STA 6857
APPLIED TIME SERIES ANALYSIS
FALL 2001

INSTRUCTOR: David M. Nickerson

OFFICE: CC II-206 (phone: 823-5528)

OFFICE HOURS: Tuesday – 2:00 to 4:00 pm
Wednesday – 3:00 to 4:00 pm
Thursday – 2:00 to 4:00 pm

TEXT: Brockwell, P.J. and Davis, R. (1996). *Introduction to Time Series and Forecasting*. Springer-Verlag, New York.

PREREQUISITE: STA 4322 (Statistical Theory II) and MAS 3105 (Elementary Linear and Matrix Algebra)

COURSE OBJECTIVE: Much of the data collected over time contain underlying structures which cannot be handled by standard statistical methods. The major objectives of this course are to learn how to recognize these situations and to master the statistical methods that appropriately address and exploit these special structures.

GRADING POLICY: During the semester there will be two exams and a cumulative final exam. Each exam will have an in-class component and a take-home component. All exams will be **open book** and **open notes**. Please bring calculators to the in-class portion of the exams to facilitate the required calculations.

There will be a total of 700 points to be earned during the semester with the following breakdown and tentative dates:

EXAM	POINTS	DATE
Exam I: in-class	100	9/20/01
take home	100	9/25/01 (due)
Exam II: in-class	100	10/25/01
take-home	100	10/30/01 (due)
Final: in-class	200	12/7/01 @ 7 to 9:50 pm
take-home	100	12/7/01 (due)
TOTAL	700	

The proposed grading scale is as follows:

POINTS	GRADE
630-700	A
560-629	B
490-559	C
420-489	D
≤ 419	F

The grade "I" will be given only in extreme circumstances. Likewise, late take-home exams will only be accepted in grave situations.

COURSE OUTLINE: Tentatively, I expect to cover Chapters 1 through 6 of the textbook excluding Chapter 4. The major topics included in these chapters are detailed below.

Chapter 1: Introduction

- autocorrelation
- stationarity
- trends & seasonality
- residual tests

Chapter 2: Stationary Processes

- linear & ARMA processes
- sample mean & autocorrelation function
- forecasting

Chapter 3: ARMA(p,q) Models

- ACF & PACF
- forecasting

Chapter 5: Modeling & Forecasting ARMA Processes

- preliminary estimation
- maximum likelihood estimation
- diagnostic checking
- forecasting
- order selection

Chapter 6: Nonstationarity & Seasonality

- ARIMA(p,d,q) models
- identification
- unit roots
- forecasting
- seasonality
- regression with autocorrelated errors

ASSIGNED PROBLEMS: Homework problems are assigned from the text. Although the solutions to these problems will not be collected, it is strongly recommended that you work at least the problem given below in order to assist you in understanding the content of the course. I will leave on reserve in the library solutions to the assigned problems.

Chapter 1 - 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.11, 1.13, 1.15, 1.16, 1.17, 1.18

Chapter 2 - 2.1, 2.2, 2.3, 2.7, 2.9, 2.10, 2.11, 2.13, 2.15, 2.16, 2.17, 2.18, 2.19, 2.21

Chapter 3 - 3.1, 3.2, 3.3, 3.4, 3.9, 3.10, 3.11

Chapter 5 - 5.1, 5.2, 5.5, 5.9, 5.10, 5.12

Chapter 6 - 6.1, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.11, 6.12

SOFTWARE: We shall use the package provided by the authors of the textbook (the compact disk can be found on the inside of the back cover). It is called ITSM2000, which stands for Interactive Time Series Modeling, 2000. The package operates under WINDOWS 95, 98 or NT. If you do not have a PC at your disposal, I will install this software on several of the PC's in the computing lab that the Department of Statistics maintains (CCII-219). The software is menu driven and very easy to operate. You should gain sufficient practice using this package through your homework assignments.