

# SYLLABUS

## Stat 960:690:2 Special Topics Topics in Time Series and Risk Management

Fall, 2008

Instructor: Professor Rong Chen  
Office: Hill Center 475  
Tel: (732) 445-5199  
email address: rongchen@stat.rutgers.edu  
Office Hours: M 2:00-3:30 or by appointment

Course Web Site: [http://stat.rutgers.edu/~rongchen/TSRM\\_Course.html](http://stat.rutgers.edu/~rongchen/TSRM_Course.html)

Prerequisite: First graduate level mathematical statistics course, graduate level applied regression course and applied time series analysis course.  
It should be emphasized that this course will cover a great deal of material at a rapid pace and will require some programming skills (**R**, or other software of your choice, such as SAS). Students who have had difficulty in previous mathematical statistics courses or have difficulty with computers may find that this course requires a considerable amount of time and effort, and should plan accordingly.

Recommended Text: (1) *Analysis of Financial Time Series*, by Ruey S. Tsay. 2nd Edition, Wiley  
(2) *Non-linear Time Series – A dynamical system approach*, by Howell Tong, Oxford Press  
(3) *Nonlinear Time Series*, by J. Fan and Q. Yao, Springer  
(4) *Introduction to Multiple Time Series Analysis*, by Helmut Lutkrpohl, Springer-Verlag

Lectures: MW 10:20-11:40, Hill 552 BUS

|          |                                   |     |
|----------|-----------------------------------|-----|
| Grading: | Homework & Computing              | 25% |
|          | Reading and Class Presentation    | 35% |
|          | Project (report and presentation) | 40% |

Schedule: Project Presentation: last two weeks of class, in class

Homework:           1. Homework will be assigned and collected.  
                          2. All homework assignment must be written on standard 8.5 by 11 paper and stapled together. Computer generated output without detailed explanation and remarks will not receive any credit

Reading and

Class Presentation: A set of papers will be distributed in class. For each paper, I will first provide background materials and knowledge in class. The students will then have about one week to read and understand the paper and ready to discuss it in class. Every paper will have a lead student discussant (by random or voluntary assignment) who will make a semi-formal presentation of the paper in class before each discussion. All other students are required to participate in discussion and possibly answer questions from other students and me. Some homework assignments will be based on the papers.

Computing:           Data analysis is an integral part of the course. The main software package is R. Instructions for using the package will not be given. If you do not have previous knowledge on R (or S+), please be aware that you may need to devote considerable time and effort to get started. R is a free software. Instructions for installing R on your PC are available on course web page. You may use any software package of your choice, but no instructions or help will be given from me.

**Course outline (tentative):** All topics will be linked to **financial statistics and risk management**

1. **Introduction and review of linear time series analysis**
2. **Time series regression, capital-asset pricing models and others**
3. **Nonlinear time series analysis, GARCH models and others**
4. **Nonparametric time series analysis, stock technical analysis and others**
5. **State-space models and dynamic systems, stochastic volatility models and others**
6. **Multivariate time series analysis, portfolio management and others**
7. (if time permits) **Other Advanced Topics**