

Quantitative Finance
Course Number: 22:839:662
Course Title: Financial Modeling II

COURSE OBJECTIVES

This course is designed as an in-depth course to help students better understand arbitrage-based theory and hedging of derivative securities. The analysis will be conducted in continuous time, although we may use discrete time models and numerical procedures for pedagogical purposes. Successful students will demonstrate mastery of fundamental quantitative finance concepts and ability to integrate and apply quantitative finance concepts to resolve business problems.

COURSE MATERIALS

Recommended Book:

Bjork, Tomas, Arbitrage Theory in Continuous Time, Oxford University Press, 3rd edition, 2009.

PREREQUISITES

Derivative Securities and Stochastic Calculus, or equivalent.

ACADEMIC INTEGRITY

I do NOT tolerate cheating. Students are responsible for understanding the RU Academic Integrity Policy <http://academicintegrity.rutgers.edu/>

I will strongly enforce this Policy and pursue *all* violations. On all examinations and assignments, students must sign the RU Honor Pledge, which states, “On my honor, I have neither received nor given any unauthorized assistance on this examination or assignment.” I will screen all written assignments through *SafeAssign* or *Turnitin*, plagiarism detection services that compare the work against a large database of past work. Don’t let cheating destroy your hard-earned opportunity to learn. See business.rutgers.edu/ai for more details.

GRADING

The grading in this course will be based upon class participation, assignments, and exams. Class participation includes your attendance in class and your contributions to the class

discussions. Questions and comments by students and the instructor are important. I expect you to attend class ON TIME, be prepared, and be willing to participate. Cell phones, iPads or any other electronic recording device will NOT be permitted during class and use of such electronics devices may result in deduction of the participation point. I will also randomly call students to answer questions and/or to come forward and solve the certain problems. If you need to leave the class early, please let me know of the reason in advance. Finally, please avoid talking during class hours (except to the instructor).

There will be periodic homework assignments and certain (group) assignments require programming using MATLAB (NO LATE ASSIGNMENTS ACCEPTED).

There will be a midterm exam and a cumulative final exam. All exams will be closed book. You will be allowed to bring a one letter-size formula sheet and your calculator. Make-up exam will be offered only because of illness or because of your participation at a scheduled university activity (coach's note required) and the instructor is informed within 24 hours of the scheduled exam time. If a student must miss the midterm for any other reason not mentioned above, the corresponding weights will be carried over to the final exam.

Any student caught cheating on an exam will receive a zero (0) on that exam and will be subject to the penalties described in the university policies and guidelines regarding academic integrity. You are required to bring your student identification card to all examinations. You are NOT permitted to wear a hat to any exam. No cell phones or other electronics are allowed in the testing room. No extra credit work will be given to make up a low grade in any exam or project assignment after they are graded. Use the bathroom prior to the exam start. bathroom breaks, if essential, will be escorted. At any time throughout the exam, only one student is allowed to use the bathroom.

Your final grade is not subject to negotiation. If you feel I have made an error, submit your written argument to me within one week of receiving your _final grade. Clarify the precise error I made and provide all due supporting documentation. If I have made an error, I will gladly correct it. But I will adjust grades only if I have made an error. I cannot and will not adjust grades based on consequences, such as hurt pride, lost scholarships, lost tuition reimbursement, lost job opportunities, or dismissals. Do not ask me to do so. It is dishonest to attempt to influence faculty in an effort to obtain a grade that you did not earn, and it will not work.

Class participation 10%
Homework 25%
Midterm Exam 25%
Final Exam 40%

CLASSROOM CONDUCT AND COURSE POLICIES

_ You are expected to come to class prepared, having read the assigned material and prepared to be involved in class discussions. If any material is unclear, please ask questions.

_ You are expected to actively participate in class discussions throughout the semester, to answer questions directed to the class, and to ask questions to clarify ideas. In addition, you are also expected to make supplemental notes for yourself during class lectures and to review your notes after class.

_ You are responsible for all material presented in class. If you miss any material because of absence or tardiness, you should ask another student for notes. The instructor's notes will not be available.

_ Students should conduct themselves in a professional manner demonstrating respect for the instructor and fellow classmates at all times. You are expected to use common courtesy in the classroom. If you are late arriving to class, please make every effort to minimize disruption to other students. Reading the paper, working on material from another class, tweeting, facebooking, or watching YouTube will not be permitted. If you do need to leave early, please inform me at the beginning of the class and leave the class discretely.

_ Laptop usage in class: A laptop or iPad may be used in class to record notes with my permission. However, students are only allowed to use these devices for coursework. Using a laptop to surf the web (i.e., viewing social media websites like Facebook, YouTube, etc) is very distracting to other students in the class and is strictly prohibited.

_ Examinations are the property of the Department. Anyone removing an examination from the classroom is strictly prohibited.

COURSE OUTLINE:

1. Overview and review of stochastic calculus
2. Black-Scholes
3. Complete market and hedging
4. Risk-neutral valuation and asset pricing
5. Dividends and currency options
6. Optimal portfolio problem
7. Equilibrium and interest rate models
8. Stochastic volatility

This outline is tentative, and the instructor may adjust the outline based on the progress through the semester.

SUPPORT SERVICES

If you need accommodation for a *disability*, obtain a Letter of Accommodation from the Office of Disability Services. The Office of Disability Services at Rutgers, The State University of New Jersey, provides student-centered and student-inclusive programming in compliance with the Americans with Disabilities Act of 1990, the Americans with Disabilities Act Amendments of 2008, Section 504 of the

Rehabilitation Act of 1973, Section 508 of the Rehabilitation Act of 1998, and the New Jersey Law Against Discrimination. More information can be found at ods.rutgers.edu.

[Rutgers University-New Brunswick ODS phone (848)445-6800 or email dsoffice@echo.rutgers.edu]

[Rutgers University-Newark ODS phone (973)353-5375 or email ods@newark.rutgers.edu]

If you are ***pregnant***, the Office of Title IX and ADA Compliance is available to assist with any concerns or potential accommodations related to pregnancy.

[Rutgers University-New Brunswick Title IX Coordinator phone (848)932-8200 or email jackie.moran@rutgers.edu]

[Rutgers University-Newark Office of Title IX and ADA Compliance phone (973)353-1906 or email TitleIX@newark.rutgers.edu]

If you seek ***religious accommodations***, the Office of the Dean of Students is available to verify absences for religious observance, as needed.

[Rutgers University-New Brunswick Dean of Students phone (848)932-2300 or email deanofstudents@echo.rutgers.edu]

[Rutgers University-Newark Dean of Students phone (973)353-5063 or email DeanofStudents@newark.rutgers.edu]

If you have experienced any form of ***gender or sex-based discrimination or harassment***, including sexual assault, sexual harassment, relationship violence, or stalking, the Office for Violence Prevention and Victim Assistance provides help and support. More information can be found at <http://vpva.rutgers.edu/>.

[Rutgers University-New Brunswick incident report link: <http://studentconduct.rutgers.edu/concern/>. You may contact the Office for Violence Prevention and Victim Assistance at (848)932-1181]

[Rutgers University-Newark incident report link: https://cm.maxient.com/reportingform.php?RutgersUniv&layout_id=7 . You may also contact the Office of Title IX and ADA Compliance at (973)353-1906 or email at TitleIX@newark.rutgers.edu. If you wish to speak with a staff member who is confidential and does **not** have a reporting responsibility, you may contact the Office for Violence Prevention and Victim Assistance at (973)353-1918 or email run.vpva@rutgers.edu]

If students who have experienced a temporary condition or injury that is adversely affecting their ability to fully participate, you should submit a request via <https://temporaryconditions.rutgers.edu> .

If you are a military **veteran** or are on active military duty, you can obtain support through the Office of Veteran and Military Programs and Services. <http://veterans.rutgers.edu/>

If you are in need of **mental health** services, please use our readily available services.

[Rutgers University-Newark Counseling Center: <http://counseling.newark.rutgers.edu/>]

[Rutgers Counseling and Psychological Services–New Brunswick: <http://rhscaps.rutgers.edu/>]

If you are in need of **physical health** services, please use our readily available services.

[Rutgers Health Services – Newark: <http://health.newark.rutgers.edu/>]

[Rutgers Health Services – New Brunswick: <http://health.rutgers.edu/>]

If you are in need of **legal** services, please use our readily available services: <http://rusls.rutgers.edu/>

Students experiencing difficulty in courses due to **English as a second language (ESL)** should contact the Program in American Language Studies for supports.

[Rutgers–Newark: PALS@newark.rutgers.edu]

[Rutgers–New Brunswick: eslpals@english.rutgers.edu]

If you are in need of additional **academic assistance**, please use our readily available services.

[Rutgers University-Newark Learning Center: <http://www.ncas.rutgers.edu/rlc>

[Rutgers University-Newark Writing Center: <http://www.ncas.rutgers.edu/writingcenter>]

[Rutgers University-New Brunswick Learning Center: <https://rlc.rutgers.edu/>]

[Optional items that many faculty include:

- Students must sign, date, and return a statement declaring that they understand the RU Academic Integrity Policy.

- Students must sign, date, and return a statement declaring that they understand this syllabus.]