance decomposition
   d. Structural VAR: short-run and long-run identification
   e. Cointegration
3. State space models, Kalman filter and dynamic factor models
4. DSGE
   a. Linearization
   b. Solution
   c. Analysis and estimation: calibration, GMM, MLE, QBE, SMM
5. Dynamic programming
   a. Introduction
   b. Approximations and numerical solution
   c. Uncertainty
   d. Estimation
6. Models with heterogeneous agents (time permitting)
Readings


1. Univariate time series
   a. Theory
      Hamilton, Chapters 3 and 6.
      Canova, Chapter 3.
      DeJong and Chate, Chapter 3.
   b. Applications

2. Vector autoregressions
   a. Theory
      Canova, Chapter 4.
      Hamilton, Chapters 10, 11, and 19.
      Favero, Chapter 6.
      Lutkepohl, Chapters 2, 3 and 4.
   b. Applications


Yuriy Gorodnichenko. 2006. “Reduced rank identification of structural shocks in VARs” [link]


3. Kalman filter and dynamic factor models
   a. Theory
      Hamilton, Chapter 13.
      Lutkepohl, Chapter 13.
      Canova, Chapter 11.1.

   b. Applications


4. DSGE
   a. Theory
      Heer and Maussner, Chapter 2.
      Canova, Chapter 2.
      Favero, Chapter 8.
      DeJong and Chate, Chapter 2.

   b. Estimation and inference
      Canova, Chapters 5.4, 6.4, 7.
      De Jong and Chate, Chapters 6, 7 and 8.
Lecture notes from Frank Schorfheide (http://www.econ.upenn.edu/~schorf/)

c. Applications
Yuriy Gorodnichenko and Serena Ng, 2007. Estimation of DSGE models when data are persistent. Mimeo. [link]
Jesus Fernandez-Villaverde, Juan Rubio-Ramirez, Tom Sargent, and Mark Watson, 2007. “ABCs (and Ds) of understanding VARs,” *AER* 97 (3): 1021-1026. [link]

5. Dynamic programming
a. Theory, computation and estimation
Miranda and Fackler, Chapters 6, 7, and 9.
Adda and Cooper, Chapters 2 and 3.
Heer and Maussner, Chapter 4.

b. Applications


6. Models with heterogeneous agents
   a. Theory
      Heer and Maussner, Chapters 5 and 6.

   b. Applications
      Peter Klenow and Jonathan Willis, 2007. “Sticky information and sticky prices,” _JME_ forthcoming [link]
      Virgiliu Midrigan, 2006. “Menu Costs, Multi-Product Firms, and Aggregate Fluctuations,” mimeo. [link]