BUSINESS SCHOOL
Te Kura Pakihi

FINC306: Derivatives
Course Outline

Semester One, 2023

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Course Outline

Paper Description and Aims

Derivative securities are the most rapidly growing area in the global financial market. In 2010, the notional global market value of derivatives was USD 605 trillion, 10 times world GDP. It was USD 629 trillion in December 2014, USD 483 trillion in December 2016. That of primary financial assets was only twice world GDP in 2010. Given the growing large size of the derivative market, a careful study of derivative securities becomes very important to a financial analyst.

The purpose of this course is to provide a comprehensive analysis on the properties of options and futures and to offer a theoretical framework within which all derivatives can be valued and hedged. Topics covered: Option strategies and static replication, no-arbitrage principle and forward price formula, the current value of a forward contract and futures trading, forward rate and forward rate agreement, swaps, model-free relationships between option prices, binomial tree model, the Black-Scholes formula, and financial engineering and security design.

Prerequisite

FINC202: Investment Analysis & Portfolio Management

Learning Outcomes

Upon successful completion of this paper, you should be able to:

1. Understand the concepts of forward and futures contracts, and how to price them using no-arbitrage principle
2. Understand the concept and pricing of swaps
3. Price options using binomial tree method
4. Price options using Black-Scholes formula
5. Analyse the derivatives embedded in structured products

Teaching Staff

Name	Office	Email
Lecturer and Paper Coordinator:		
Pakorn (Beam) Aschakulporn	OBS5.15	Pakorn.Aschakulporn@otago.ac.nz
Office Hours:	Thur 13:30 – 16:30	
Tutor:		
Weihan Li		Weihan.Li@postgrad.otago.ac.nz

Please contact Weihan with any administrative enquiries about the paper, e.g. tutorial changes, or requests for late submission of assignments.

Class Representatives

Class representatives are an important means of communication between students and staff. Contact details for your student class representatives can be found on Blackboard.

Course Delivery

		Time	Location
Lectures:	Mon	10:00 – 10:50	ARCH1
	Wed	14:00 – 15:50	ARCH1
Tutorials:	Mon	14:00 – 14:50	R1S3
	Thur	14:00 – 14:50	T103
	Thur	15:00 – 15:50	SDAVD

A place to check your timetable is `https://tts-web-prod.otago.ac.nz/wtv2023/default.aspx`.

Students must attend both lectures and at least one tutorial each week.

Lectures present the key conceptual material through discussion and interaction between teaching staff and students. Lectures are supported by readings.

In-class exercises posted from time to time during the lecture are designed for students to practice immediately the new concepts and skills. Active participation in discussion is expected for all students.

Tutorials are interactive, collaborative sessions in which students attempt to cement concepts presented at lectures with their peers in a supportive environment.
Tutorials begin in the **second week** of semester.

Tutorials offer you the opportunity to work in groups on a series of tasks designed to apply the concepts that you have been exposed to in class and from your reading, and to stimulate your interest in the course as it applies to "everyday" issues. The key feature of tutorials, as opposed to lectures and individual study, is participation of all members of the tutorial group. **Please prepare for tutorials before going to them.**

The *Course Calendar* (in this outline) details scheduling information. Note that this calendar may change as the course proceeds. Any changes will be announced at lectures and be detailed on Blackboard.

Learning Resources

Recommended Textbooks

→ McDonald, Robert L., 2013, *Derivatives Markets*, 3rd edition, Pearson Higher Education, Inc.

→ McDonald, Robert L., 2009, *Fundamentals of Derivatives Markets*, Pearson Education, Inc.

* Either is fine. The second textbook is derived from the first half of the first book.

The material presented in the lectures and tutorial is sufficient and necessary to successfully complete the course. The textbooks are additional but optional resources.

Blackboard

`https://blackboard.otago.ac.nz/` provides you with access to course materials, class notices, and resources. Blackboard is used to email the whole class so it is important that you check your student email and Blackboard regularly.

Student Webmail

We will use your student email account to email you information relevant to your programme. To forward your University email address to an email address that you use regularly:

1. Log into your Student Mail account (`http://www.otago.ac.nz/smlanding/`) using your student username and password.
2. Click the **Cog** button (top right corner).
3. Click on **Mail** under **Your App Settings**.
4. Under **Accounts** on left hand side, select **Forwarding**.
5. Under the Forwarding heading, type in the email address you want your email to be forwarded to. You can also choose to have a copy of these emails kept on your StudentMail account, so please check the box if you would like this.
6. Click the **Save** button.

Please use your student email when you're emailing us.

Assessment and Grading

All material presented is examinable (except where stated otherwise) by assignments and examinations. All important assessment information such as due dates and times, content, guidelines and so on will be discussed in lectures/tutorials and, where appropriate, detailed on Blackboard. Students are responsible for ensuring that they are aware of this information, keeping track of their own progress, and catching up on any missed classes.

Your final mark is

$$\min\left\{\frac{20A}{100}+\frac{25M}{100}+\frac{50E}{100}+\frac{10P}{100},100\right\},$$

where each component is: A Assignments ($\times 4$), M Midterm, E Exam, and P Participation (Classes/Tutorials).

Course Requirements

Attendance and In-class Participation

The material of this paper is highly sequential. To ensure that students gain the maximum benefit from classes, students are required to attend all lectures and one tutorial each week. Attendance will be randomly checked in each tutorial and lectures. **Students are required to attend at least 70% of classes; otherwise they may be treated as having failed the whole course.** Attendance may be considered in assigning points for the individual class contribution.

In addition to attendance, in-class exercises will be posted from time to time during the lecture and/or tutorial. Credits will be awarded to those who provide directly related comments and suggestions. Students should also prepare to be called upon for input to solving the problems.

Workload

FINC306 is an 18-point paper – this means ∼180 hours of work is required for this paper. *As a guide, based on an 18-point paper, this usually works out to a minimum of 14 hours work per paper per week. Work is made up of formal contact time (lectures, tutorials, laboratories, etc) and independent study (studying, revision, assignments, reading, etc).* (`https://www.otago.ac.nz/study/planning/workload.html`)

Potential breakdown:

Contact Hours	Lectures (3 hrs per week)	39
	Tutorials (1 hr per week)	12
Non-Contact Hours	Assignments (∼15 hrs each)	60
	Review/Prep/Study	69
Total		180

Assignments

You are required to work on them individually. Discussion among classmates is allowed. Please submit your assignment on time. Late assignments will not be marked unless an extension has been given. Remember to fill and attach the assignment cover sheet.

Midterm Test

The **two-hour** midterm test will be during class on the first Wednesday lecture after the mid semester break. The main purpose of the midterm test is to test your understanding of the fundamental concepts and your ability of doing some basic calculations. Please bring your approved calculator!

University of Otago approved calculators: List A - Scientific Calculators: Casio FX82 Casio FX100 Sharp EL531 Casio FX570 Casio FX95

An alternate test date may be scheduled for students who provide a valid reason for not being able to attend the scheduled test. Sufficient notice must be provided.

Students should pass the midterm exam ($> 50\%$) to pass the course.

Final Examination

A **three-hour** final examination will be comprehensive of all course topics and materials. It will be given according to the semester schedule.

Students should pass the final exam (> 50%) to pass the course.

Academic Integrity

Academic integrity means being honest in your studying and assessments. It is the basis for ethical decision-making and behaviour in an academic context. Academic integrity is informed by the values of honesty, trust, responsibility, fairness, respect and courage. Students are expected to be aware of, and act in accordance with, the University's Academic Integrity Policy.

Academic Misconduct, such as plagiarism or cheating, is a breach of Academic Integrity and is taken very seriously by the University. Types of misconduct include plagiarism, copying, unauthorised collaboration, submitting work written by someone else (including from a file sharing website, text generation software, or purchased work) taking unauthorised material into a test or exam, impersonation, and assisting someone else's misconduct. A more extensive list of the types of academic misconduct and associated processes and penalties is available in the University's Student Academic Misconduct Procedures.

It is your responsibility to be aware of and use acceptable academic practices when completing your assessments. To access the information in the Academic Integrity Policy and learn more, please visit the University's Academic Integrity website at `www.otago.ac.nz/study/academicintegrity`, or ask at the Student Learning Centre (HEDC) or the Library, or seek advice from your paper co-ordinator.

For further information:

→ Academic Integrity Policy

→ `http://www.otago.ac.nz/administration/policies/otago116838.html`

→ Student Academic Misconduct Procedures

→ `http://www.otago.ac.nz/administration/policies/otago116850.html`

Learning Outcomes

Learning Outcome	Participation	Assignments	Midterm	Exam	Total
Understand the concepts of forward and futures contracts, and how to price them using no-arbitrage principle	✓	A1;A2	✓	✓	35%
Understand the concept and pricing of swaps	✓		✓	✓	15%
Price options using binomial tree method	✓	A3		✓	25%
Price options using Black-Scholes formula	✓	A4		✓	20%
Analyse the derivatives embedded in structured products	✓			✓	5%
Total	5% (+5%)*	20%	25%	50%	100%

* Plussage.

Course Calendar

Week	Topic		Notes
	Monday	**Wednesday**	
1	Introduction		
2	Option Strategies and Static Replication		
3	No-Arbitrage Principle and Forward Price Formula		**A1** Due Wed.
4	The Current Value of a Forward Contract and Futures Trading		
5	Forward Rate and Forward Rate Agreements		**A2** Due Wed.
6	Swaps		

Mid Semester Break

7	Midterm Review	**Midterm Exam**	
8	Model-Free Relationships between Option Prices		
9	Binomial Tree Model I		
10	Binomial Tree Model II		**A3** Due Wed.
11	The Black-Scholes Model		
12	Quantitative Finance/Financial Engineering/Review		**A4** Due Wed.
13	Review		

A# – Assignment #

Disclaimer

While every effort is made to ensure that the information contained in this document is accurate, it is subject to change. Changes will be notified in class and via Blackboard. Students are encouraged to check Blackboard regularly. It is the student's responsibility to be informed.