Specialization: PhD Level

Code: GEnvE 868 Course: Stochastic behavior and Time Series Analysis

Instructor: Tryfon Daras

Bibliography
4. Course notes (eclass.science.tuc.gr)

Course objectives
A time series is a sequence of measurements/data points, consisting of successive measurements made over a time interval (e.g. daily closing value of a stock market, ocean tides, counts of sunspots e.t.c.). Time series are used in statistics, signal processing, pattern recognition, econometrics, weather forecasting, earthquake prediction, electroencephalography. Time series analysis comprises methods for analyzing time series data in order to extract meaningful statistics and other characteristics of the data. Time series forecasting is the use of a model to predict future values based on previously observed values. If a time series can be predicted exactly is called deterministic. If the future values are partly determined by past value, i.e the future values have a probability distribution, the series is called stochastic. In addition, time series models will often make use of the natural one-way ordering of time so that values for a given period will be expressed as deriving in some way from past values.

Syllabus
- Introduction/terminology
  - stochastic process
  - time series
  - measures
  - autocovariance function
  - correlogram
- Time series analysis
  - simple models
  - trend analysis
- analysis of seasonal variation
- smoothing methods

- Stationary processes
  - autoregressive process
  - moving average process
  - mixed processes

- Parameter estimation
- forecasting

**Work load**
Written assignments/problem solving

**Student evaluation**
1. Written assignments (20%)
2. Final exam (80%)