

**THE UNIVERSITY OF CHICAGO**  
**Graduate School of Business**  
Business 41912, Spring Quarter 2008, Mr. Ruey S. Tsay

**COURSE INFORMATION**

**Course website:**

<http://faculty.chicagogsb.edu/ruey.tsay/teaching/ama>

Course Objective:

- To learn basic techniques for analysis of multi-dimensional data
- To study multivariate distributions, especially Gaussian distribution
- To understand multivariate statistical inference and applications
- To discuss various methods for dimension reduction, including principal component analysis, factor model, multi-dimensional scaling, sliced inverse regression, etc.

Textbook: *Applied Multivariate Statistical Analysis* by R.A. Johnson and D.W. Wichern, Prentice-Hall, 6th Ed., 2007. ISBN 0-13-187715-1.

Reference:

1. *An Introduction to Multivariate Statistical Analysis* by T.W. Anderson (2nd Ed), Wiley, 1984.
2. *Independent Component Analysis* by Hyvärinen, A., Karhunen, J. and Oja, E. (2001), John-Wiley. ISBN 0-471-40549-X.

Articles: A list of recent articles for dimension reduction will be given and students are expected to read over these articles (Download from e-journals from the library).

Office hour:

Wednesday: 1:30 pm to 2:30 pm or by appointment.

My phone number 702-6750, My office: HPC 455.

E-mail: [ruey.tsay@gsb.uchicago.edu](mailto:ruey.tsay@gsb.uchicago.edu)

(this is the easiest way to make contact with me)

Teaching assistant: TBA.

- e-mail:

Grading:

Mid-term (30%), Final Exam (45%), and Homework Assignments (25%).

**Special notes:**

- Homework is due **before** the class one week after assigned.
- No late homework assignments will be accepted. Solutions or discussions will follow after the assignments are handed in.
- **You may discuss assignments with each other, but must turn in your own answers.**
- No e-mail submission of any assignment will be accepted.
- Mid-term: Week 6, open book. (May 9)

Computing:

The main package is R version 2.6.2 (see [www.r-project.org](http://www.r-project.org)). You may use any software of your choice.

**Course Outline:** All topics include applications

1. Multivariate Normal Distributions
2. Inferences about a mean vector and comparisons
3. Multivariate Linear Regression
4. Principal Component Analysis & Independent Component Analysis
5. New developments in dimension reduction:
6. Factor Analysis and discriminant analysis
7. Canonical Correlation Analysis: prediction
8. Discrimination and Classification
9. Clustering and Introduction to Data Mining
10. Other topics if time permits

### **GSB Honor Code**

This course requires students to follow the GSB Honor Code and Standards of Scholarship in examination, final project and 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.