

Math 590: Time Series Analysis

2:00-3:15pm, TuTh, Fall, 2005

Yong Zeng

Course Description: This course is intended to present the basis knowlegde (including models, methods and concepts) of time series analysis to students with a good background of intermediate mathematical statistics. Some elementary knowledge of basic linear regression analysis would be helpful but not necessary. The presentation will be balanced between theory and data analysis, with sufficient theory to understand the basis of methods and a broad variety of models and many real data examples. Case studies will be drawn from business and economics, network traffic and meteorology, and data will be analyzed by students using existing computer programs (SAS and R). Students are also expected to understand proper use and limits of time series models.

Brief Outline: Topics to be covered may include stationary stochastic processes, autocorrelation, partial autocorrelation, AutoRegressive Integrated Moving Average (ARIMA) models, identification, estimation and diagnostic checking of time series models and model selection procedures, tests for (unit root) nonstationarity, seasonal models, long memory models, prediction and forecasting, regression models with time series errors; many AutoRegressive Conditional Heteroskedastic (ARCH) type models and other models for volatility; non-linear models; econometric models for high frequency data; extreme values, quantile estimation and value at risk; and Markov chain Monte Carlo Methods. Due to time constraints, not all the latter topics mentioned will be covered in the course.

Prerequisites: Math 441 or equivalent; some knowlegde of correlation and regression analysis would be helpful.

Text: The required textbook is “Analysis of Financial Time Series” by Ruey S. Tsay, Wiley, 2002.

Other References

1. “Time Series Analysis: Forecasting and Control” by Box, Jenkins, and Reinsel, 3rd edition, Prentice Hall, 1994.
2. “Time Series Analysis” by J. D. Hamilton, Princeton University Press.

Grading: There will be assignments worth a total of 25% of your grade, two lab assignments each worth 15%, a midterm in class worth 20%, and a final (not comprehensive) worth 25%.

There will be roughly 5-8 assignments for the course. You are permitted to discuss homework problems and lab assignments, but you must write up the solutions independently. No credit will be given to assignments found to be substantially similar.

You are allowed two sides of 8.5" \times 11" notes for midterm and final. Solutions for the midterm and the final examinations must be explained, and no credit will be given for an answer without the relevant justification and explanation.

There will be no makeup exams (midterm or finals). Late assignments will be penalized by 10% and will not be accepted after a week.

How to Reach Me:

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Office Hours: 11-12pm, TuTh, Manheim Hall, 307A, or by appointments gladly