COURSE DESCRIPTION
The purpose of this class are 2 fold:

1) To understand the basics of how investors and traders use R programming to visualize and quantify investments

2) To understand how probabilities and distributions are used in the world of capital finance and investments

COURSE MATERIALS
Textbook: R Graphics Cookbook, Winston Chang


GRADING
Grading for this class will be based on a point system. Everyone in the class starts with 0 points, as the semester goes on and you complete different work and take different exams, you will earn points. Your total points will be summed up after the final to give you your final grade for the class. The class will consist of 8 labs, 2 HW (your midterm review), 2 Midterms, and a Final. In addition, you can earn additional points through bonus questions and problems I give.

Lab 1 – 10 pts
Lab 2 – 10 pts
Lab 3 – 10 pts
Lab 4 – 10 pts
Lab 5 – 10 pts
Lab 6 – 10 pts
Lab 7 – 10 pts
Lab 8 – 10 pts

*Labs are meant for you to practice the lessons from the class, and allow me to give individual attention to students with their programming*
HW1 – 35 pts
HW2 – 35 pts
Midterm 1 – 100 pts
Midterm 2 – 100 pts
Final – 200 pts

The Stock Game:
1st place 50 pts
2nd place 10 pts
Those that beat me 5 pts
Last place -1 pt

*Additional points through bonuses*

A >=400
400 > B+ >=350
350 > B >= 325
325 > C+ >= 300
300 > C >= 275
275 > D >= 250
F < 250
LECTURES:

Date | Lesson
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Lecture 1 | **Introduction**
  Discuss the concept of stocks being valued according to future cash flows and the uncertainty around it.
  We discuss the Syllabus and how your semester grade depends on the point system.
  Install R and Rstudio and Quantmod (financial package that allows you access to historical stock and option prices) package on your laptop. All the software is free.

Lecture 2 | **Data and Containers**
  In this lecture we go over the basic concepts of data objects in R called containers. We also explore how we use these containers to load up data and do analysis on the data, i.e. daily returns, std, etc. We also discuss R’s control statements (for loops, If/else statements).

Lecture 3 | **Script files and Graphing**
  In this lecture we go over the importance of visualization when analyzing data and how the investment world relies on it to summarize incredible amounts of data fast.

Lecture 4 | **Discrete historical Model**
  In this lecture we build our first our first stock probability model (a very simple model). It’ll be based on historical daily returns and will be discrete. I will also post your HW#1.

Lecture 5 | **Investing in the future by looking at the past**
  In this lecture we’ll attempt to find cheap investments using the probability model from our previous lecture in addition to discussing the dangers of this kind of “naïve” stock picking. We will also review your HW#1 for Midterm 1.

Lecture 6 | **midterm 1**

Lecture 7 | **Stock options and Black Scholes**
  In this lecture you will be introduced to stock options and the famous equation, Black Scholes, which theoretically prices stock options. We will talk about the relationships between stock prices and their options and display it using programming.

Lecture 8 | **Implied volatility and the normal distribution**
  In this lecture we build a normal distribution using the implied volatility derived from using options data, the black scholes model, and the bisection method. We discuss how this is a future looking model (based on the
market) and the down side to using a normal
distribution. I also post your HW#2

Lecture 9  Lecture 7
In this lecture we review all the material from the
beginning of class, and link it together for the Midterm #
2.

Lecture 10  miterm 2

Lecture 11  Quarterly filings and stock prices
In this lecture we’ll discuss the difference between long
term, and short term investing in the stock market and
the importance of the quarterly filings on short term
gambles in the market. We attempt to forecast what the
market is implying and see if any of our two models can
help identify good stocks to buy in the short term.

Lecture 12  Portfolio Theory and correlation
Given the uncertainty in the markets and in the
distributions of our stock models, we attempt mitigate
our risk by investing in uncorrelated stocks.

Lecture 13  Sweave and Presenting your portfolio

Lecture 14  Final Review

TBD  Final