

Faculty	Natural Sciences		
Home Department	Mathematics and Applied Mathematics		
Module Topic	Mathematics		
Generic Module Name	Mathematics 322		
Alpha-numeric Code	MAT322		
NQF Level	7		
NQF Credit Value	30		
Duration	Semester		
Proposed semester to be offered	Second semester		
Programmes in which the module will be offered	BSc (Mathematical and Statistical Sciences (3227, 3031) BSc (Physical Science) (3233, 3120) BSc (Computer Science) (3221, 3023)		
Year Level	3		
Main Outcomes	<p>On completion of this module students should be able to:</p> <ul style="list-style-type: none"> • Implement the basic tools of the geometric Brownian motion of stock prices. • Use their knowledge of elementary cases of pricing via arbitrage of options to solve problems. • Use their knowledge of vanilla and exotic options and their valuation to solve problems. • Use the Black-Scholes formula to solve option pricing problems. • Use the n-period binomial model method to solve problems. • Use Monte Carlo simulation approach to solve option pricing problems. 		
Main Content	<ul style="list-style-type: none"> • Elementary probability theory • Normal random variables • Geometric Brownian motion • Present value analysis • Introduction to derivatives • Pricing contract via arbitrage, The arbitrage theorem • The Black-Scholes formula • Vanilla options • Multi-period binomial model method • Option valuations by expected utility • Exotic options • Portfolio optimization • Autoregressive models and mean reversion • Simulations-random walk, Monte Carlo methods 		
Pre-requisite modules	MAT211 and (MAT212 OR MAT221)		
Co-requisite modules	None		
Prohibited module Combination	None		
Breakdown of Learning Time	Hours	Time-table Requirement per week	Other teaching modes that does not require time-table
<i>Contact with lecturer / tutor:</i>	39	Lectures p.w.	3
<i>Assignments & tasks:</i>	16	Practicals p.w.	1
<i>Practicals:</i>	20	Tutorials p.w.	1
<i>Assessments:</i>	26		
<i>Self-study:</i>	160		
<i>Other: Tutorials</i>	39		
Total learning time:	300		

Method of Student Assessment	Continuous Assessment (CA): 50% Final Assessment (FA): 50%
Assessment Module Type	Continuous and Final Assessment (CFA)