

FIN3116/FIN3712 OPTIONS AND FUTURES

AY2020/2021 Semester 2

Class Meetings: BIZ1 #02-02; Fridays 1200-1500

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MODULE DESCRIPTION

This is a course in the theory and applications of financial derivative valuation. This course will present an in-depth analysis of financial derivative valuation, trading strategies for derivatives, and risk management of derivative positions. It will cover Black-Scholes and risk-neutral binomial option pricing models. The main goal of the course is to become proficient in derivative value calculations and the implementation of derivative trading strategies.

Since the course emphasizes fundamental concepts underlying derivative valuation theory, the approach will be analytical and rigorous. As such, students are expected to be comfortable with probability and statistics, the stock market, and a spreadsheet package such as Excel. Some use of stochastic calculus and differential equation will also be required.

The course employs homework assignments, classroom lectures and discussions, and computer-based assignments to convey the material. Some work will be done individually and some in groups. **Each student is expected to contribute regularly to classroom discussion synchronously and asynchronously.** This is particularly true when we discuss assignments, but also during lectures and general discussions.

The material for this course needs to be absorbed consistently. As the course progresses, students should work on the suggested textbook problems and homework assignments to prepare for projects and quizzes. All these problems are essential for a full understanding of the material covered in the course. Students should find it helpful to read the assigned readings **before** we cover the material in class; in general, the difficulty of the material covered in class will be **at least** that of the textbook.

LEARNING OUTCOMES

The objective of this course is to provide an in-depth analysis of financial derivative products: forwards/futures, swaps, and options. The analysis includes their valuation, trading strategies, and risk management. It should provide lasting conceptual framework in which to view the derivative markets and to examine new ideas, concepts, and instruments as they evolve in the future.

After completing the course, you should be able to:

1. understand how financial derivatives are used by market participants,
2. understand how financial derivative values are calculated,
3. appreciate the pros and cons of the most widely used derivative pricing models,
4. identify mispricing in the derivative markets, and
5. understand practical considerations in constructing portfolios involving financial derivatives.

PREREQUISITE

Financial derivative is a quantitative field. You should be comfortable with tools for the analysis of data; familiarity with Microsoft Excel (or other statistical tools, like R or Python) will be needed. Knowledge of standard financial concepts such as market efficiency and arbitrage will be assumed. You should have taken one basic finance module (FIN2004/2704) and one module in Investment Analysis (FIN3102/3702) or the equivalent.

COURSE MATERIALS

1. Textbook

Introduction to Derivatives and Risk Management, 10th Edition (ISBN: 978-1305104969)

Authors: Chance and Brooks

2. Financial calculator

Each student is required to bring a calculator to all classes and quizzes. Any calculator that has an x^y button will do. Because of the variety of calculators used, students will be expected to learn how to use their calculators on their own.

3. Class presentation slides and relevant resources will be posted on LumiNUS.

Please note that the materials do not comprise self-contained lectures. Rather, the intent is to reduce the amount of rote copying so that more time can be devoted class discussion.

4. Selected articles from academic finance journals and periodicals (WSJ, Economist, etc.) will be shared directly in Microsoft Teams.

5. Project assignments (see below).

6. Homework problems.

Problems from the textbook will be included as homework assignments. You will be responsible for understanding all assigned problems (including those that are not part of the graded assignments) since they will help prepare you for projects and quizzes.

TECHNICAL ON-BOARDING

Platform	Purpose
LumiNUS	LumiNUS is the platform for formal communications , distribution of course materials , and submission of project assignments and homework problems.
Microsoft Teams	Microsoft Teams is the platform for informal communications, sharing, and discussions for this course. Your activities here (e.g., sharing class notes, supporting a point of view with facts, challenging a point of view, synthesizing new ideas or arguments, troubleshooting your peers' technical problem, encouraging class discussion with thought-provoking insights/articles) count towards class participation .
Zoom	Zoom is a class delivery tool for live classes for on- and off-site students . Recordings are available on LumiNUS for review after-class. Your activities here (e.g., Q&As) count towards class participation . I recommend you turn the video on during classes.
Poll Everywhere	Poll Everywhere is a tool for our live classes . Please register an account with your NUS credential . Your activities (e.g., Q&As, polls) here count towards class participation and class attendance .

ASSESSMENTS

Component	Weight
Homework	10%
Project 1: TBA (due and presented on Week 8)	15%
Project 2: TBA (due and presented on Week 12)	15%
Quiz 1: TBA (Week 6)	20%
Quiz 2: TBA (Week 13)	30%
Class Participation and Citizenship	10%
Total	100%

Letter grades will be assigned based on the class distribution of the course's total scores. The grade cutoff points will be adjusted based on the class's overall performance.

Homework

Students will be asked to do and submit a series of individual homework assignments. At two points in the term (weeks 7 and 13), I will grade one randomly selected homework assignment. Failure to turn in a homework assignment (even one which is not eventually graded) by its deadline will result in a zero grade.

Projects

Each project report may be prepared by **teams of 3-4 participants**; individual submissions are **not** accepted. The objective is to answer the questions provided in each project assignment. The project reports should not exceed four double-spaced pages of **text**. The intent of this page limitation is to enforce careful and concise writing.

The four-page limitation does not include **figures and exhibits**; please include those as you deem necessary to convince (but not confuse) the reader. Your response should be consistent with and supported by your main analysis. Project reports (and supporting documents) should be submitted to the instructor **by 10 am on the due date** via **LumiNUS**.

While each group will submit only one report for the group, **all students must come fully prepared to present their solutions to the rest of the class**. Each group should bring a short presentation slide deck (PowerPoint or otherwise) in a USB thumb drive and share the short presentation file with the instructor on Microsoft Teams (i.e., private chatroom for the group) before the class session. **I will randomly select some groups to present their work during the class discussion**. The whole group will be penalized if the presentation is longer than **10 minutes**, is unclear, or does not match the group's project report. I may interrupt the presentation to clarify certain issues or correct contents in the interest of the class. As I may **randomly select a group member** to present the group's slide deck, I highly recommend each group member to practice the presentation to improve clarity and ensure that they meet the time constraint.

Grading of the group projects will be based on the accuracy of the analytical analysis (60%) and on exposition and presentation of findings (40%; this includes the classroom presentation component above). I will conduct a **group evaluation survey** after project reports are submitted. Please keep track of how your teammates contribute to the report and how your team functions as a whole.

Quizzes

There will be two **in-class** quizzes in Week 6 and Week 13. The quiz format will likely be a combination of multiple-choice and true-false questions, extensive numerical problems, and essay-type questions. These questions will be designed to test your knowledge of conceptual and qualitative material, as well as your analytical and problem-solving skills. The **second quiz** will be **cumulative** but will emphasize topics covered after the first quiz.

If you are unable to take the first quiz on the scheduled date for a valid and documented reason, the weighting of the first quiz's grade will be transferred to the second quiz (pending approval from the Head of

the Finance Department). Students must take the second quiz to receive a passing grade for this module.

Class Participation and Citizenship

I will observe student participation in the course (e.g., classroom, Microsoft Teams, Zoom, Poll Everywhere) and reward students who make a substantial effort. Simply attending classes is a necessary condition, but **not sufficient** to receive a favorable class participation grade. In evaluating class participation, I will look for comments that are thoughtful and lead the class discussion forward. My evaluation will be based on how well you have participated in class, looking at the quality, not the quantity, of your participation. You can improve your participation grade considerably by coming to class prepared. Participation points are awarded **at my discretion** and are based solely on **my opinion** of your efforts and your contribution to class discussions. These points are not automatically given, but must be earned. They are **not subject to negotiation**.

CONTACTS

To ensure that I am available for consultation, I recommend that you **direct message me through Microsoft Teams** to arrange an appointment.

CLASS POLICIES

Attendance

Our class discussions will go beyond the scope of the textbook for most topics. Therefore, it is important for you to attend class. You are responsible for all announcements made in class. If you are unable to attend a particular class, please notify the professor of your absence **prior** to that class. Failure to notify the professor of absence, or missing more than **two sessions** during the course, might result in a failing grade. For an excused absence, the make-up for missed work will be determined by the professor in consultation with the student.

Tablets, PDAs, Phones

Please be respectful of others in your usage of electronic devices and wireless communication. By taking this class, you agree to be bound by the following policies:

- **Mobile phones** need to be shut off or set to silent mode during class session. No telephone calls, SMS/MMS messages, e-mails and/or chats during class. Upon violation of this policy, you will be asked to put your mobile device on the table in off mode and FACE DOWN. You may also be asked to deposit your devices in a designated area in the classroom.
- **Laptops and tablets** are restricted to note-taking, Poll Everywhere, and Zoom use only. The use of these devices for chat sessions, checking/answering e-mails, and web surfing is prohibited. I will announce exceptions to the policy for class sessions with course-related content on the web.
- Violation of the policies can lower the class citizenship component of course grade above.

ACADEMIC HONESTY & PLAGIARISM

Academic integrity and honesty is essential for the pursuit and acquisition of knowledge. The University and School expect every student to uphold academic integrity & honesty at all times. Academic dishonesty is any misrepresentation with the intent to deceive, or failure to acknowledge the source, or falsification of information, or inaccuracy of statements, or cheating at examinations/tests, or inappropriate use of resources.

Plagiarism is 'the practice of taking someone else's work or ideas and passing them off as one's own' (The New Oxford Dictionary of English). The University and School will not condone plagiarism. Students should adopt this rule - You have the obligation to make clear to the assessor which is your own work, and which is the work of others. Otherwise, your assessor is entitled to assume that everything being presented for assessment is being presented as entirely your own work. This is a minimum standard. **In case of any doubts, you should consult your instructor.**

- Additional guidance is available [HERE](#).
- Online Module on Plagiarism [HERE](#).

TENTATIVE COURSE SCHEDULE **[Subject to Change]**

This is an approximate schedule of topics that will be covered. The assigned readings will provide the framework for classroom discussions. All readings are required; please read them **prior** to the corresponding lecture. Recommended reading will be assigned throughout the course. Adjustments might be made during the course if the pace is faster/slower than expected. (* in front of the week number denotes HW is due at the beginning of that class meeting; # denotes public holidays, alternative arrangements TBA)

Week	Date	Topic	Reading
1	15 Jan	Introduction; Mechanics of Derivative Markets	CB, Chapter 1 (Introduction) CB, Chapter 2 (Structure of Derivatives Market) • Problems: Ch. 2
2	22 Jan	Pricing Forwards and Futures	CB, Chapter 8-1, 8-2, 8-3 (Carry Arbitrage, Pricing Models) Problems: Ch. 8 (part 1)
3	29 Jan	Hedging using Futures	CB, Chapter 9 CB, Chapter 10 Problems: Ch. 9-10
*4	5 Feb	Interest Rates Futures and Forwards (FRA)	CB, Chapter 12-1 (Forward Rate Agreements) Problems: Ch. 12 (part 1)
5	# 12 Feb	Swaps	CB, Chapter 11 Problems: Ch. 11
*6	19 Feb	*** Quiz 1 ***	
RECESS WEEK			
7	5 Mar	Properties of Options; Mechanics of Option Markets Pricing Stock Options: Binomial	CB, Chapter 3, 4 Problems: Ch. 3-4
8	12 Mar	*** Project 1 ***	
*9	19 Mar	Pricing Stock Options: Black-Scholes	CB, Chapter 5 Problems: Ch. 5
*10	26 Mar	Option Trading and Hedging Strategies	CB, Chapter 6 CB, Chapter 7 Problems: Ch. 6
11	# 2 Apr	Changing Underlying Assets; Interest Rates Options Exotics	CB, Chapter 12-2, 12-3 (Interest Rate Options, Interest Rate Swaptions) CB, Chapter 8-4 (Pricing Options on Futures) CB, Chapter 13 Reading: "Options on Stock Indexes, Currencies, and Futures" Problems: Ch. 13 Problems: Ch. 8 (part 2), Ch. 12 (part 2)
*12	9 Apr	*** Project 2 ***	
13	16 Apr	*** Quiz 2 ***	

Note: The default delivery plan is face-to-face instruction for all students with live Zoom streaming (for those are symptomatic or living in extraordinary circumstances). With the ongoing COVID-19 pandemic, there are contingency plans for face-to-face and virtual instruction alternatives if policies and guidelines change during the semester. Stay tuned to LumiNUS and Microsoft Teams announcements.

ACKNOWLEDGMENTS

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1. **Johan Sulaeman** (<https://bizfaculty.nus.edu.sg/faculty-details/?profId=372>)
2. **Adrien Verdahan** (web.mit.edu/adrienv/www)