



DERIVATIVES & RISK MANAGEMENT

WITH DR. RAISA VELTHUIS

Prerequisites: MSF 8600

MSF 8615–001

Class: TR 4:00 – 5:15 pm, Bartley 3001

Office Hours: TR 2:30 – 3:30 pm, and by appointment

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Futures and options contracts are among the most actively traded financial instruments. They are an important segment of contemporary financial markets. This course examines exchange-traded and over-the-counter derivative contracts such as futures, forwards, options, and swaps. The goal is to develop a core set of principles that will help us understand the diverse ways that derivatives are used in practice. These principles are developed through a series of real-world examples with an emphasis on simultaneously developing intuition and familiarity with a broad spectrum of markets, as well as valuation, and risk-management applications. The course is quantitative, and we will work with various equations. However, a large emphasis is placed on understanding the economic concepts behind the equations. The material in this course should be useful to anyone who is planning a career in trading, corporate finance, risk management, management consulting, or any other field involving financial decision-making. In my class, you can expect to be challenged, engaged, and supported as you explore the multifaceted world of financial derivatives!

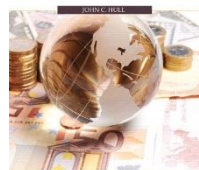
Learning outcomes: What you will know

Upon successful completion of MSF 8615, you will be able to:

1. Understand how derivative markets operate
2. Compare and contrast various basic derivative contracts, including forwards, futures, swaps, and options.
3. Implement hedging and trading strategies using derivatives
4. Employ the binomial model, Black-Scholes model, and use simulations to price options
5. Discuss financial news and gain awareness of the risks involved with derivatives.

What book and other materials do I need?

Options, Futures, and Other Derivatives



Textbook: Options, Futures, and Other Derivatives, 11th Edition, by John C. Hull, Pearson, 2022. ISBN 978-0136939979. The latest version of the software DerivaGem can be downloaded from the author's [website](#).

Access to news sources, e.g., Wall Street Journal, Financial Times. Refer to the [Library site](#) for info on how to access your free VSB subscriptions.



Office 365: All students have free access to Office Suite products (Word, Excel, Powerpoint, Outlook), which are helpful tools for your assignments. For more details, see <http://office.villanova.edu>



Calculator: A financial calculator will be required for this course and should be brought to each class for solving problems. I recommend the Texas Instruments BAII Plus (which I will be using) or the Hewlett Packard HP 10bII+. Calculators with storage capability will not be allowed for exams.

Q&A: Please use [Piazza](#) to ask any questions you may have that relate to the course. This tool may help you get help fast and efficiently from classmates and myself. I encourage you to post all your questions here, instead of relying on email. It can be especially helpful to learn what made a concept "click" from a classmate that just mastered it. Your contributions also count towards your class participation grade.

Classroom Expectations:

You are expected to have read the required textbook chapters or other assigned materials ahead of class. Please come prepared with questions. Your participation in class will be important to facilitate and benefit everyone's learning.

Course delivery: Students are expected to attend class in-person. Absences due to illness, quarantining, or other circumstances will be dealt with on a case-by-case basis. Let me know if there are any problems or if there is anything I can assist with.

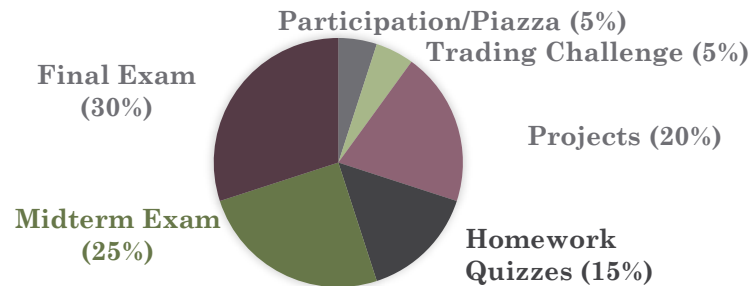
Use of class materials and content: Class content will be provided to students at the instructors' discretion. Students are not permitted to record, photograph, or otherwise capture any element of classes without prior, expressed permission from the course instructors. Similarly, students are not allowed to redistribute any course materials. All work submitted for any assignment or exam must be the student's own work.

Electronics:

A financial calculator is recommended for the course, which you are allowed to use for problems and exams. Laptops, smartphones, and other electronic devices with wireless connection are useful to access certain content and participate in in-class quizzes. You will be asked to put away your devices if they become a source of distraction to you and your classmates.

Grading information:

The course grade is based on class participation, homework quizzes, a trading challenge, two projects, a midterm exam, and a final exam. The lowest quiz score will be dropped. Participation involves use of the discussion platform (Piazza) and engaging in class discussions.



Grades will be reported and updated in the gradebook on Blackboard. At the end of the semester, I will assign letter grades according to the following scale: A: 94 to 100, A-: 90 to 93.99, B+: 87 to 89.99, B: 83 to 86.99, B-: 80 to 82.99, C+: 77 to 79.99, C: 73 to 76.99, and F: 72.99 and below.

Regrading policy: If you think that there are grading errors on your tests or your grade on an exam (or project) does not reflect the quality of your performance, submit the entire assessment together with a written explanation of your reasoning within a week of the return of the assessment. Any work submitted for re-grading will be subject to a complete re-grade, which means that your grade could go up, stay the same, or go down.

Assignments:

- **Homework & Quizzes:** Textbook questions that assess your understanding of the material will be assigned every class and quizzed once a week (at random). This will give you practice and timely feedback. You can ask for help from other students and myself as you work on the problems via Piazza. Participating on Piazza counts towards your participation score.
- **Trading Challenge:** Early-on in the semester, we will participate in the weeklong CME trading challenge to get first-hand experience of derivatives trading. You will be asked to write a short report, before and after the competition is over, outlining and reflecting on your strategy.
- **Projects:** There are two group projects to demonstrate the practical applications of the course concepts. You will also gain familiarity with financial software and databases.
 - 1) Derive the implied probability distribution of future market returns from traded index option prices. In the process, you will better understand the log-normal distribution and the concept of risk-neutral probabilities.
 - 2) Use Monte-Carlo simulation to price various exotic options (more details to come).

Exams:

Two non-cumulative exams will be given. Exams are to be taken in-person. I recommend that you focus your studies on understanding the main concepts and ensuring that you can work out a variety of problems that resemble but are not exactly the same as the problems you've encountered on the homework.

Makeup exam policy: To be excused from an exam, a student should (i) have an approved university or medical excuse, or (ii) submit a written request to be absent from an exam one week prior to the exam date, and have the request be approved by the instructor.

Course Outline:

This outline is the expected order in which the information will be presented. Depending on time constraints I may alter this outline. You will be given ample notice if changes are made.

1. Introduction to Futures and Forward Markets – Ch. 1
2. Futures and Forward Markets – Ch. 2
3. Hedging Strategies using Futures – Ch. 3
4. Determination of Forward and Futures Prices – Ch. 5
5. Interest Rate Futures – Ch. 4 and Ch. 6
6. Swaps – Ch. 7 & 25

Mid-term exam

7. Mechanics of Options Markets – Ch. 10
8. Properties of Stock Options – Ch. 11
9. Trading Strategies Involving Options – Ch. 12
10. The Binomial Option Pricing Model – Ch. 13
11. The Black-Scholes-Merton Model and Implied Volatilities – Ch. 15 & 20
12. Index Options – Ch. 17
13. The Greek Letters – Ch. 19
14. Monte Carlo Simulation – Ch. 21
15. Exotic Options and Other Nonstandard Derivatives – Ch. 26

Final exam

Important Policy Information

COVID-19: Since this course is designed as an in-person course, I will not be accommodating requests to join class remotely. If you cannot attend per the University Excused Absence policy, we will arrange for a way for you to make up any missed work. You are not required to wear masks in the classroom but are free to do so. Be considerate of our shared responsibility to ensure the health and safety of the community.

Academic Integrity: When students come to Villanova, they join an academic community founded on the search for knowledge in an atmosphere of cooperation and trust. Students must be honest and forthright in their academic studies. To falsify the results of one's research, to steal the words or ideas of another, to cheat on an assignment, or to allow or assist another to commit these acts corrupts the educational process. Students are expected to do their own work and neither give nor receive unauthorized assistance. Students are expected to abide by Villanova's Code of Academic Integrity. Students who violate this code will face consequences at the discretion of both the instructor and the university. Details of the code, statement of integrity, and process for violation of the code can be found in detail by [clicking here](#).

Plagiarism / Copying: All work you submit for grading or academic credit is designed to reflect your knowledge and skill related to the course subject matter. Therefore, unless otherwise indicated, all work submitted is to be done on an individual basis. This includes but is not limited to all exams, quizzes, homework, papers, written assignments, and presentations. Plagiarism is claiming work as your own that you have copied from another person, whether that other person knows about it or not. This includes copying from web sites without proper source citation and using homework or papers prepared by current or past students, tutors, or online course sharing channels, whether working as an individual or working in a group / team. However, you may discuss homework questions with classmates on our Piazza page.

Students with disabilities: It is the policy of Villanova to make reasonable academic accommodations for qualified individuals who have specific learning needs and for students with disabilities. Registration is needed in order to receive accommodations. You must present verification and register with the Learning Support Office by contacting 610-519-5176 or at learning.support.services@villanova.edu or for physical access or temporary disabling conditions, please contact the Office of Disability Services at 610-519-4095. Contacts are listed on the [ODS website](#). Students must notify their faculty of accommodations by providing their letter from the Office of Disabilities or Learning support services within the first two weeks of the class.

University Diversity Statement: Villanova University, as a Catholic Augustinian institution of higher education, recognizes diversity as an integral component of the teaching and learning experience and as an essential element of the ongoing intellectual, social and spiritual development of every member of the Villanova community. Accordingly, Villanova University will be a diverse community. We commit ourselves to cultivating an academic environment marked by genuine curiosity about different perspectives, ardent receptivity to knowledge generated through intercultural connections and a genuine sensitivity to the variety of human experiences marked by domestic and global differences.

Resources: Successful people access support from others as needed. Villanova University has many supportive services that can help you as you strive to achieve your goals. I encourage you to reach out to me or make use of other resources on campus.

Your Professor	Message me on Teams , e-mail me at raisa.velthuis@villanova.edu , set up a zoom call, or stop by my office at Bartley 2005.
Librarians	The Library staff assist students with critical and evaluative use of information. Furthermore, Course Reserve materials can be requested at the circulation desk on the first floor. Visit the library at Falvey Hall or call (610) 519-4270.
Learning Strategies	Learning Support Services provides learning and study skills resources for all students who wish to enhance their academic experience in preparing to meet their educational goals. These services include study skill workshops, study groups and homework help sessions for selected courses, academic coaching, accommodation support for students with disabilities, and study skills consultation. They are located in the Learning Commons in Falvey Suite 212 or call 610.519.5176.
Disability Counselors	The Office of Disability Services (ODS) is the primary office at Villanova University with specialized knowledge and experience in physical disability issues.
Tutoring	Several resources are available for students seeking support with a challenging course or to enhance achievement in areas in which the student already excels. Among others, the Writing Center and the Center for Speaking and Presentation are available to help you develop important skills that are part of your class assignments.
Counseling	The University Counseling Center provides services that help students function optimally with regard to emotional, academic, social and psychological issues. The Center is well used by our student leaders and academically most talented students. For students who encounter a more difficult condition such as depression, anxiety, panic, or disordered eating, the staff is also experienced in diagnosis, crisis intervention, and treatment of these conditions. Visit at Room 206, Health Services Building or call (610) 519-4050.
Academic and Career Advisors	The VSB advising team facilitates the exploration and development of academic and career goals, including advising on internships and study abroad opportunities, and empowers students to be responsible decision-makers and active participants in defining their futures. Visit at Bartley Hall 1054 or call (610) 519-5532.
Underrepresented students	The Center for Access, Success and Achievement aims to recruit, retain, and graduate underrepresented, first generation, and Pell Eligible students through holistic support in a culturally diverse and academically excellent environment. Visit at Falvey Hall, Room 211 or call 610.519.4075.
International students	The International Students Services Office provides assistance with Immigration rights and responsibilities, Educational, social and personal counseling, Cultural adjustment issues, and Campus and community activities. Visit at Connelly Center 2nd Floor or call 610.519.7827.