Module code	SM-4333			
Module Title	Financial Mathematics			
Degree/Diploma	Bachelor of Science (Mathematics)			
Type of Module	Major Option			
Modular Credits	4	**Total student Workload**	10	hours/week
		Contact hours	4	hours/week
Prerequisite	SM-2201 Ordinary Differential Equations SM-2203 Linear Algebra and its Applications			
Anti-requisite	None			

Aims

The module is designed to enable students to acquire a knowledge and understanding of some of the basic concepts of financial mathematics, including stochastic models for stocks and the pricing of contingent claims.

Learning Outcomes

On successful completion of this module, a student will be expected to be able to:

Lower order :	40%	- list the functions of a stock market and describe the properties of the more important financial instruments that are traded in them (bonds, stocks and options)
Middle order :	40%	- calculate the market price of a bond; estimate the drift and volatility of a stock from a sequence of stock prices; use the Black-Scholes and binomial models to price options
Higher order:	20%	- construct stochastic models of high-volatility financial assets - work independently and in a team

Module Contents

- Introduction to options and markets: Definition and brief history of financial derivatives
- Asset Price model: Brief review of additive and multiplicative model; general random walk model; geometric Brownian motion model and Wiener process.
- Black-Scholes partial differential equation: Taylor's series, Ito's lemma and random diffusion equation.
- Black-Scholes model: Arbitrage principle, hedging techniques, Greek letters, Black-Scholes analysis and principle; boundary and final conditions for Black-Scholes formulae.
- Variation of the Black-Scholes model: Deterministic and stochastic volatility; random interest rate; dividend paying option; American option and transaction costs.
- Binomial model: Risk-neutral principle, discrete random walk and price jumps.

Assessment	Formative assessment	Tutorial and feedback.	
	Summative assessment	Examination: 60%	
		Coursework: 40% - 2 class tests (40%)	