Time Series Analysis - I

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1 Course Outline

This course will focus on stochastic models and forecasting **univariate processes**.

1. Stationary stochastic processes

    (a) Linear stationary models and properties
        i. Pure AR and MA processes
        ii. Mixed processes

    (b) Estimation
        i. Conditional and exact ML estimation of ARMA models
        ii. Use of Kalman filter recursions in exact ML estimation of ARMA models

    (c) Forecasting
        i. Principles of forecasting
        ii. MMSE and properties
        iii. Calculating and updating forecasts
        iv. Practical aspects of forecasting

    (d) Practical aspects of estimation and diagnostic procedures.

2. Univariate non-stationary processes

    (a) Linear non-stationary models : Introduction and interpretation

    (b) Trend stationary and difference stationary processes: comparison

    (c) Processes with deterministic time trend: estimation and inference

    (d) Univariate processes with unit roots.

    (e) Detecting, and testing for, unit roots

        i. Dickey-Fuller, Phillips-Perron, others

        ii. Unit root tests under structural change

        iii. Other issues in unit root testing

3. Modeling Volatility

    (a) Univariate AutoRegressive Conditional Heteroskedasticity models.

    (b) Estimation

    (c) Inference

    (d) Testing

4. Modelling Cycles

5. Non parametric time series modelling

2   Textbooks

1. *Box, G.E.P. and G.M.Jenkins*, (1994), **Time series analysis: forecasting and control**, Prentice Hall International, Inc., New Jersey.

2. *Hamilton, J.D.* (1994), **Time series analysis**, Princeton University Press, Princeton, New Jersey.

3. *Maddala, G.S. and In-Moo Kim* (1999), **Unit roots, cointegration, and structural change**, Cambridge University Press, Cambridge.

4. *Bannerjee, A. et.al.*, (1993), **Cointegration, error correction and the econometric analysis of non-stationary data**, Oxford University Press, Oxford.