Annexe A: New/Revised Course Content in OBTL+ Format

Course Overview

The sections shown on this interface are based on the templates [UG OBTL+](#) or [PG OBTL+](#)

If you are revising/duplicating an existing course and do not see the pre-filled contents you expect in the subsequent sections e.g. Course Aims, Intended Learning Outcomes etc. please refer to [Data Transformation Status](#) for more information.

Expected Implementation in Academic Year	AY2024-2025
Semester/Trimester/Others (specify approx. Start/End date)	Semester 1
Course Author * Faculty proposing/revising the course	Loh Yu Sheng
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Course Title	Mathematics of Finance
Course Code	BA2202
Academic Units	4
Contact Hours	52
Research Experience Components	

Course Requisites (if applicable)

Pre-requisites	
Co-requisites	
Pre-requisite to	
Mutually exclusive to	
Replacement course to	
Remarks (if any)	

Course Aims

The aim of this course is to equip actuarial science students with the knowledge of the theory and practical applications of the mathematics of finance in the various aspects of actuarial work. Specifically, this course aims to cover topics listed in the IFoA 2019 Curriculum CM1: Section 2-3 and CM2: Section 1-3. Partial credits for exemptions of CM1 and CM2 modules will be given to completion of this course.

Course's Intended Learning Outcomes (ILOs)

Upon the successful completion of this course, you (student) would be able to:

ILO 1	Differentiate between different types of discount and interest rates, and when to use them.
ILO 2	evaluate the PV and FV of simple annuities.
ILO 3	Evaluate and construct loan repayment schedules.
ILO 4	Use several performance measures of projects and investments.
ILO 5	Evaluate investment instruments.
ILO 6	Calculate forward rates and measure the duration and convexity of cash flows.
ILO 7	Evaluate stochastic interest models under several assumptions.
ILO 8	Explain the concepts of rational expectations theory and behavioural economics.
ILO 9	Estimate investment risk using risk measures.

Course Content

The following topics will be covered in this course. 1. Cash flow Models 2. Time Value of Money 3. Theory of Interest Rates 4. Level Annuities and varying Annuities 5. Equations of Value 6. Loan Schedules 7. Project Appraisal 8. Financial instruments 9. Term Structure of Interest Rates and interest rate risk 10. Stochastic Interest Rate Models 11. Simple Distribution Functions 12. Theories of Financial Market Behaviour 13. Measures of Investment Risk

Reading and References (if applicable)

- IFoA Subject CT1 – Financial Mathematics. Exam paper and examiners' reports are available at: https://www.actuaries.org.uk/studying/prepare-your-exams/past-exam-papers-and-examiners-reports

- IFoA Actuarial Mathematics: https://www.actuaries.org.uk/studying/curriculum-2019/actuarial-mathematics

- Financial Mathematics for Actuaries: Updated Edition. Wai-Sum Chan and Yiu-Kuen Tse; McGraw-Hill, 2013.

- An introduction to the mathematics of finance. A deterministic approach (2nd ed). Stephen Garrett; Butterworth-Heinemann, 2013

Planned Schedule

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
1	Cash flow Models, Time Value of Money	ILO 1	Handouts		
2	Theory of Interest Rates	ILO 2	Handouts		
3	Level Annuities, Varying Annuities	ILO 2	Handouts		
4	Loan Schedules	ILO 3	Handouts		
5	Project Appraisal	ILO 4	Handouts		
6	Financial instruments	ILO 5	Handouts		
7	Term Structure of Interest Rates	ILO 6	Handouts		
8	Mid-Term Test				
9	Stochastic Interest Rate Models, Simple Distribution Functions	ILO 7	Handouts		
10	Theories of Financial Market Behaviour, Rational Expectations Theory	ILO 8	Handouts		
11	Theories of Financial Market Behaviour, Behavioural Economics	ILO 8	Handouts		

Week or Session	Topics or Themes	ILO	Readings	Delivery Mode	Activities
12	Estimate investment risk using risk measures	ILO 9	Handouts		
13	Review				

Learning and Teaching Approach

Approach	How does this approach support you in achieving the learning outcomes?
Seminars	The interactive lecture session where there is ample opportunities for open discussion on the conceptual questions raised in the class allows you to think critical and share their ideas and concept with the class.
In-Class activities	Some learning outcomes for this course are skills which are practical and can be used immediately. To understand that the materials are relevant to practice, you work with some problems of financial transactions such as mortgages.

Assessment Structure

Assessment Components (includes both continuous and summative assessment)

No.	Component	ILO	Related PLO or Accreditation	Weightage	Team/Individual	Rubrics	Level of Understanding
1	Continuous Assessment (CA): Test/Quiz(Mid-term test)	1-6	Problem Solving & Decision Making	10	Individual		
2	Continuous Assessment (CA): Class Participation(Class participation)	1-9	Oral Communication	10	Individual		
3	Continuous Assessment (CA): Presentation(Class presentation)	1-9	Written/oral Communication	10	Individual		
4	Summative Assessment (EXAM): Final exam(Final Examination)	1-9	Acquisition of knowledge, Problem Solving & Decision Making	70	Individual		

Description of Assessment Components (if applicable)

Formative Feedback

Feedback is central to this course. You will receive both written and verbal feedback from me about your mid-term test. You will also receive written feedback in response to your presentation.

NTU Graduate Attributes/Competency Mapping

This course intends to develop the following graduate attributes and competencies (maximum 5 most relevant)

Attributes/Competency	Level
Decision Making	Basic
Problem Solving	Basic
Critical Thinking	Basic

Course Policy

Policy (Academic Integrity)

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values. As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the academic integrity website for more information. On the use of technological tools (such as Generative AI tools), different courses / assignments have different intended learning outcomes. Students should refer to the specific assignment instructions on their use and requirements and/or consult your instructors on how you can use these tools to help your learning. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Policy (General)

You are expected to complete all assigned pre-class readings and activities, attend all seminar classes punctually and take all scheduled quizzes and tests by due dates. You are expected to take responsibility to follow up with course notes, quizzes and course related announcements for seminar sessions they have missed. You are expected to participate in all seminar discussions and activities.

Policy (Absenteeism)

Absence from class without a valid reason will affect your overall course grade. Valid reasons include falling sick supported by a medical certificate and participation in NTU's approved activities supported by an excuse letter from the relevant bodies.

If you miss a lecture, you must inform the course instructor via email prior to the start of the class.

Policy (Others, if applicable)

Last Updated Date: 14-06-2024 02:18:43

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