SYLLABUS FOR STATISTICS 417 - LECTURE 1
MODELS IN FINANCE
WINTER QUARTER 2018

Instructor: Nicolas Christou
Office: 8931 Math Sciences Bldg.
Telephone: (310) 206-4420
e-mail: nchristo@stat.ucla.edu
WWW: `http://www.stat.ucla.edu/~nchristo/statistics417/`
Office hours: Wednesday 15:00-18:00, Saturday 12:00-14:00.

Lecture	Day	Class Time	Location
Lecture 1	W	18:00 - 20:50	MS 5128

RESOURCES:
Handouts can be accessed at `http://www.stat.ucla.edu/~nchristo/statistics417/`

Software:
`R`, can be downloaded freely from `http://cran.stat.ucla.edu`
`RStudio`, can be downloaded freely from `https://www.rstudio.com`.
Statistics Online Computational Resource (SOCR), freely available at: `http://www.socr.ucla.edu`.

COURSE PREREQUISITES:
Students are expected to be familiar with discrete and continuous random variables, expectation, variance, covariance, and correlation, joint, marginal, and conditional distributions, central limit theorem, χ^2, t, and F distributions, properties of estimators, method of maximum likelihood, statistical tests, multivariate normal distribution and its properties.

OUTLINE

In this course students will be exposed to several statistical techniques used in investment theory and get hands on experience by applying the various models on real stock market data. The course consists of two major parts.

Part I:
This part of the course will be devoted to portfolio management. The topics are listed below:
   a. Combining individual stocks into portfolios (risk and expected return of a portfolio).
   b. Maximizing return given risk, or minimizing risk given return.
   c. Properties of the minimum variance set (efficient frontier).
   d. The single index model (with and without short sales allowed).
   e. Constant correlation model (with and without short sales allowed).
   f. Multi-group model (short sales allowed).
   g. Portfolio performance.

Part II:
This part of the course will discuss some topics pertaining to managing investment risk. These topics include:
   a. Pricing of complex securities such as European and American options.
   b. Investing strategies using options.
   c. Binomial model.
   d. Weiner and Markov processes.
   e. Ito's lemma.
   f. Log-normal property of stock prices.
   g. Black-Scholes model.
   h. "The Greeks".
   i. Implied volatility.
   j. Simulations.

COURSE POLICIES:
Please remember to turn off cell phones. The use of laptop computers will not be permitted in class unless there is a lab activity during lecture. Students needing academic accommodations based on a disability should contact the Center for Accessible Education (CAE) at (310) 825-1501 or in person at Murphy Hall A255. For more information visit `http://www.cae.ucla.edu`.

ACADEMIC INTEGRITY:
You are expected to adhere to the honor code and code of conduct. As a student and member of the University community, you are here to get an education and are, therefore, expected to demonstrate integrity in your academic endeavors. All students must uphold University of California Standards of Student Conduct as administered by the Office of the Dean of Students. Students are subject to disciplinary action for several types of misconduct, including but not limited to: cheating, multiple submissions, plagiarism, prohibited collaboration, facilitating academic dishonesty, or knowingly furnishing false information. You may have assignments or projects in which you work with a partner or with a group. For example, you are welcome, and even encouraged, to work with others to solve homework problems. Even though you are working together, the assignment you submit for a grade must be in your own words, unless you receive specific instructions to the contrary. For more information about academic integrity, please go to `http://www.deanofstudents.ucla.edu/`.

COURSE GRADES:
There will be homework assignments, labs, a project, and a final exam. Late assignments will not be accepted and make-up exams will not be given. Being in class on time and fully participating is important for your understanding of the material and therefore for your success in the course.

PROJECT:
For the project, students will select 30 stocks from 5 industries. Using the models discussed in class, students will construct efficient portfolios and analyze their performance over time. This on-going project will be discussed regularly with the instructor on its progress. You will have $1,000,000$ to invest in the 30 stocks. One can use many investing strategies, however these should be in addition to the models discussed in class.

The course grade will be based on the calculation:

$$\text{Final score} = 0.30 \times \text{Homework/Labs} + 0.30 \times \text{Project} + 0.40 \times \text{Final}$$

COMMUNICATION:
Please keep a current e-mail address with my.UCLA.edu in order to receive class announcements and reminders.

IMPORTANT DATES:
First class: Wednesday, 08 January.
Last class: Wednesday, 14 March.
Holidays: 15 January (Martin Luther King, Jr.), 19 February (Presidents' Day).

EXAMS:
Final exam: Monday, 19 March, 18:00-21:00.

Good Luck !!!