

STAT 520 (=MGSC 520), Forecasting and Time Series -- Fall 2017

Instructor:

David Hitchcock, associate professor of statistics

209A LeConte College

Phone: 777-5346

Email: hitchcock@stat.sc.edu

Course Web Page: <http://www.stat.sc.edu/~hitchcock/stat520.html>

(Also accessible via Blackboard – go to course page in Blackboard

And then click on “Course Web Page” link on left of page)

Classes:

Meeting Times: MWF 1:10 pm – 2:00 pm, WMBB Nursing 409 **or via distance by streaming video**

Office Hours: Mon-Wed-Fri, 10:45-11:55 a.m., or **please feel free** to make an appointment to see me at other times.

Textbook:

Main textbook: *Time Series Analysis with Applications in R* (2nd Edition), by J.D. Cryer and K. Chan, Springer, 2008.

Additional textbook (available for free download online): *Time Series Analysis and Applications* (EZ edition), by R.H. Shumway and D.S. Stoffer, 2016.

The Shumway and Stoffer textbook is available as a free download

at <http://www.stat.pitt.edu/stoffer/tsa4/>: look for the "tsaEZ" link in the "EZ time series" section.

Prerequisite: STAT 516 or MGSC 391, or equivalent

Course Outline: Chapters 1-10 of the Cryer and Chan textbook. Topics covered include: models for stationary and nonstationary time series, analysis of trends using regression methods, ARIMA model specification, transformations, parameter estimation, model diagnostics, forecasting, and seasonal ARIMA models, and (time permitting) ARCH and GARCH models (Chapter 12).

Learning Outcomes: By the end of the term successful students should be able to do the following:

- Understand how fundamental measures such as mean, variance, and autocovariance and autocorrelation relate to time series data
- Understand the common models used in time series analysis
- Specify and estimate appropriate models for real time series data
- Undertake model validation and remedial action to improve models
- Perform advanced time series data analyses such as forecasting and inference

Exams:

There will be two take-home midterm exams (exact dates to be announced, around late September and early to mid-November). There will be an in-class final exam on Wednesday, December 13 at 12:30 p.m. If you are not able to come to campus for the final exam, you must contact Shannon Carson at distributed learning (scarson@mailbox.sc.edu or 803-777-2189) to set up a proctor. See <https://sc.edu/dl/ss/testsite.html> for information about approved testing sites in the state of South Carolina. If you are on campus and not able to attend the final exam time because of a conflict with another class, you may either contact the distributed learning office to set up a proctor, or may arrange with me to take it at some other time.

Homework: Homework will be assigned on the course web page. Due dates will be posted given on the course web page. Late homework will be penalized. You must do each homework problem independently. You may not look at another student's work while doing the homework. You may ask me for help on the homework problems. If homework is found to have been copied, all students involved will receive a 0. [To be clearer, students can ask each other informal ORAL questions about homework, but **cannot look at or copy each other's homework papers**. All submitted homework must be the student's **own work** and **NOT come from any other person or external source**.]

Project: All students must do a data-analysis project. The project will contain the analysis of a real time series data set of interest using methods we have learned in this class, and a typed report detailing the findings of the analyses. The details about the project will be announced about a month into the course.

Graduate Students: Any students enrolling in the course for graduate credit will do some extra homework problems during the semester.

Grading:

The course grade will be based on homework average (15%), project grade (20%), the two midterm exams (20% each), and a final exam (25%). The overall course average will result in the following grades: 90-100 = A, 87-89 = B+, 80-86 = B, 77-79 = C+, 70-76 = C, 67-69 = D+, 60-66 = D, 59 and below = F.

Computing: Some problems in this course involve significant computations, and for these, we will learn to use the free software package R. This is available in the labs and also as a free download for your home computer (see course web page for details). It is not assumed that you have much/any previous experience with R. Example code in R is given on the course web page.

During Class: No cell phones may be on during class. In the distance studio where class is recorded, laptops and tablets (e.g., i-pads) may be used only for note-taking and other course-related activities. Students may not use laptops and tablets to look at unrelated web pages, play games, etc.

Course Schedule: MWF, August 25 through December 8. Special dates:

No class (Labor Day): September 4 (Monday)

Last day to withdraw without "WF" grade: October 16 (Monday)

No class (Fall Break): October 20 (Friday)

No class (Thanksgiving Break): November 22, 24 (Wednesday, Friday)

Late September: Exam 1

Early- to mid-November: Exam 2

Wednesday, Dec. 13 (12:30 p.m.) final exam