Time series Analysis (I) Syllabus
Fall 2015

Course Outline:

This is an introductory course to time series analysis. Methods are hierarchically introduced – starting with basic concepts and terminologies, progressing to different data analysis skills, and ending with different modelling and inference procedures in time series. The course material will cover not only stationary and linear time series, but also nonstationary and nonlinear time series. After this course, students are expected to master the knowledge and skills needed to do both theoretical and empirical research in fields operating with time series data sets.

Basic Information:

Instructor: Haiqiang Chen

Email: hqchen2009@gmail.com

Office Hour: TBA, Econ Building A204

TA: Houquan Hu, Email: hu2006211456@126.com

Course Time and Classroom: Monday 8:00am-9:40am (Nanqiang 2-503) & Wednesday 2:30pm-4:10pm (Econ Building D136).

Textbook:

Time Series Analysis, James D. Hamilton, 1994.

Reference book:

Analysis of Financial Time Series (3rd ed.), Ruey S. Tsay, 2010.

Time Series for Macroeconomics and Finance, John Cochrane, lecture notes, Available from Cochrane's web site;

Statistics and Data Analysis for Financial Engineering, David Ruppert, 2011.

Software:

R-language, download from http://cran.r-project.org/

Recommend to use R-studio: https://www.rstudio.com/products/rstudio/download/

Online Learning resource: https://www.rstudio.com/resources/training/online-learning/

Grading:

A homework will be assigned each week and you are required to finish it in time. An empirical project will be assigned one month before

the end of semester as well. You need to finish the project with your teammates and present the main results in class.

Weight of grade:
Assignments 10%, Empirical Project 10%
Attendance and Class Performance: 10%
Mid-term 30%, Final Exam 40%

Course Plan:

- Introduction
- Review of Probability and Statistics
- Basic Definitions:
  - stationarity
  - autocorrelation function
  - transforming to stationarity;
- Linear Time Series Models:
  - AR/ MA/ ARMA models
  - ACF and partial autocorrelation functions
  - forecasting
  - parameter estimation
  - ARIMA models/ seasonal ARIMA models
- Spectral analysis
  - Spectral density
  - Peridogram
  - Spectral estimation

Midterm Exam

- State space models:
- Vector Autocorrelation Models (VAR)
- Nonstationary time series:
  - Unit roots;

  - Deterministic time trends;
  - Unit root asymptotics and testing;
  - Cointegration;

- Nonlinear time series models;

Final Exam