Econ 721 - Econometrics III  
(Section 0101)

Instructor:

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Office Hours: Wed. 2:00pm - 4:00pm (or by appointment)  
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Lecture:

Tues/Thurs 5:00 - 6:15 pm, Tydings Hall Room 2108

Course Overview:

This course covers selected topics in econometrics and statistics. Particular attention is paid to methods for analyzing non-stationary economic time series and methods which are useful for studying large dimensional data sets. Throughout this course, there will be a focus on understanding the statistical properties of the methods being discussed.

Prerequisite:

Students are presumed to have had at least a one-semester course in mathematical statistics at the level of R.V.Hogg, A.Craig, and J.W.McKean, *Introduction to Mathematical Statistics (6th Edition)* as well as a strong background in linear algebra. Students are also assumed to have knowledge of the material covered in Econ 623 and Econ 624, including basic knowledge of asymptotic theory and of the linear regression model.
Academic Integrity:

Academic integrity is a foundation for learning. The University has approved a Code of Academic Integrity available on the web at http://www.president.umd.edu/policies/iii100a.html. The Code prohibits students from cheating in exams, plagiarizing, submitting the same paper for credit in two courses without authorization, buying papers, submitting fraudulent documents, and forging signatures.

Students with Disability

A student, who has a documented disability and who wishes to receive accommodation or services from the University’s Disabilities Support Service (DSS), must first complete a registration process which involves meeting with one of the senior staff members at DSS and providing the appropriate documentation. An appointment with DSS can be scheduled by calling (301) 314-7682.

Recommended Textbooks and References in Econometrics and Statistics:


Princeton University Press.


**Some Useful References in Probability:**

The following books are good references for the asymptotic theory presented in this course.


Course Outline and Reading List

1. Topics in Trending/Persistent Time Series (Univariate Case)

1a. Processes with Deterministic Time Trends
   • Hamilton (1994): Chapter 16

1b. Functional Limit Theory and Asymptotics for Integrated Processes
   • Hamilton (1994): Chapter 17, Sec. 17.2-17.3; Chapter 18, Sec. 18.1.
   • Billingsley (1958): Chapters 2 and 3.

1c. Unit Root Processes: Estimation and Hypothesis Testing
   • Hamilton (1994): Chapter 17, Sec 17.1, 17.4-17.9.
2. Topics in Trending/Persistent Time Series (Multivariate Case)

2a. Spurious Regression

- Hamilton (1994): Chapter 18, Sec. 18.

2b Cointegration: Estimation, Testing, and Cointegrating Rank Determination

- Hamilton (1994): Chapter 18, Sec.18.1-18.2; Chapter 19, Sec. 19.1-19.3; Chapter 20.
- Tsay (2010): Chapter 8

3. Factor Analysis and Related Techniques for Multivariate Data Analysis

a. Principal Components
b. Factor Models
c. EM Algorithm
• Tsay (2010): Chapter 9

4. Methods of Bayesian Inference and Bayesian Computation

   a. Background on Bayesian Econometrics and Statistics
   b. Background on Markov Chains
   c. Basic Monte Carlo Integration
   d. Importance Sampling
   e. Markov Chain Monte Carlo
   f. Empirical Bayes
   g. Bayesian VAR
   h. Bayesian Estimation of DSGE Models

• Zellner (1996): Chapters 2-4, 6 and 7
• Robert and Casella (2004): Chapters 2,3, 6, and 7


5. Time Series Models of Regime Switching

• Hamilton (1994): Chapter 22


6. State Space Models and Kalman Filtering

- Tsay (2010): Chapter 11

7. ARCH/GARCH and Stochastic Volatility Models

a. AutoRegressive Conditional Heteroskedasticity (ARCH)
b. Generalized ARCH (GARCH)
c. Other Extensions of the ARCH Model
d. Stochastic Volatility Model

- Tsay (2010): Chapter 2
- Hamilton (1994): Chapter 21
8. Methods of Forecasting

a. Principles of Forecasting
b. Forecast Evaluation
  c. Bayesian and Frequentist Model Averaging
d. Bagging

• Hamilton (1994): Chapter 4

**Grading for Econ 721:**

The course grade will be based on a term paper. The paper should be some application of one or more of the methods covered in class, and it is due by 6:00pm on Friday, December 18.