

COURSE OUTLINES: BA3203 Actuarial Aspect of Asset/Liability Valuation

Academic Year	2022	Semester	2
Course Coordinator	Nie Ciyu		
Course Code	BA3203		
Course Title	Actuarial Aspect of Asset/Liability Valuation		
Pre-requisites	BA2204 Models		
No of AUs	4		
Contact Hours	52		
A) Course Aims/Description			
<p>The aim of this course is to develop the necessary skills to construct and apply asset/liability models and to value stocks, financial derivatives and insurance liabilities. These skills are necessary to communicate with other financial professionals and to critically evaluate modern financial theories.</p>			
B) Intended Learning Outcomes (ILO)/Objectives			
<p>By the end of this course, you should be able to:</p> <ol style="list-style-type: none"> 1. understand the basics Economic model and statistical model of asset pricing; 2. demonstrate understanding of basic stochastic modelling theories; 3. apply the most common derivative pricing models; 4. understand the framework of Ruin Theory and the key results; 5. apply triangle methods for general insurance reserving and pricing. 			
C) Course Content			
<ul style="list-style-type: none"> • Portfolio Theory/Models of Asset Returns • Asset Pricing Models • Brownian Motion and Martingales • Stochastic Calculus and Ito Processes • Stochastic Models of Security Prices • Introduction to Derivatives/Greeks • Binomial Model • Black-Scholes Option Pricing Formula • Martingale Representation Theorem and 5-Step Method • Arbitrage-Free Pricing and 5-Step Method with Black-Scholes Model • Ruin Theory • Run-off triangles 			

D) Assessment (includes both continuous and summative assessment)					
Component	ILO Tested	NBS Learning Goal (Refer to Appendix 1 for list)	Weightage	# Team/Individual	Assessment Rubrics (attach rubrics in appendix)
1. Final Examination	ILO1-ILO5	Acquisition of knowledge	70%***	Individual	N.A.
2. Coursework: Participation	ILO1-ILO5	Communication; Acquisition of knowledge	10%	Individual	Communication Rubric
3. Coursework: Seminar presentation	ILO1-ILO5	Communication; Acquisition of knowledge	10%	Individual	Communication Rubric
4. Coursework: Mid-term quiz	ILO1, ILO2, ILO3	Communication; Acquisition of knowledge	10%	Individual	N.A
Total			100%		

*** The 70% weightage for final is required by the accreditation agreement with the IFOA.

E) Formative feedback

You will receive verbal feedback through in-class discussion to your course participation. You will receive written summative feedback on the mid-term quiz. You will receive summative group feedback on the exam following the conclusion of the module.

F) Learning and Teaching approach

Approach	How does this approach support you in achieving the learning outcomes?
Seminars	Key concepts introduced in this module will be explained in detail in the seminars supported with examples and exercises. The seminars provide opportunities for open discussion on the conceptual questions, which allow you to think critically and share your ideas with the class. The seminars involve the interaction between the instructor and the entire class, making sure that the targeted learning outcomes could be successfully achieved.
In-Class activities	In-class activities, including questions & answers, going through tutorial questions, discussions, etc., provides you hands-on experience to apply

	materials and concepts introduced in this module to practice of the risk management and insurance practice. Such in-class activities guarantee that learning outcomes could be satisfying achieved.
G) Reading and References	
<p>CM2 – Actuarial Mathematics 2 Study material and relevant curriculum information can be found at http://www.actuaries.org.uk/.</p> <p>Baxter, M. and Rennie, A., Financial calculus: An introduction to derivative pricing, Cambridge University Press (HG6024.A3B355)</p> <p>Cairns, A. J. G., Interest rate models: An introduction, Princeton University Press (HG1621.C136)</p> <p>Dickson, D.C.M. (2005): Insurance Risk and Ruin. Cambridge University Press, Cambridge</p> <p>Elton, E. J., Gruber, M. J., Brown, S. J. et al., Modern portfolio theory and investment analysis, 8th ed., John Wiley, (HG4529.5.E51)</p> <p>Hull, J. C., Options, futures and other derivatives, 8th edition, Prentice Hall (HG6024.H913)</p>	
H) Course Policies and Student Responsibilities	
<p>(1) General</p> <p>You are expected to complete all assigned post-class readings and activities (e.g. tutorial questions provided), attend all seminar classes punctually and take all scheduled assignments and tests by due dates. You are expected to take responsibility to follow up with course notes, assignments and course related announcements for seminar sessions they have missed. You are expected to participate in all seminar discussions and activities.</p> <p>(2) Absenteeism</p> <p>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.</p> <p>If you miss a lecture, you must inform the course instructor via email prior to the start of the class.</p>	
I) Academic Integrity	
<p>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.</p> <p>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</p>	

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. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

J) Course Instructors

Instructor	Office Location	Phone	Email	Consultation Hours
Nie Ciyu	S3-B1A-33	67906256	cynie@ntu.edu.sg	

K) Planned Weekly Schedule

Week	Topic	ILO	Readings/ Activities
1	Portfolio Theory Models of Asset Returns	ILO1	Handouts & Tutorial questions
2	Asset Pricing Models Brownian Motion and Martingales	ILO1	Handouts & Tutorial questions
3	Stochastic Calculus and Ito Processes	ILO2	Handouts & Tutorial questions
4	Stochastic Models of Security Prices	ILO2	Handouts & Tutorial questions
5	Introduction to Derivatives Greeks	ILO3	Handouts & Tutorial questions
6	Binomial Model	ILO3	Handouts & Tutorial questions
7	Black-Scholes Option Pricing Formula	ILO3	Handouts & Tutorial questions
8	Recess		
9	Martingale Representation Theorem and 5-Step Method	ILO3	Handouts & Tutorial questions
10	Arbitrage-Free Pricing and 5-Step Method with Black-Scholes Model	ILO3	Handouts & Tutorial questions
11	Ruin Theory I	ILO4	Handouts & Tutorial questions
12	Ruin Theory II	ILO4	Handouts & Tutorial questions
13	Run-off triangles	ILO5	Handouts & Tutorial questions