ECON 941: ECONOMETRICS II (TIME SERIES ECONOMETRICS)

SCHOOL OF ECONOMICS – LEBOW COLLEGE OF BUSINESS – DREXEL UNIVERSITY

PROFESSOR ANDRÉ KURMANN

SPRING 2014

COURSE SCHEDULE AND LOCATION

The course will meet once a week, on **Wednesdays from 9:00am to 11:50am**, in **GHALL 121**. Attendance is required.

COURSE DESCRIPTION

The course provides an introduction to modern time series econometrics. The objective is to familiarize students with the fundamentals needed to understand and conduct research in the fields of macroeconomics and finance. Key topics include autoregressive moving average (ARMA) models and vector autoregressions (VARs); forecasting; estimation and inference with generalized method of moments (GMM), maximum likelihood (ML) and Bayesian methods; state space models and the Kalman filter; spectral analysis; and the treatment of unit root and cointegrated processes. The various topics are illustrated with different applications and computer-based assignments.

COURSE PREREQUISITES

This is a Ph.D. course. The prerequisite is ECON 940 (Econometrics I) or equivalent. In addition, a working knowledge of MATLAB is assumed.

COURSE MATERIAL

Lecture notes

Most lectures will take place on the board and will not be available in the form of slides or handouts. So taking good lecture notes is imperative.

Reading material

The textbook for the course is Hamilton's *Time Series Analysis,* Princeton University Press (1994), available for purchase in the bookstore and online. In addition, you might find it useful to look in parallel at Cochrane's reader *Time Series for Macroeconomics and Finance*, available on the course website. The textbook is a reference guide for modern time series econometrics. The reader is more condensed and focuses on key practical concepts.

WEBSITE

There is a Blackboard Learn website containing the syllabus, the course reader, problem sets, and other useful information.

GRADING

Grades are based on a final exam (40%), a midterm (30%), and problem sets (30%).

Exams

The midterm and the final exam cover the entire material assigned up to the respective exam date. Both exams are closed-book, except for one single 8.5'' x 11'' double-sided sheet of notes. The midterm exam will take place during class, around week five (to be determined). The final exam will take place during finals week as determined by the Registrar's Office.

Problem sets

There will be a problem set on average every two weeks. Most of the problem sets will include applied work with MATLAB. Problem sets have to be completed individually – students may not collaborate or copy answers from each other.

Regrade requests

Regrade requests must be submitted **within one week** from the date the exam or problem set is returned and must be accompanied by the **regrade request form** and the **statement of honesty** posted on the course website. Regrade requests must be about a specific question. For any request, the entire exam or problem set will be automatically regraded; meaning, the grade may stay the same, go up or go down after regrading. Any alteration of the exam or problem set is therefore strictly forbidden and will be considered a violation of Academic Integrity.

ACADEMIC INTEGRITY

All relevant University policies regarding Academic Integrity must be followed. Please consult the Guide on Academic Policies for details. In particular, any collaboration or copying of answers by students on exams or problem sets will be considered cheating and pursued according to University policy.

CONTACT INFORMATION AND OFFICE HOURS

Email: kurmann.andre@drexel.edu
Office Hours: To be determined
Office: GHall 1036

COURSE OUTLINE
(subject to change)

1. Basic time series concepts

Content: difference equations, lag operators; stationary ARMA processes; Wold representation
Readings: Cochrane, chapters 3-4 and 6; Hamilton, chapters 1-3

2. Forecasting and impulse response functions

Content: linear projection; state space representation of ARMA; impulse response functions
Readings: Cochrane, chapter 5; Hamilton, chapter 4

3. Vector autoregressions

Content: representation; identification; impulse responses; variance decomposition; Granger causality
Readings: Cochrane, chapter 7; Hamilton, chapters 10-11 (except 11.3 and 11.7)

4. Classical extremum estimation

Content: review of linear regression model; asymptotic theory; maximum likelihood; GMM
Readings: Hamilton, chapters 5, 7, 8, 14

5. Bayesian estimation

Content: Likelihood principle; priors; Bayes' theorem; Bayesian estimation of ARMA and VARs; importance sampling and markov-chain-monte-carlo
Readings: Hamilton, chapter 12

6. State space models and the Kalman filter

Content: state space representation of time series models; Kalman filter; ML and Bayesian estimation
Readings: Hamilton, chapter 13

7. Spectral analysis

Content: population spectrum and cross-spectrum; filtering in the frequency domain; estimating the spectrum; filtering time-series
Readings: Cochrane, chapters 8-9; Hamilton, chapter 6

8. Unit roots and cointegration

Content: deterministic and stochastic trends; Classical and Bayesian approaches for unit roots and cointegration; vector error correction models
Readings: Cochrane, chapters 10-11; Hamilton, chapter 16-19