Instructor: Joshua M. Tebbs, Department of Statistics
Course: Forecasting and Time Series
Class Time: MW 11.40-12.55 in Wardlaw 116
Prerequisite: STAT 516 (or equivalent)
Office: 209G LeConte (tel: 777.5163)
Office Hours: MW 10.00-11.00 (or by appointment)
email: `tebbs@stat.sc.edu`
url: `http://www.stat.sc.edu/∼tebbs/index.htm`

Required Course Material:

- Cryer, J. and Chan, K. *Time Series Analysis with Applications in R*, 2nd edition. Copyright 2008, Springer.

Course Description: The purpose of this course is to introduce you to the analysis of time series data. This course requires a strong familiarity with statistical methods such as confidence intervals, hypothesis tests, and regression (topics covered in STAT 515-516). Additional knowledge of probability, distribution theory, and mathematical statistics (e.g., STAT 511-513) will help enormously.

Learning Outcomes: We will cover Chapters 1-10 in Cryer and Chan. We will discuss 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. If time permits, we will discuss ARCH and GARCH models (Chapter 12). After completing this course, you should have a firm understanding of these topics and be comfortable with modeling and forecasting time series data.

Note: For students in actuarial science, successful completion of this course, along with STAT 516 (or STAT 704-5), confers Validation by Educational Experience (VEE) credit for the Applied Statistical Methods. See `www.soa.org` for more information.

Computing: We will use R in this course. You are expected either to know R or to learn it quickly (by example). The R package is available for free from `www.r-project.org`. Read carefully the "Introduction to R" Appendix in Cryer and Chan (starts on pp 423).

Homework: There will be periodic homework assignments during the semester. Homework should be written up neatly and stapled. R code and output must be included. The homework assignments are a very important component of this course. Each will count towards your final grade. Late homework will receive at most 25 percent credit.

Project: You will find a time series data set of your choice and analyze, model, and forecast the series using methods learned in this course. Your analysis will be written up in a final report with abstract, body, conclusions, and appendices. Further information about the project will be disseminated later.

Exam Schedule: We will have one take-home midterm roughly halfway through the semester (e.g., sometime between October 7-21). A closed-book, closed-notes, cumulative final examination will be on Friday, December 13, at 9.00am. Please note that I do not give make up examinations unless your absence is due to a university commitment and you have informed me about it at least one week in advance.

Grade Breakdown: Your course grade will be determined by homework (25 percent), the midterm (15 percent), the project (25 percent), and the final examination (35 percent). Final course grades will be assigned according to a 90-80-70-60 scale.

Some additional comments:

- Working together on homework problems is permitted and encouraged, but each student should write up his/her solutions independently of others (this will help greatly). Naturally, cheating on exams is a serious offense and will be dealt with harshly.

- Many students find this course to be challenging, especially at the beginning where there is a large amount of theory needed. As the course progresses, students generally come to realize that this theory aids in applying statistical techniques with real time series data. Most students find the computing component (with R) to be not overwhelming.

- The distance aspect of this course affords you the flexibility to attend class at your own convenience. However, I have found that students who are not disciplined will fall behind in attendance. This almost always leads to deleterious results. I would strongly recommend that you physically attend class as scheduled (MW 11.40-12.55) if you are on campus. Re-watching lectures can help with difficult concepts.

- Previous students have found working on the project to be very rewarding. Start thinking about which topic you would like to write about and begin looking for interesting time series data sets on this topic.

- I would like to talk to anybody with a disability that may require special attention with examinations or other aspects of the course. Please talk with me ASAP.

My expectations for you:

1. Attend every class and be on time.

2. Read appropriate sections of the text/notes before class.

3. Treat homework very seriously.

4. Ask questions if you do not understand something or wish to know more.

5. Make it your goal to understand everything we do.