OR 538: Analytics for Financial Engineering and Econometrics
Fall 2017

Class time: 7:20-10:10 pm
Room: Planetary Hall 120
Instructor: Sabyasachi Guharay, Ph.D.
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Phone: 703-993-1670
Office Hours: Thursday, 5:10 - 7:10 pm and by appointment

Course Description:
This course introduces the basic analytics for financial engineering and econometrics through hands on experiments in R. Students will be introduced to topics include financial transactions and econometric data management, correlation, linear and multiple regressions for financial and economic predictions, financial time series analysis, portfolio theory and basics of risk analysis. This course will provide a foundation of basic theory and methodology as well as applied examples with techniques to analyzing large financial and econometric data. Students will be able to apply their knowledge by working on a team project where they will learn from their peers.

Prerequisites:
Graduate standing (Undergraduate engineering math: Calculus, probability theory, statistics, and some basic computer programming skills. Some background in stochastic process and differential equation would also be helpful, but not required.) Familiarity with one scientific programming language such as C++, Java, MATLAB, R, SAS, is a bonus but not required. Any computational needs will be self-contained in the course.

Grading:
Homework 20%; Term Project 30%; In-Class Final 50%

There will be approximately five - seven hand-in assignments during the semester, a group mini term project, as well as an in-class final exam. The exams will not be open book. However, you will be permitted a one page (double-sided) "cheat sheet" with notes and/or formulae. In class final exam date will be set by the University. Make-up exam can only be granted if you must be absent because of medical conditions (documentation from doctors required) or other circumstances that you have no control over. Please notify the instructor at least 5 days before the exam. The only exception is medical emergencies that you cannot know beforehand. Make-up will be at the same level of difficulty as the regular exam.

Late homework and term project submissions are allowed. However, the penalty for late homework and term project is 30% for the first day and then 5% per day. **No exemption.** Homework problems should be worked out independently but discussions are allowed.

Teams consisting of 2 members each will work on the term project. Details of the term project will be provided by the 4th lecture of the course.

Lecture Materials and Textbooks

Lecture slides:

PowerPoint lecture slides for a topic will be posted online before the lecture(s) on this topic. Slides are not self-contained and only provide a guideline and summary of important background information and results. You are strongly encouraged to read the slides prior to attending the lecture, for it will aid in generating class discussions.

Required text:

David Ruppert & David Matteson, "Statistics and Data Analysis for Financial Engineering with R Examples" Springer, 2nd edition, 2015.

Optional texts:

(1) Rene Carmona, "Statistical Analysis of Financial Data in R," Springler, 2014.
(2) John C. Hull, "Risk Management and Financial Institutions" 4th Edition.

Software

R

R is free of charge (https://cran.r-project.org/). You can download to your personal PC to use. Basics of using R and specific applications will be shown in class.

Academic Integrity

GMU is an Honor Code university; please see the Office for Academic Integrity for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when you are responsible for a task, you will perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form. Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions. When in doubt (of any kind) please ask for guidance and clarification.

Disabilities Statement

If you have a documented learning disability or other condition that may affect academic performance you should: 1) make sure this documentation is on file with Office of Disability Services (SUB I, Rm. 4205; 993-2474;http://ods.gmu.edu) to determine the accommodations you need; and 2) talk with me to discuss your accommodation needs.

Mason Diversity Statement

George Mason University promotes a living and learning environment for outstanding growth and productivity among its students, faculty and staff. Through its curriculum, programs, policies, procedures, services and resources, Mason strives to maintain a quality environment for work, study and personal growth.

An emphasis upon diversity and inclusion throughout the campus community is essential to achieve these goals. Diversity is broadly defined to include such characteristics as, but not limited to, race, ethnicity, gender, religion, age, disability, and sexual orientation. Diversity also entails different viewpoints, philosophies, and perspectives. Attention to these aspects of diversity will help promote a culture of inclusion and belonging, and an environment where diverse opinions, backgrounds and practices have the opportunity to be voiced, heard and respected.

The reflection of Mason's commitment to diversity and inclusion goes beyond policies and procedures to focus on behavior at the individual, group and organizational level. The implementation of this commitment to diversity and inclusion is found in all settings, including individual work units and groups, student organizations and groups, and classroom settings; it is also found with the delivery of services and activities, including, but not limited to, curriculum, teaching, events, advising, research, service, and community outreach.

Acknowledging that the attainment of diversity and inclusion are dynamic and continuous processes, and that the larger societal setting has an evolving socio-cultural understanding of diversity and inclusion, Mason seeks to continuously improve its environment. To this end, the University promotes continuous monitoring and self-assessment regarding diversity. The aim is to incorporate diversity and inclusion within the philosophies and actions of the individual, group and organization, and to make improvements as needed.

Student Support Resources on Campus

Resources that you may find helpful may be found at:

http://ctfe.gmu.edu/teaching/student-support-resources-on-campus/