Statistics 137: Applied Time Series Analysis
Spring Quarter 2005

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Project Options:
1. Data Analysis Project
2. Report on State-Space Model (Chapter 4)

Grading: Homework Problems 30%, Project 30%, Midterm 20%, Final 20%

Texts:

## Outline and Assignments

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### Option 1. Data Analysis Project

**Data:** The project is meant to be interesting and fun for you. Think broadly about data that you might like to work with. The data are meant to be from a time series. Think of something you are interested in, maybe, economics, music, speech, medicine, engineering, finance, sports, daily life, government, etc.: all of these subjects can produce time series data that are available, in many cases, via internet search engines or the links in the course website. Try to obtain at least 100 successive, equi-spaced observations on one or more series.

**The Proposal:** Due by May 13 or sooner is a proposal indicating (a) a brief description of the data, (b) an indication of the source, (c) the objectives of your investigation and (d) the analyses you intend to complete.

**Analyses:**

1. Present graphs and scatter-plots that illustrate where you think the analysis is going.
2. Detrend or transform as necessary.
3. Present autocorrelations, cross correlations.
4. Fit an ARMA or ARIMA model with forecasts.
5. Compute a power spectral estimate.

**The Report:** For the report you should

1. Describe the data and the source
2. Describe the scientific questions motivating your investigation.
3. Discuss the use of each analysis technique for this problem.

4. Present conclusions, including final models.

5. Submit typed final report of 10-15 pages by June 1.

Option 2. Report on State-Space Model (Chapter 4)

Chapter 4 describes a multivariate model called the state-space model which subsumes a large number of conventional models that are used for describing data. It is particularly useful in (1) economics, where it describes data that are composed of additive terms for trend and seasonal components, (2) statistics and biostatistics, where it handles longitudinal data or (3) social sciences where it can model panel data observed over time.

The difficulty with covering the material in Chapter 4 is that it requires some familiarity with matrix notation and a little more background in regression.

The Report: For the report on the state space approach you should

1. Summarize the model and what is obtained by Kalman filtering and smoothing.

2. Describe the examples in the chapter and find your own data set that would be appropriate for applying the state-space approach.

3. Solve Problems 4.2 and 4.3 using ASTSA.

4. Present analysis and conclusions, including final models for your own data.

5. Submit typed final report of 10-15 pages by June 1.