

THE UNIVERSITY OF ILLINOIS
Department of Statistics
STATISTICS 429
Time Series Analysis and Its Applications
Fall 2006

Instructor information:

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Associate Professor

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Office hours: Tuesdays (12 : 30 – 1 : 30 pm) and Wednesdays (9 – 11 am)

Teaching assistant information:

Zhi He, Ph.D. student

Discussion and Office Hours: Tuesdays, 4-5:15 pm

Location: TBD

Textbook: Brockwell and Davis. *Introduction to Time Series and Forecasting*. Second edition, Springer.

Software: R Project which can be downloaded at <http://www.r-project.org>

Pre-requisites. Background in probability and mathematical statistics. In particular the students should be familiar and comfortable with the following concepts: conditional probability, distribution of random variables, first and second order moments, sampling distributions, central limit theorem, maximum likelihood estimation and hypothesis testing, linear regression and analysis of variance.

Course content

Part I: Chapters 1 and 2 (coverage for the first midterm)

- Introduction to time series data sets
- Stationary models, autocorrelation
- Classical decomposition of time series data, estimation of the trend and seasonality
- Introduction to linear processes and ARMA processes
- Estimation of the autocorrelation function
- Forecasting stationary time series

Part II: Chapters 3 and 4 (main topics for the second midterm)

- Autocorrelation and partial autocorrelation of ARMA models
- Forecasting ARMA processes
- Estimation of ARMA parameters
- Order selection
- Model diagnostics

Part III: Spectral Analysis (main topics for the final exam)

- Spectral densities
- Periodograms
- Linear Filtering
- Spectral representation of stationary processes
- Estimating the spectrum

Grading:

1. Two midterms and final exam (25% each), three problem sets (combined for 25%).

2. Scale:

A [94, 100], A- [90, 94)

B+ [88, 90), B [84, 88), B- [80, 84)

C+ [78, 80), C [74, 78), C- [70, 74)

D+ [68, 70), D [64, 68), D- [60, 64)

F [0, 60)

3. A grade of A+ will be awarded to the student whose average is at least 98% and has the highest average in the class.

Note:

1. All exams are cumulative.
2. No special make up exam is given for any of the exams that are missed except for extreme health problems. Proper documentation should be provided (e.g., a doctor's certificate ordering you to stay in the hospital or at home).
3. Problem sets must be handed on or before the end of the lecture on the day that they are due. Late problem sets cannot be accepted.

Problem Set 1. Due on September 19,2006. You are required to do all the listed problems but turn in, for grading, only those that are indicated by *. Show all solutions explicitly.

- Chapter 1: 1.2*abc**d**ef*; 1.4*; 1.5*; 1.14*; 1.15*ab*
- Chapter 2: 2.1*; 2.2*; 2.3*ab*; 2.5*; 2.14*; 2.16*

Tentative Exam Dates

Exam 1: Tentative date is September 28,2006.

Exam 2: Tentative date is November 1,2006.

Final: 13 December 2006, Tuesday, 8-11 am. The date is fixed by the university.