

# **Sharif University of Technology**

## **Econometrics for Macroeconomics**

### **Syllabus**

**Summary:** Econometrics for Macroeconomics is a second-year graduate-level course in econometrics, with a primary focus on models and methods used in applied macroeconomic research. Time-series topics will be a considerable focus in this course. The topics covered assume a knowledge of the material taught in the econometrics (1) sequence of the master program.

**Reading:** The textbook for this course are:

- Hamilton, James Douglas. Time series analysis. Princeton university press, 1994.
- Hayashi, Fumio Econometrics, Princeton university press, 2000
- Brockwell, Peter J., and Richard A. Davis. Time series: theory and methods. Springer Science & Business Media, 2009.
- Koop, Gary. Bayesian econometrics. Wiley, 2003.
- Geweke, John. Contemporary Bayesian econometrics and statistics. Vol. 537. John Wiley & Sons, 2005.
- Wooldridge, Jeffrey M. Econometric analysis of cross section and panel data. MIT press, 2010.

**Grades:** Course grades will be determined by performance on problem sets (20%), a midterm (30%), and a final exam (50%).

**Problem Sets:** There will be computer programming work required on most of the problem sets. You may not use a canned package (e.g. Stata, R) for the computer exercises.

**Teaching Assistants:** The TA's will occasionally hold office hours which will be announced

#### **Course Outline and Readings:**

Structural Estimation: GMM and MLE, **Homework (1) & Homework (2)**

Adda, Jerome, and Russell W. Cooper. Dynamic economics: quantitative methods and applications. MIT press, 2003.

Wooldridge (12.1-12.5, 13.1-13.5, 14.1, 14.6)

Time Series basic models: AR, MA, ARMA, estimation, **Homework 3**

Hamilton (1-5)

Spectral representation

Hamilton, (6)

Brockwell and Davis

Heteroskedasticity: HAC, HAR, ARCH, **Homework 4**

Hamilton (21)

Müller, Ulrich K. "HAC corrections for strongly autocorrelated time series." *Journal of Business & Economic Statistics* 32.3 (2014): 311-322.

Bayesian Estimation and DSGE Models, **Homework 5**

Koop

Gemeke

Smets, Frank, and Rafael Wouters. "Shocks and frictions in US business cycles: A Bayesian DSGE approach." *American economic review* 97.3 (2007):

State Space Representation and Kalman Filter, **Homework 6**

Hamilton (13)

Harvey, Andrew. "Forecasting with unobserved components time series models." *Handbook of economic forecasting* 1 (2006): 327-412.

Non-stationary, Unit Roots, Breaks and Time Varying Coefficients, **Homework 7**

Hamilton (17-19)

VAR, SVAR, Cointegration, Forecasting, **Homework 8**

Hamilton (11)

Weak IV

Andrews, Isaiah, James H. Stock, and Liyang Sun. "Weak instruments in instrumental variables regression: Theory and practice." *Annual Review of Economics* 11 (2019): 727-753.

Dynamic Factor Models and "Big Data", **Homework 9**

Stock and Watson, "Factor Models and Structural Vector Autoregressions in Macroeconomics" in *Handbook of Macroeconomics*, Vol2A, John B. Taylor and Harald Uhlig (eds), 2016, Chapter 8, pp 415-526.

Numerical Optimization