

COURSE INFORMATION

GSB Honor Code: This course requires students to follow the GSB Honor Code and Standards of Scholarship in examination, final project 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
- To study simple models and methods for analysis of financial time series
- 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.

Web: All data sets of the textbook are posted on Web at
<http://gsbwww.uchicago.edu/fac/ruey.tsay/teaching/fts2/>

Handouts and assignments are posted on Web at
<http://gsbwww.uchicago.edu/fac/ruey.tsay/teaching/bs41202/>
(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:

Wednesday: 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 project (35%), and homework assignments (30%).

Computing and software:

Data analysis is an integral part of the course. Two main software packages will be used: R and S-Plus. *Instructions for using these packages will be given and discussed. No prior knoweldge of the packages is required.* R is a free software and S-Plus is available on four GSB computers at Hype Park Center and four computers at the Gleacher Center.

You may use any package of your choice, however.

Special notes:

- R is free at <http://www.r-project.org> (with R-Metrics, R.2.1.1 or higher. Also, R needs the Ox package with G@RCH to perform flexible GARCH estimation). S-plus will be available on some of the GSB PCs.
- There are six HW assignments. The best five scores are used to compute the final grade. That is, students may drop one of the assignments.
- 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 project is due on Week 10 (last class). You may have an individual final project or a joint project consisting of 2 students. Further information will be announced in class.

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, extreme value analysis 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.