Econ 721 - Econometrics III
(Section 0101)

Instructor:

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Office Hours:  Tues/Thurs 4:00pm - 5:00pm
              (or by appointment)
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Lecture:

Tues/Thurs  5:00 - 6:15 pm, Tydings Hall, Room 2102

Course Overview:

This course covers selected topics in econometrics and statistics. Particular attention is paid to the following four topics: methods for analyzing non-stationary economic time series, Bayesian approaching for analyzing time series data, methods for factor analysis, and models of conditional heteroskedasticity. 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.

University Policies Regarding Graduate Courses

A guide to UMD policies towards graduate courses can be found at

https://gradschool.umd.edu/faculty-and-staff/course-related-policies
This link takes one to a graduate school website which lists official university policies with regard to such issues as academic integrity, grading disputes, sexual misconduct, non-discrimination policy, absences and accommodations, and so forth. In particular, the University of Maryland Code of Academic Integrity prohibits students from engaging in various forms of academic dishonesty including cheating, fabrication, plagiarism, self-plagiarism, and the facilitation of academic dishonesty. A complete statement of the University of Maryland Code of Academic Integrity can be downloaded at

https://policies.umd.edu/assets/section-iii/III-100A.pdf

Students with Disability

UMD guarantees appropriate accommodations for students with disabilities. If you require accommodations, please contact me as soon as possible. If you need further clarification, the link to Accessibility and Disability Service (ADS) is

https://www.counseling.umd.edu/ads/

University Masking Guidelines

- Effective Monday, August 29, 2022; wearing a mask will no longer be required in a classroom setting.
- However, the Director of the University Health Center still recommends that KN95-type mask be worn indoors for added protection.

Lecture Slides

A copy of the lecture slides will be uploaded onto ELMS. They are made available for the sole purpose of helping students learn the course material. Students are not allowed to copy and/or distribute these slides without the instructor’s permission.

Recommended Textbooks and References in Econometrics and Statistics:


**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. Methods of Bayesian Inference and Bayesian Computation
- Background on Bayesian Econometrics and Statistics
- Background on Markov Chains
- Basic Monte Carlo Integration
- Importance Sampling
- 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  

4. 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
5. Factor Analysis and Related Techniques for Multivariate Data Analysis
a. Principal Components
b. Factor Models
c. EM Algorithm

- Tsay (2010): Chapter 9

6. Methods of Forecasting

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

- Hamilton (1994): Chapter 4
7. Time Series Models of Regime Switching

- Hamilton (1994): Chapter 22
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 related to the class lectures, and it is due by 6:00pm on Monday, December 19, 2022.