Stat 481/581: **Introduction to Time Series**

Instructor: Dr. Yan Lu, luyan@math.unm.edu

Time and Location: 11:00am-12:15pm TR, GSM 230

Office hours: HUM 468, Tuesday 3:30pm-4:30pm, Thursday 9:40am-10:40am (or by appointment)

Textbook: Time Series Analysis and Its Applications With R Examples (Robert H. Shumway & David S. Stoffer), 2th ed

Prerequisites: Probability (STAT 461/561). Previous experience with linear regression (STAT 440/540) and statistical computing is a plus but not required.

Topics: This class offers an introduction to time series methods from both a theoretical and applied perspectives. Topics to be discussed in this class are exploratory techniques for time series (autocorrelations, periodogram, etc.); spectral theory and estimation; Autoregressive Moving Average (ARMA) models; Box-Jenkins methodology; forecasting in time series; diagnostics of time series models. Special topics may consider non-stationary time series processes and ARCH-GARCH models etc,. The methodology will be illustrated with the analysis of different data sets arising in the context of the physical sciences, psychology, economics and finance, etc.

Grading: Homework Assignments together with homework solutions will be given about every 2 or 3 weeks. They will not be collected. Midterm exam is a closed book exam, but you can bring two A4 sheets notes (both sided). Midterm exam accounts 50%. Final project and a short presentation accounts 50%. We will give detailed information of final project after midterm exam.

	Stat 581	Stat 481
A+	95%-100%	90%-100%
A	85%-94%	80%-89%
B	75%-84%	70%-79%
C	65%-74%	60%-69%
D	under 64%	under 60%

Tentative Schedule

Ch. 1: Introduction to time series

Ch. 2: Time Series Regression

Ch. 3: ARIMA modeling. Estimation of autoregressive moving averages processes. Model diagnostics, forecasting and applications.

Ch. 4: Spectral estimation using Fourier analysis and Filtering.

Ch. 5: Special topic: Long memory, GARCH, threshold models

Ch. 6: State-Space Models (if time permits)

Computing

(1) R package, R package can be downloaded from website for free http://www.r-project.org

(2) ASTSA, ASTSA is an interactive, menu driven time series package. A free copy is available on book author's website: http://www.stat.pitt.edu/stoffer/tsa2/

(3) Data is available at http://www.stat.pitt.edu/stoffer/tsa2/