

SYLLABUS FOR STATISTICS C183/C283 - LECTURE 1
STATISTICAL MODELS IN FINANCE
SPRING QUARTER 2022

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Office hours: MWF 11:00 - 12:00, 14:30 - 15:30, TR 13:00 - 15:00

Lecture	Day	Class Time	Location
Lecture 1	MWF	12:00 - 12:50	Fowler A139

Hello Everyone! My name is Nicolas Christou and I have been a faculty member of the UCLA Department of Statistics since 2000. I am honored to be part of your UCLA journey, and I look forward to having you in Statistics C183/C283!

OFFICE HOURS:

Office hours are offered every day and some weekends. Do not hesitate to come to office hours if you have any questions. It will be great to see you! The weekend office hours will be announced by email every Friday. The office hours during the week are MWF 11:00 - 12:00, 14:30 - 15:30 and TR 13:00 - 15:00. I can also meet by appointment outside of the office hours. Please let me know and we will schedule a meeting.

POLICIES AND PROCEDURES

Spring Quarter COVID-19 Protocols

- Classes are held in person (with few exceptions).
- Indoor masking is required.
- The campus expects to drop the indoor masking requirement on April 11 for those up to date with vaccinations. However, masks still will be strongly recommended for the protection of all.
- Please be respectful of others choices to mask or not after April 11. Those choices will not affect individuals grades.
- All quarter, students and instructors are required to complete daily symptom monitoring.
- Required weekly testing for those up to date with vaccinations is expected to also drop on April 11, although it will still be highly recommended.
- For more information about testing and other details, see the COVID-19 and vaccine resources page: <https://covid-19.ucla.edu>.
- Instructors should continue to be flexible in meeting students COVID-related needs.

RESOURCES:

Handouts can be accessed at http://www.stat.ucla.edu/~nchristo/statistics_c183_c283/

Software:

R, can be downloaded freely from <https://cran.r-project.org>.

RStudio, can be downloaded freely from <https://www.rstudio.com>.

Statistics Online Computational Resource (SOCR), freely available at: <http://www.socr.ucla.edu>.

Textbooks (optional): *Options Futures and Other Derivatives* by John Hull, Prentice Hall 6th Edition, 2006), *Modern Portfolio Theory and Investment Analysis*, by Elton, Gruber, Brown, Goetzmann, Wiley 6th Edition, 2003.

COURSE PREREQUISITES: Statistics 100B.

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. Multigroup and multi-index models (short sales allowed).

Part II:

This part of the course will discuss topics on options pricing and investment strategies:

- a. Investing strategies using options.
- b. Binomial model.
- c. Weiner and Markov processes.
- d. Ito's lemma.
- e. Log-normal property of stock prices.
- f. Black-Scholes model.
- g. "The Greeks".
- h. Implied volatility, simulations.
- i. Value at Risk (VaR).

ACCOMODATIONS

Students needing academic accommodations should contact the Center for Accessible Education (CAE): <http://www.cae.ucla.edu> or call (310) 825-1501.

STUDENT RESOURCES

- COVID-19. You can find information for students related to COVID-19 here: <https://covid-19.ucla.edu/information-for-students/>.
- Counseling and psychological services (CAPS): <https://www.counseling.ucla.edu>.
- Resources on Equity, Diversity, and Inclusion: <https://equity.ucla.edu/know/>.
- Undocumented Student Program (USP): <https://www.usp.ucla.edu>.
- Students can embrace their identities - LGBTQ Center: <https://www.lgbt.ucla.edu>.

COURSE GRADES:

We will maintain the academic rigor of an upper division/graduate course in statistics while being flexible in student assessment. There will be one midterm exam, three quizzes, weekly homework, a final exam, and a final project.

1. Final exam (30%): The final exam is scheduled on Tuesday, 07, 15:00 - 18:00.
2. Midterm 1 (20%): Week 4, Tuesday, 04/19, 18:00 - 20:00.
3. Midterm 2 (20%): Week 8, Tuesday, 05/17, 18:00 - 20:00.
4. Weekly homework (15%). There is flexibility on the submission due dates. Homework can still be uploaded 24 hours after the due date. All homework assignments will be uploaded on Gradescope (<https://www.gradescope.com>).
5. Project (15%). The project is required and it is due anytime during week 8 of the quarter, 17-21 May.

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 these 30 stocks. The project is required and parts of the project will be due weekly. The last part of the project (portfolio performance) is due during week 7.

The course grade will be based on the calculation:

$$\text{Final score} = 0.15 \times \text{Homework} + 0.20 \times \text{Midterm1} + 0.20 \times \text{Midterm2} + 0.15 \times \text{Project} + 0.30 \times \text{Final}$$

COMMUNICATION:

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

IMPORTANT DATES:

First day of classes: Monday, 28 March.

Last day of classes: Friday, 03 June.

Holidays: Monday, 30 May (Memorial Day).

EXAMS:

Final exam: Tuesday, 07 June, 15:00 - 18:00.

Midterm 1: Tuesday, 04/19, 18:00 - 20:00.

Midterm 2: Tuesday, 05/17, 18:00 - 20:00.

Good Luck !!!