Statistics 435/711

Spring 2019

Instructor

Paul Shaman, 425 JMHH, shaman@wharton.upenn.edu, 215-898-8749

Class Hours and Location

MW 3–4:20, JMHH G65

Office Hours

MTuTh 4:30–6, and by appointment

Teaching Assistant

Somabha Mukherjee, somabha@wharton.upenn.edu

Course Materials

Class notes. These are the main source material for the course. The notes will be posted throughout the semester on Canvas.

Tsay, R. S., *Analysis of Financial Time Series*, 3rd ed. Wiley, New York, 2010. Some supplementary reading will be recommended in Tsay's book, and the book will also provide several data sets for discussion and for homework.

Software

The course uses R software. As we proceed, I will discuss the use of R in the class notes and lectures.

The R package is free and open software and is available at www.r-project.org. Several items of R documentation are posted on Canvas.

Course website

Statistics 435/711 is using Canvas. You can gain access by going to https://canvas.upenn.edu/. All notes, homework assignments and data sets for the course will be distributed and managed via the website.

Course Description

The aims of this course are to introduce basic time series and forecasting techniques. The emphasis is upon the use of statistical methodology, and the written communication of statistical results. Considerable time will be devoted to understanding statistical and econometric problems in the contexts in which they arise, and to proper selection of statistical techniques and interpretation of the statistical output.

As noted above, the primary class materials are instructor's notes; the text is supplementary. Use of R will be illustrated in the class notes.

There will be five homework assignments. Each will involve the analysis of data sets and interpretation of the findings, and the presentation of a clearly organized and presented written report. The homework is designed to teach and to give experience in the use of time series methodology. You are encouraged to consult with each other in doing the homework, and also to contact the Teaching Assistant and me for help. ***File sharing is not permitted, and you must submit your own writeup, with your own calculations***. ***Penalties will be imposed if file sharing is detected.*** Homework must be submitted by the due date specified for the assignment. ***Unless otherwise instructed, please submit hard copy for the assignments.***

There are no examinations.

Calendar

There are 28 classes (Monday–Wednesday schedule).

The first class is Wednesday, 16 January.

There is no class Monday, 21 January (Martin Luther King, Jr. Day)

The drop period ends Friday, 22 February.

There are no classes the week of 4 March (Spring break).

The withdrawal deadline is Friday, 5 April.

The last class is Wednesday, 1 May.

Topics

The primary goal is to present time series techniques. Basic multiple regression will be reviewed at the beginning, and additional regression topics will be presented as they are needed. For the most part, because of time limitations, attention will be focused on univariate series. Data sets studied will be primarily, but not exclusively, business and economic time series, including financial market data.

Multiple regression methods

Distributed lag models

ARIMA models

Spectral methods

Exponential smoothing

Combination of forecasts

ARCH and GARCH models