

STATISTICS 674: Time Series Analysis II. Spring, 2011.

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TEXT:

1. (Required) *Analysis of Financial Time Series*, 3rd Edition, R.S. Tsay, 2010, Wiley.
2. (Required) *Time Series Analysis and Its Applications with R Examples*, Shumway, R. and Stoffer, D., 2006, New York, Springer. Electronic copy available through TAMU libraries.
3. (Recommended) *Introduction to Time Series and Forecasting*, P. Brockwell and R. Davis, 2003, New York, Springer. Electronic copy available through TAMU libraries.
4. (Recommended) *Time Series Analysis: Theory and Methods*, P. Brockwell and R. Davis, 1991, New York, Springer.
5. (Recommended) *New Introduction to Multiple Time Series Analysis*, H. Lutkepohl, 2007, Springer, New York.
6. (Recommended) *Anticipating Correlations*, R. Engle, Princeton University Press, 2009, Princeton.
7. (Recommended) *Foundations of Prediction Theory and Time Series Analysis*, M. Pourahmadi, 2001, New York, Wiley.

PREREQUISITE: STAT 673. Absolutely No Auditors.

FOCUS OF THE COURSE: STAT 674 is for motivated graduate students in statistics and other fields who seek a solid background in the theory and methods of time series for the analysis of multivariate data collected over time. We begin with univariate ARCH/GARCH models, then move to the time-domain structure of multivariate stationary processes, vector ARMA models (Tsay, Chap. 8), spectral representation and estimation of the spectral density matrix (Shumway and Stoffer, Chap. 6). The focus will then shift to multivariate ARCH/GARCH models, applications to economics and financial time series (Tsay, Chaps. 9-12), engineering and biomedical sciences (Shumway and Stoffer, Chap. 7) and other areas of interest to students in the course. About the last third of the course, I will discuss and present applications of spectral-domain techniques and graphical models to clustering

and classification of biomedical and brain mapping (fMRI,...) data ; potential connections among multivariate time series, longitudinal data analysis and analysis of correlated data.

Early in the semester, students will be divided into smaller groups interested in similar application areas, they will be assigned a project and relevant research papers and datasets to study, analyze and present at various times in the course. We will use a wealth of datasets from the text and other sources. Research papers published in the last decade or so will be used to cover emerging techniques and areas of applications of multivariate time series analysis.

#### GRADE POLICY:

1. Only one midterm exam worth 100 points will be given in class. There is no final examination.
2. Homework will be assigned regularly and posted on DoStat (Reference and Registration codes are : DS-??? and TSA), it will contribute 50 points to the course. The quality of writing and logical presentation of the arguments leading to a result, not just the correct answer, will contribute greatly to the grade for this part of the course.
3. Quizzes will be given periodically covering the most recent topics covered in class and will contribute 50 points toward the course grade.
4. Project in the course will involve a significant amount of data analysis, reading the relevant literature in the student's area of interest, computational effort, discussion and presentation in the class. This is worth 100 points. The final project report should be organized and typed following the format of a research article in statistics or areas of applications. The quality of writing and presentation in class will contribute greatly to the grade for this part of the course.
5. The final course grade will be based on the standard scale where a total of 90 to 100 percent will be an A, 80 to 89 percent will be a B, etc.
6. Attendance and classroom participation are encouraged and will be rewarded, they are integral parts of the learning process .
7. ACADEMIC INTEGRITY STATEMENT: "An Aggie does not lie, cheat, or steal or tolerate those who do." The Aggie Honor Council Rules and Procedures are available at <http://www.tamu.edu/aggiehonor>.
8. STATEMENT ON PLAGIARISM: As commonly defined, plagiarism consists of passing off as one's own ideas, words, writing, etc., which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you should have the permission of that

person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated. If you have any questions regarding plagiarism, please consult the latest issue of the Texas A&M University Student Rules, under the section "Scholastic Dishonesty."

9. STATEMENT ON DISABILITIES: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation for their disabilities. If you believe you have a disability requiring an accommodation, please contact the Office of Disability Services in Room B118 of Cain Hall. The phone number is 845-1637.