Numerical and Statistical Methods in Finance FIN6832

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Class time and place: Thurs. 4:00-6:45pm, JSOM 2.803

Office Hours: By appointment. I strongly urge you to use email (the above address) to contact me outside of class. I check my email messages daily Monday through Friday, you can be sure I will receive your message this way.

Pre-requisite & other restrictions: FIN 6360 (Options and Futures Markets) or FIN6381 (Introductory Mathematical Finance). If you have not completed all of the prerequisites or obtained an official waiver you may not register for this class.

Course Objectives: This course will primarily focus on building an advanced skills in numerical and statistical analysis and applying in financial markets, investment decision, and trading strategies.

1. Students will learn advanced statistical models and some non-parametric models
2. Students will develop programming skill in R to effectively analyze financial data.
3. Students will construct financial models in R to obtain quantitative solutions to financial problems.

Textbook: "Statistics and Data Analysis for Financial Engineering" by David Ruppert and David S. Matteson, the Second Edition, Springer
Notes: Additional reading materials will be posted on eLearning. Some of the papers will be discussed in class.

Computers & Software: We will be using laptop computers during classes to work on some examples and models. We will also learn some basic programming techniques in R.

Grading System: Students earn a grade in the class by demonstrating mastery of the class material. Grades will be based on an end-of-semester ranking of students

according to the total accumulated score. Both the total score and students' respective rankings will be used in assigning final grade. The precise cutoff scores used to assign grades will be an end-of-semester decision based on my perception of the difficulty of the exams and class works and other factors that I consider appropriate. The final letter grades A, B, C, or F will be given.

Grading will be based on the following weightings of assigned material.

Project & assignments	40%
Exam 1	30%
Exam 2	30%

Notes: There will be no make-up exams. You are responsible for taking all exams on the designated dates. Note: You must have my permission to skip an exam. If you have to miss an exam (with my permission and appropriate documents), the weight of course grade on that exam will be shifted to the final exam.

Project & Assignments: Students are randomly formed into groups. Each team will have 3-4 students. Every member should actively participate and contribute to the projects. All assignments should be submitted by eLearning and late submission is not accepted.

Class Attendance& Class Work: Students registered for the class are required to attend all sessions. In the classroom, you cannot browse any other websites except for webpage related course materials. You will be asked to leave the classroom once discovered.

Student Conduct and Discipline: The University of Texas System and The University of Texas at Dallas have rules and regulations for the orderly and efficient conduct of their business. It is the responsibility of each student and each student organization to be knowledgeable about the rules and regulations which govern student conduct and activities. The University of Texas at Dallas administers student discipline within the procedures of recognized and established due process. Procedures are defined and described in the Rules and Regulations, Board of Regents, The University of Texas System, Part 1, Chapter VI, Section 3, and in Title V, Rules on Student Services and Activities of the university's Handbook of Operating Procedures. Copies of these rules and regulations are available to students in the Office of the Dean of Students, where staff members are available to assist students in interpreting the rules and regulations (SU 1.602, 972/883-6391).

Academic Integrity: The faculty expects from its students a high level of responsibility and academic honesty. Because the value of an academic degree depends upon the absolute integrity of the work done by the student for that degree, it is imperative that a student demonstrate a high standard of individual honor in his or her scholastic work.

Scholastic dishonesty includes, but is not limited to, statements, acts or omissions related to applications for enrollment or the award of a degree, and/or the submission as one's own work or material that is not one's own. As a general rule, scholastic dishonesty involves one of the following acts: cheating, plagiarism, collusion and/or falsifying academic records. Students suspected of academic dishonesty are subject to disciplinary proceedings. Plagiarism, especially from the web, from portions of papers for other classes, and from any other source is unacceptable and will be dealt with under the university's policy on plagiarism (see general catalog for details). This course will use the resources of turnitin.com, which searches the web for possible plagiarism and is over 90% effective.

These descriptions and timelines are subject to change at the discretion of the professor.

Tentative Academic Calendar:

Session	Topic	Reading Assignments
Week 1	Exploratory Data Analysis	Chapter 2-4
Week 2	Univariate Distributions and Resampling	Chapter 5 & 6
Week 3	Regression Models and Advanced Topics	Chapter 9-11
Week 4	Multivariate Statistical Models: Multivariate Distributions and Copulas	Chapter 7 & 8
Week 5	Multivariate Analysis: Factor Models and Principal Component Analysis (PCA)	Chapter 18
Week 6	Multivariate Analysis: Factor Models and Principal Component Analysis (PCA)	Chapter 18
Week 7	Multivariate Analysis: Canonical Correlation Analysis (CCA)	
Week 8	Mid-term Exam	
Week 9	Time Series Models and Seasonality Analysis	Chapter 12 & 13
Week 10	Stochastic Volatility and Statistical Trading Strategies	Chapter 14 & 15
Week 11	Portfolio Selection	Chapter16
Week 12	Risk Management: Value at Risk (VaR) Analysis and Expected Shortfall (ES)	Chapter 19
Week 13	Risk Management: Value at Risk (VaR) Analysis and Expected Shortfall (ES)	Chapter 19
Week 14	Fall Break and Thanksgiving Holiday (No class)	
Week 15	Numerical Methods: MCMC	Chapter 20
Week 16	Numerical Methods: MCMC	Chapter 20

Last Day of Classes: Wednesday, Dec. 7th.

Final Exams: Friday, Dec. 9th – Thursday, Dec. 15th.

This course schedule is not absolute. While every effort will be made to follow the schedule as listed, changes may be made as needed. It is the student's responsibility to track changes that are announced.