MATH 681: TIME SERIES ANALYSIS

Instructor :	David A. Stephens (Burnside 1235)
Email :	d.stephens@math.mcgill.ca
Lectures :	Tuesday & Thursday 16:05-17:25 (Burnside 1234)
Office Hours :	Friday 11:00-13:00
Textbook :	*Introduction to Time Series and Forecasting* (2nd Edition) by P. J. Brockwell and R. A. Davis.
Web Site :	http://www.math.mcgill.ca/∼dstephens/681/

TARGET SYLLABUS

1. **INTRODUCTION**
   - 1.1 Simple Stationary Models
   - 1.2 Trends and Seasonality
2. **STATIONARY PROCESSES**
   - 2.1 Properties
   - 2.2 Linear Processes
   - 2.3 Autoregressive Processes
   - 2.4 Moving Average Processes
   - 2.5 Forecasting
3. **ARMA MODELS: ESTIMATION AND FORECASTING**
   - 3.1 Basic Properties
     - 3.1.1 $ARMA(p, q)$ models
     - 3.1.2 Autocorrelation and Partial Autocorrelation Functions
     - 3.1.3 Forecasting
   - 3.2 Estimation and Model Selection
     - 3.2.1 Method of Moments
     - 3.2.2 Maximum Likelihood
     - 3.2.3 Residual Checking
     - 3.2.4 Model Selection
4. **NON-STATIONARY AND SEASONAL MODELS**
   - 4.1 ARIMA Models
   - 4.2 Unit Roots
   - 4.3 Seasonal Models
   - 4.4 Estimation, Hypothesis Testing and Forecasting
5. **STATE-SPACE MODELS**
   - 5.1 State-Space Formulation
   - 5.2 Structural Models
   - 5.3 State-Space Formulation of ARIMA Models
   - 5.4 Filtering and Smoothing: The Kalman Filter and EM Algorithm

6. **FINANCIAL TIME SERIES MODELS**

   6.1 Parameter-Driven Models
   6.2 Observation-Driven Models

7. **MULTIVARIATE TIME SERIES MODELS**

   7.1 Multivariate Time Series Models
   7.2 Multivariate ARMA Models

8. **SPECTRAL ANALYSIS**

   8.1 Spectral Representations of Stationary Processes
   8.2 Spectral Representations of ARMA Models
   8.3 Estimation
      8.3.1 Model-based/Parametric Estimation
      8.3.2 Model-free Estimation: The Periodogram

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