Time Series **Spring 2007**

Preliminary Course Outline

Instructor: Rebecka Jornsten, rebecka@stat.rutgers.edu
Office hours: 451 Hill Center, T5.30-6.30
Class homepage: http://www.stat.rutgers.edu/~ rebecka/Stat565

Week/Date	Chapters	Topics	HW/Lab
w1, Jan 16	Introduction, Stationary Processes	1-2	Lab 1
w2, Jan 23	Stat. processes, Measures of Dependence Tests of Randomness	2-3	Lab 2
w3, Jan 30	ARMA, Forecasting	3	
w4, Feb 6	ARIMA/SARIMA	3	lab 2 due
w5, Feb 13	ARMAX	3, 5	lab 3
w6, Feb 20	Review, Estimation	3	
w7, Feb 27	Estimation, Model selection	3	lab 3 due
w8, March 6	Spectral methods	4	lab 4
	SPRING BREAK		
w9, March 20	Spectral methods, Multivariate	3-5	Project Proposal due
w10, March 27	Bootstrap	handout	lab 4 due, lab 5
w11, April 3	Bootstrap	handout	
w12, April 10	ARCH, GARCH	5	lab 5 due, lab 6
w13, April 17	Wavelets and Image processing	handout	
w14, April 24	Wrap-up, State-space	handout	lab 6 due
Final May 2			Project Due

Homeworks and labs make up 30 % of the final grade.
The final makes up 35 %.
The project is worth 35 % of the final grade.

Text: Shumway and Stoffer, 2nd edition.
Software: R. R is free - downloads for windows, linux available and easy to install yourself. R is also installed on the stat lab computers.

Time Series **Spring 2007**

Project - Project Proposal

The project proposal is due March 20. However, the sooner you get a proposal to me, the sooner I can give you feedback on it. Don't wait until the last minute.

The proposal should contain the following;

a) a brief description of the data you intend to analyze,

b) an indication of the source of the data set,

c) the objectives of your investigation,

d) an overview of the analyses you *anticipate* completing.

For an informative proposal, some initial plotting and data exploration is often necessary. Don't look for a project that is "standard" or "easy", look for something that interests you. It is preferable if your data set consists of 250-500 equally spaced observations, but if you have something specific in mind, don't let that requirement stop you.

Examples of previous projects:

1. The McKenzie river
2. Stock market predictions
3. Travel load at LAX
4. Unemployement rate
5. Radar speckle: noise or signal?
6. Beanie babies
7. A time series analysis of Michael Jordan
8. Immigration statistics
9. Daily brightness of a variable star
10. Credit debt in America
11. Predicting Ischemic episodes
12. Central England temperatures
13. Analysis of simultaneous EEG recordings in cats
14. Movements of Sea Urchins
15. Consumer price index
16. Breaking waves and wave patterns
17. Seal migration

Time Series **Spring 2007**

Lab reports

Lab reports should be typed! Unless the lab contains an analytical problem, do not hand in handwritten material.
The report should contain the following;

a) Introduction. Briefly state the purpose of the lab, what type of data were analyzed, what new methods were brought in, what the results were.

a) Description of the methods used. Be brief - don't repeat what's in the lab text, just the key elements. Try to put your own spin on the description - how do you understand that the method works?

b) Discuss your results in more detail. Results without discussion are not graded. Include only the crucial plots and graphs, don't go for quantity. Label all plots and graphs, include captions. The captions should tell the reader almost everything they need to know about the figures. In the text you can add some more detail and how the information in the figures directed the rest of your analysis.

e) Conclusions: what is the take-home message. This is a very important part of a lab. Try to make sure you convince me that you understood what you did in the lab, and express the conclusions in your own words - don't copy sentences from the lab text or the book.

For help with computing; Modern applied statistics with Splus (Venables and Ripley) is a good text. Phil Spector (`http://www.stat.berkeley.edu/users/spector`) has an on-line introduction to Splus, and Splus and R are very similar. For help with R, check out `http://cran.us.r-project.org/` and the on-line tutorials poster on the class homepage.