Time Series **Fall 2004**

Preliminary Course Outline

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Week/Date	Chapters	Topics	HW/Lab Due
w1, Sep 2	Introduction, Stationary Processes	1.1-1.6 2.1-2.2	Lab 1
w2, Sep 9	Stat. processes, Measures of Dependence Tests of Randomness	2.1-2.4 1.4, 1.6	Lab 2
w3, Sep 16	Forecasting	2.5, 3.1-3.3	
w4, Sep 23	Spectral methods	4.1-4.4	
w5, Seb 30	Spectral methods	4.1-4.4	Lab 3
w6, Oct 7	Review, Estimation	5.1-5.2	
w7, Oct 14	Estimation, Model selection	5.2-5.5	
w8, Oct 21	ARIMA/SARIMA	6.1-6.3	Lab 4
w9, Oct 28	Multivariate	7.1-7.7	Project Proposal due
w10, Nov 4	Multivariate, Bootstrap	7.1-7.7, handout	Lab 5
w11, Nov 11	Smoothing, Image processing	handout	
w12, Nov 18	Wavelets	handout	Lab 6
	Thanksgiving		
w13, Dec 2	State-Space	8.1-8.7	
w14, Dec 9	Wrap-up, new methods	handout, 9.2	
Final Dec 16			Project Due

Homeworks and labs make up 25 % of the final grade.
The final makes up 50 %.
The project is worth 25 % of the final grade.

Text: Brockwell and Davis, Introduction to Time Series and Forecasting.
Software (suggested): R. R is free - downloads for windows, linux available and easy to install yourself. R is also installed on the stat lab computers.

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Project - Project Proposal

The project proposal is due Oct 28. 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 analyse,

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

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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.