

Module code	SM-4312		
Module Title	Mathematical Modelling		
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		
Anti-requisite	None		
Aims			
<p>This module is intended to introduce students to the modelling of real-life phenomena such as occur in natural sciences, medical sciences, engineering, social sciences, finance and management by means of Ordinary Differential Equations (ODE), Partial Differential Equations (PDE) and Difference Equations (DE). On completing this module, the student should be able to understand the mathematical models used in real-life applications and to solve various real-life problems analytically using ODE, PDE and DE techniques. This module should also give the student some awareness of the importance of mathematical modelling in understanding real-life phenomena and solving real-life problems that occur in Brunei and internationally.</p>			
Learning Outcomes			
<i>On successful completion of this module, a student will be expected to be able to:</i>			
Lower order :	40%	<ul style="list-style-type: none"> - understand the basic principles of mathematical modelling. - Understand how to apply these principles in scientific problems. 	
Middle order :	40%	<ul style="list-style-type: none"> - analyse the various equations and how to use them in solving real scientific problems. 	
Higher order:	20%	<ul style="list-style-type: none"> - interpret the results of analyses, and make an appropriate report for an effective communication - work independently and play effectively in collaboratively in a team, especially in tutorial class. 	
Module Contents			
Modelling through ODE:			
<ul style="list-style-type: none"> - Growth and Decay, single species population, two interacting (competition, predator-prey, cooperation) species, epidemics - Mechanical systems, spring mass system, electrical circuits. Sales and advertisements, consumer buying behaviour. Testing for Diabetes, intake of Drugs. Planetary motions, pursuit curves. - Chemical kinetics, compartmental systems 			
Modelling through PDE:			
<ul style="list-style-type: none"> - One-dimensional heat equation. - One-dimensional wave equation. - Single Sturm Louville Problems. Traffic Models 			
Assessment	Formative assessment	Tutorial and feedback.	
	Summative assessment	Examination: 60%	
		Coursework: 40% <ul style="list-style-type: none"> - 2 tests (20%) - 2 assignments (20%) 	