ECONOMETRICS II
Time Series Econometrics

Course Syllabus

Professor: Norman Swanson, 304 NJH: 848-932-7432.
Class Location & Time: HH 705 - Monday 10:20-1:20
Recitation Location & Time: tba
Email: nswanson@econ.rutgers.edu

Course Website: http://econweb.rutgers.edu/nswanson/econ508/
Office Hours: Swanson - M 1:30-2:30 (or by appointment)

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Learning Goals and Assessment:

Departmental learning goals and assessment for graduate classes, and in general for the economics doctoral program, are detailed at the following website:
http://economics.rutgers.edu/graduate/program/learning-goals
Additionally, departmental learning goals and assessment for masters students are detailed at the following website:
http://economics.rutgers.edu/graduate/program/learning-goals-masters
In this course, and as fully detailed at the above referenced documents, learning goals and assessment will include:
(i) Attain marked ability, scholarship, research and leadership skills in economics, with specialization in selected sub-disciplines
(ii) Engage in and conduct original research
(iii) Prepare to be professionals in careers that require training at the highest levels in economics and selected sub-disciplines

Additionally, note that your course grade will be based on the results from 1 in class paper presentation (35%), 1 in class midterm examination (35%), and a final project (30%), or as to be determined by professor. The main focus of this course is on time series econometrics. Throughout the course, we will discuss and review topics including LM, LR, and Wald tests, ARIMA models,
and maximum likelihood estimation. We will also cover VAR models, unit roots, cointegration, spurious regression, and Granger causality. Finally, we will discuss other time series topics including forecasting, continuous time financial models, bootstrapping, Monte Carlo methods, and GARCH. The overall focus of the course will be on financial and macro econometrics.

**MSMF Students:** This course covers the same broad content as Econ 508 taught to PhD Economics students. The depth of coverage will vary, as will the course requirements, as appropriate for the class.

The course outline is meant only as a guide, and topic coverage and length of coverage may vary from the time allotted in the syllabus. After finishing each main topic I will summarize completely what we have learned and what you will be required to know for the test(s). Note that most advanced texts in econometrics cover all or most of the topics in the course, so that you may essentially use texts other than those listed. Finally, note that the course is meant to be self-contained, in the sense that full knowledge of class lecture material is essentially sufficient for testing purposes, and texts need be used only for extra study and clarification.

**Disclaimer**

Qualified persons with disabilities are encouraged to participate in all programs and activities at this university. If you anticipate needing any type of accommodation in this course or have questions about physical assess, please tell the instructor as soon as possible.

**Textbooks**


* required text.

Course Notes

Swanson, Norman R. and Valentina Corradi: *Prediction and Simulation Based Specification Testing and Model Selection*

Swanson, Norman R.: *Economics 508 Lecture Notes* (available on Sakai, not for distribution)
PART I. ARIMA Models (week 1)
(i) AR, MA, and ARMA Models
(ii) Specification, Estimation and Testing
Readings: (H) Chapters 3,5, (GN) various.

PART II. Testing (week 2/3)
(i) Testing: F-tests, $\chi^2$ tests and F approximations thereof - LM, LR, and Wald Tests, etc.
(ii) Nonlinearity, Serial Correlation, Heteroskedasticity, ARCH, Predictive Accuracy, Causality, and Related Tests
Readings: (G) various, (H) Chapter 5, (W) Chapter IV.2, (DM) Chapter 3.6 and various.

PART III. Nonstationarity Versus Stationarity (week 4)
(i) Random Walks and Spurious Regression
(ii) Stochastic and Deterministic Trends - Trend vs. Difference Stationarity
(iv) Unit Root Testing

PART IV. Vector Processes (week 5)
(i) VARs: Estimation and Testing
(ii) VARs: Interpretation - IRFs and FEVDs
(iii) Cointegration - Introduction and Motivation
(iv) Error-Correction Models: Estimation and Testing
Readings: (H) Chapters 10,11,18,19,20 (DM) Chapter 20, (GN) Chapter 8.

PART V. Introduction to Forecasting (week 6-10) - see Lecture Notes
(i) Forecasting Time Series
(ii) Model Selection
(iii) Testing

PART VI. Introduction to Monte Carlo Methods
(i) Experimental Design
(ii) Test and Estimator Assessment Methods
Readings: (DM) Chapter 21.

PART VII. Introduction to Financial Econometrics
(i) Single Factor Models - CIR, Geometric Brownian Motion and Related Models
(ii) Stochastic Volatility and other multi-factor and multi-dimensional Processes
(iii) Estimation (GMM, SGMM, ccf methods)
(iv) Specification Testing
Readings: (H) Chapter 14. See also:


PART VIII. Further Topics; as time permits and throughout course

(i) Generalized Autoregressive Conditional Heteroskedasticity (GARCH) Models
(ii) Bootstrapping Techniques
(iii) Nonparametric Techniques
Readings: (GT) all, (H) Chapters 13,14,21, (DM) Chapter 16.

PART IX. Further Topics; as time permits and throughout course

(o) Project discussion.
(i) TAR, STAR, LSTAR, and ESTAR Models
(ii) Nonlinear Cointegration
(iii) Neural Network Models
(iv) Panel Data Modeling:
    Fixed Effects Models, Random Effects Models, Simultaneity Problems
Readings: to be announced