

Subject Description Form

Subject Code	AMA432
Subject Title	Mathematical Methods for Investment
Credit Value	3
Level	4
Pre-requisite	<p>Introduction to Statistics for Business (AMA1501) or Introduction to Statistics (AMA1502) or Probability and Engineering Statistics (AMA2104) or Statistics for Finance Analytics (AMA2601) or Introduction to Statistics (AMA2634/AMA2634A) or Probability and Distributions (AMA2691) or equivalent AND Intermediate Calculus and Linear Algebra (AMA2007) or Mathematics I (AMA2111) or Mathematics for Engineers (AMA2308) or Engineering Mathematics (AMA2380) or Applied Mathematics I (AMA2511) or Mathematical Methods for Finance (AMA2703) or Advanced Mathematical Methods for Economics and Finance (AMA273) or Mathematics for Scientists and Engineers (AMA2882) or Engineering Mathematics (AMA290) or equivalent</p>
Objectives	This subject is to introduce the basic concepts and techniques of financial modeling and portfolio analysis. Special emphasis is on the applications of mathematics and statistics to financial decision making and asset allocation.
Intended Learning Outcomes	<p>Upon satisfactory completion of the subject, students should be able to:</p> <ol style="list-style-type: none"> a. outline the basic principles and assumptions for the theory of interest; b. apply portfolio theory to consider the management of portfolio; c. synthesize the knowledge and techniques required in solving real-life problems.
Subject Synopsis/ Indicative Syllabus	<p><i>Theory of Interest</i> Review of compound interest. Nominal and effective interest rates. Present value and discounted cash flows. Annuities. NPV and IRR. Fixed income securities.</p> <p><i>Introduction to Financial Instruments</i> Forwards/Futures. Options. No arbitrage pricing theory. Option strategies.</p> <p><i>Portfolio Theory</i> Measurement of risks. Portfolio risk and return. Market efficiency. Mean-variance portfolio analysis. The Markowitz model.</p>

	<p><i>Pricing Models</i> Capital asset pricing model (CAPM). Factor models.</p> <p><i>Utility theory</i> Utility functions. Risk Aversion. Utility maximization for optimal portfolio and the mean-variance criterion.</p>				
Teaching/Learning Methodology	The subject will be delivered mainly through lectures and tutorials. The lectures will be conducted to introduce the concepts of mathematical methods for investment in the syllabus, which are then reinforced by learning activities involving demonstration, tutorial exercise and assignments.				
Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)		
			a	b	c
	1. Assignments	10%	✓	✓	✓
	2. Tests	30%	✓	✓	✓
	3. Examination	60%	✓	✓	✓
Total	100 %				
	<p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: The subject focuses on knowledge, skill and understanding of Mathematical Methods for Investment, thus, Exam-based assessment is the most appropriate assessment method, including 30% test and 60% examination. Moreover, 10% worth of assignments are included as a component of continuous assessment so as to keep the students in progress. Continuous Assessment comprises of assignments and tests. A written examination is held at the end of the semester.</p>				
Student Study Effort Expected	Class contact:				
	▪ Lecture		26 Hrs.		
	▪ Tutorial		13 Hrs.		
	Other student study effort:				
	▪ Assignment		33 Hrs.		
	▪ Self-study		33 Hrs.		
	Total student study effort		105 Hrs.		
Reading List and References	<p><u>Textbook:</u> Luenberger, D.G. Investment Science (Parts I and II) 2nd edition Oxford University Press 2014</p>				

	<u>References:</u>	
	Elton, E.J.	Modern Portfolio Theory and Investment Analysis 9th edition Wiley 2014
	Panjer, H.H. <i>et al</i>	Financial Economics: With Applications to Investments, Insurance and Pensions Society of Actuaries 2001