ST565 Time Series - Syllabus (Tentative)

Course Name: Time Series
Course Number: ST565
Credits: 3
Term: Winter 2014
Prerequisites: ST 412/512 and ST 422/ST 522 or equivalent
Lectures MWF 900-950, FURM 105
Instructor: Charlotte Wickham, 76 Kidder
charlotte.wickham@stat.oregonstate.edu
Help Sessions: Wed 1400-1530, Thu 1400-1500 (Location TBA)
TA: TBA

Course Content

The analysis of serially correlated data in both time and frequency domains. Autocorrelation and partial autocorrelation functions, autoregressive integrated moving average models, model building, forecasting; filtering, smoothing, spectral analysis, frequency response studies.

Topics covered will include:

- Exploratory analysis and graphical display of time series
- Common stationary models for time series and their estimation
- Forecasting of time series
- Regression with errors described by a time series model
- Analysis of time series in the spectral domain

Student Learning Outcomes

After completing ST565 you will be familiar with the issues in understanding, analyzing and interpreting data measured in time. You will be able to:

- Define the concept of stationarity and describe it’s importance in time series analysis.
- Define basic stationary time series models: white noise, AR(1) and MA(1).
- Define the autocovariance and autocorrelation functions and derive the autocorrelation function for basic time series models.
- Explore and graphically summarise trend, seasonality, correlation and variation in time series data using R.
- Apply the Box-Jenkins modelling approach to identify, fit, check and forecast SARIMA models for time series data.
- Estimate and interpret regression models with time series structure on the errors.
- Define the spectrum and interpret a periodogram of a time series.

Evaluation of Student Performance

- Homework – 40% of final grade. There will be approximately 8 homeworks, your lowest homework grade will be dropped. I encourage you to work together on homeworks but what you hand in must be your own work (and in your own words).
- Midterm – 25% of final grade. The midterm will be in week 6. More details later.
- Final – 35% of final grade. The final will be comprehensive, Tuesday June 12th at 1200.
Learning Resources

Required *Time Series Analysis and Its Applications: with R Examples* by Robert Shumway and David Stoffer. This is the primary textbook and I expect you to do the readings assigned from this book.

Optional Two other books I find useful are (also available online):

- *Introductory Time Series with R*, P Cowperwait & A Metcalfe. This is a much more applied (i.e. less math) book. Great if you just want some intuition and how to do things in R without the theory.
- *Time Series Analysis With Applications in R*, Jonathan D. Cryer and Kung-Sik Chan. A slightly different approach.

Web site

Course materials (lecture notes and homeworks) will be posted at [stat565.cwick.co.nz](http://stat565.cwick.co.nz). Class email announcements and grades will be distributed through Blackboard. You need to have an ONID account in order to use Blackboard.

Disability statement

Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting me prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at (541) 737-4098.

Academic integrity

Academic dishonesty is a serious offense and will be addressed following the guidelines set out in the Academic Regulations of OSU (go to [http://catalog.oregonstate.edu](http://catalog.oregonstate.edu), click on Registration Information → Academic Regulations, and read AR 15).

The Student Conduct Code [http://oregonstate.edu/studentconduct/code/](http://oregonstate.edu/studentconduct/code/) defines Academic dishonesty as

> ... an act of deception in which a Student seeks to claim credit for the work or effort of another person, or uses unauthorized materials or fabricated information in any academic work or research, either through the Student’s own efforts or the efforts of another.

Examples include, but are not limited to, the following:

- verbatim copying of another student’s homework assignment
- copying off another student’s exam
- using prohibited materials (e.g., cell phone, cheat sheet) during an exam
- communicating with another student during an exam
- changing answers on an exam after the exam has been graded
- unattributed use of material copied from an article, textbook, or web site
- continuing to write on an exam after the instructor or TA has asked for the exams to be handed in.