SYLLABUS

FSRM 16:958:563
Regression Analysis in Finance

Fall, 2016

Instructor:	Professor Rong Chen Office: Hill Center 580 Tel: (848) 445-7690 email address: rongchen@stat.rutgers.edu Office Hours: Thursday 3:00-5:00 or by appointment
Grader:	Ms. Yi Chen Email address: elynn.chen@rutgers.edu Office Hours: Wed 1:15-3:15 Office Location: Hill Center 555
Course Web Site:	*http://stat.rutgers.edu/~rongchen/Reg_Course16.html*
Prerequisite:	Level IV Statistics (e.g. Statistics 960:401 or 960:484) It should be emphasized that this course will cover a great deal of material at a rapid pace and will require some programming kills (**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.
Text:	*Statistical Models and Methods for Financial Markets*, by Tze Leung Lai and Haipeng Xing. Springer [Supplemental Text] *Applied Linear Regression Models*, by Neter, Kutner, Nachtsheim and Wasserman. Springer Note: Not all topics and chapters in the books will be covered. There will be supplemental materials outside the books. Lecture notes will be posted on the course web site.
Lectures:	Thursday 6:40-9:30, SEC 208 BUS

Grading:	Homework & Computing	20%
	Midterm Exam	25%
	Final Exam	30%
	Project	25%

Schedule:	Midterm: Thursday, Oct 20 (in class) Final: Thursday, Dec 8 (tentative)
Project Schedule	Proposal: Thursday, Oct 20 Intermediate Report: Thursday, Nov 10 Presentation: Thursday, Dec 1 (two sessions: 5-7:30 and 7:30-10:00) Final Report: Saturday, Dec 17 by email

Homework:

- Homework will be assigned and collected regularly. **Late homework will not be accepted. DO NOT COPY from other sources. Electronic coy is not accepted**.
- All homework assignment must be written on standard 8.5 by 11 paper and stapled together. Computer generated output without detailed explanations and remarks will not receive any credit. You may type out your answers, but make sure to use different fonts to distinguish your own words with computer output. Only hard copies are accepted, except under special circumstances. You should also submit the R source code with computing assignments, as an appendix.
- Homework solutions will be available on our course web site.

Computing: The main software package is **R**. Instructions for using the package will be given and briefly discussed. If you do not have previous exposure to **R**, 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 PC are available on the course web page. You may use any other software package of your choice, but no instructions or help will be given from TA or me.

Project: Project is to be carried out by a team of two investigators. Imagine that the upper management is contemplating to disband your team and this is your last chance to show how useful you are to the company, in order to save your job. You can choose to do (but not limited to) one of the following things: (i) finding a strategy that will potentially generate positive returns, (ii) demonstrating your ability to help other team/line of business in generating useful information from data to help their business, (iii) demonstrate your ability to evaluate risk more accurately, including risk calculation and stress testing.

Your **project proposal** needs to include what you plan to do, why it is important to the business, what kind of data you are going to use and a list of possible methodologies you plan to use. Your **intermediate report** needs to include data description, preliminary analysis, the methodologies you are using, and the results you expect to get. The presentation is limited to 10 minutes to your upper management who will decide if you still have a job tomorrow. Your **final report** should contain a report of what you have done, with an executive summaries for a very busy boss who missed your presentation, and with details for an expert consultant who will read all the details of your report and give an expert opinion to the upper management. All data files with detailed information (where it comes from, what are the variables, how it was processed or cleaned, etc) and R code for the project should be submitted in a zip file.

Course outline (tentative):

1. **Introduction**
2. **Review: Basic concepts in Probability and Statistics; Related basic concepts in Investments and Finance**
3. **Correlation and Portfolio management**
4. **Simple linear regression and capital asset pricing model**
5. **Multiple linear regression and foreign exchange models, multi-factor pricing models, Nelson-Siegel yield curves, and some hedging strategies**
6. **Logistic regression model and its applications in finance**
7. **Nonlinear regression models and asymmetric CAPM models, nonlinear interest rate models, and regime switching models**
8. **Nonparametric regression models and nonparametric yield curve models, automatic technical analysis, and others**
9. (if time permits) **Regression with ultra-high dimensional data**, **Principle and factor analysis** and others