



## Statistics 5350/7110 Syllabus

Fall 2023

### Instructor

Paul Shaman, shaman@wharton.upenn.edu

### Class Hours and Location

The class is fully online. All lectures are synchronous.  
TuTh 12 –1:30, via Zoom, accessed via Canvas.  
Videotapes of all classes will be available on Canvas for the entire semester.

*The class schedule follows the undergraduate calendar. Class meeting days are listed at the end of this syllabus, and variations in the MBA calendar are also described.*

### Office Hours

MW 5:00–6:30 pm, and by appointment, all via Zoom

### Course Materials

Class notes. These are the main source materials 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 assigned in Tsay's book, and the book will also provide some data sets for discussion and for homework.

### Software

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

The R package is free and open software and is available at [www.r-project.org](http://www.r-project.org). Several items of R documentation have been posted on Canvas.

## Course website

Statistics 5350/7110 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. Ed Discussion will be used to communicate with the class, to address questions and post announcements. There is a link on Canvas for access.

## Course Description

The aims of this course are to introduce basic time series and forecasting techniques. The emphasis will be upon the use of statistical methodology, and the written communication of statistical results. Considerable time will be devoted to understanding statistical 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 will be instructor's notes; the text will be supplementary. Use of R will be incorporated into 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 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. ***All assignments will be submitted via Canvas and should be in the form of a pdf or Word file.***

There are no examinations.

## **Fall 2023 University Calendar (Undergraduate Calendar)**

The first class is Tuesday, 29 August.

The course selection period ends Tuesday, 12 September.

The drop period ends Monday, 9 October.

Fall break, Thursday–Friday, 12–13 October.

Grade type change deadline is Friday, 27 October.

The withdrawal deadline is Monday, 6 November.

Thanksgiving break, Thursday–Friday, 23–24 November.

The last class is Thursday, 7 December.

Reading days are 12–13 December.

Final exams are 14–21 December.

### **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

Trends and seasonality

Spectral methods

Distributed lag models

ARIMA models

Exponential smoothing

Combination of forecasts

ARCH and GARCH models

VIX, the CBOE Volatility Index

### **Class meeting days, undergraduate calendar**

There are 28 classes (Tuesday, Thursday schedule).

Week	Class dates
28 August	29, 31
4 September	5, 7
11 September	12, 14
18 September	19, 21
25 September	26, 28
2 October	3, 5
9 October	10, Fall Break
16 October	17, 19
23 October	24, 26
30 October	31, 11/2
6 November	7, 9
13 November	14, 16
20 November	21, Thanksgiving
27 November	28, 30
4 December	5, 7

There are four fewer class meetings on the MBA calendar. ***However, note that the undergraduate calendar is being used for all enrollees in the course.*** The four dates without class meetings on the MBA calendar are 10 October (MBA core exams), 17 and 19 October (MBA Opportunity Week), and 7 December.