THE UNIVERSITY OF CHICAGO
Graduate School of Business
Business 41202-01/81, Spring Quarter 2008, Mr. Ruey S. Tsay

COURSE INFORMATION

GSB Honor Code: This course requires students to follow the GSB Honor Code and Standards of Scholarship in examinationa and homework assignments. The GSB Honor Code requires students to sign the following pledge, "I pledge my honor that I have not violated the Honor Code during this examination," on every examination.

Course Objectives:

- To learn some basic knowledge of financial time series data, including high-frequency data
- To study simple models and methods for analysis of financial time series (both for mean and volatility evolution)
- To assess market risk and to study methods for calculating Value at Risk (VaR)
- To understand proper use and limits of econometric methods in finance.

Textbook: *Analysis of Financial Time Series* by Ruey S. Tsay (John Wiley, 2005), 2nd Ed., ISBN 0-471-69074-0.

References:

- *The Econometrics of Financial Markets* by Campbell, Lo, and MacKinlay, 1997, Princeton University Press: New Jersey.
- *Options, Futures, and Other Derivatives*, 6th Ed. by J.C. Hull, 2005, Prentice-Hall: Upper Saddle River, New Jersey.
- *Modeling Financial Time Series with S-plus* by E. Zivot and J. Wang, 2005, 2nd Ed., Springer: New York. (2nd printing)

Web: All data sets of the textbook are posted on Web at
http://faculty.chicagogsb.edu/ruey.tsay/teaching/fts2/
Handouts and assignments are posted on Web at
http://faculty.chicagogsb.edu/ruey.tsay/teaching/bs41202/sp2008/
(or click on the course name on my teaching web page)
Students are encouraged to check the course Web site regularly for information concerning the course.

Office hour:
Wednesdays: 1:30 pm to 2:30 pm or by appointment.
My phone number (773)702-6750, My office: HPC 455
Fax number: 773-702-0458
E-mail: ruey.tsay@ChicagoGSB.edu
(the easiest way to make contact with me)

Teaching Assistant:
Mr. David Matteson
E-mail: matteson@uchicago.edu
TA will hold weekly review sessions. He will also help you with software packages and answer your questions.

Grading:
In-class Exam (35%), Final Exam (35%), and homework assignments (30%).

Computing and software:
Data analysis is an integral part of the course. The main software package used is R. Other packages such as S-Plus and Matlab can also be used. R is a free software. Instructions for install R on your PC are available on course web page.
Instructions for using the R package will be given and discussed. No prior knoweldge of the package is required.

Special notes:

- R is free at http://www.r-project.org (with R-Metrics and fSeries package, R.2.4.1 or higher. Also, R needs the Ox package with G@RCH to perform flexible GARCH estimation).
- There are six HW assignments. The best five scores are used to compute the final grade.
- Homework is due **before** class on the due day. No e-mail submission is accepted.
- No late homework assignments will be accepted; I plan to post solutions on the Web promptly.
- Students may discuss homework assignments, but **every student must hand in his or her own solutions**.
- In-class exam: Week 6, open book.
- Final exam in the examweek as scheduled.

Course Outline: **All topics include data analysis and applications**.

1. Returns and their empirical characteristics
2. Linear time series models and their applications
3. Volatility modeling via conditional heteroscedastic models
4. Nonlinear models, neural networks and their applications
5. High-frequency data analysis, realized volatility, and market microstructure
6. Continuous-time diffusion models and Ito's Lemma
7. Value at Risk (VaR), stress test, peak over the threshold, expected loss, and quantiles.
8. Multivariate models, factor models, and their applications, if time permits
9. Multivariate conditional heteroscedastic models, if time permits
10. Markov Chain Monte Carlo methods and their applications, if time permits.