

Module code	SM-4311		
Module Title	Applied Mathematical Methods I		
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 and SM-2202 Multivariate Calculus		
Anti-requisite	None		
Aims			
The module is designed for students to introduce and understand an array of important mathematical tools and techniques and methods which: (a) build on knowledge gained in the first two years of the mathematics programme, (b) will be used in later modules, especially in applications.			
Learning Outcomes			
<i>On successful completion of this module, a student will be expected to be able to:</i>			
Lower order :	40%	- understand the basic principles of important mathematical tools, techniques & methods - Understand how to apply these mathematical tools, techniques & methods in scientific problems.	
Middle order :	40%	- analyse the various mathematical tools, techniques and methods and when to use them if necessary.	
Higher order:	20%	- 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			
<ul style="list-style-type: none"> - Orthogonal Curvilinear Coordinate System and Tensor: Coordinate transformation, invariant properties of tensors under coordinate transformation, Basis and reciprocal basis vectors, Dyadic representations. Einstein summation notation, Levi-Civita Tensor, Expressions for gradient, divergence, Laplacian and curl of a vector in an orthogonal curvilinear coordinate system. - Orthogonal Functions: Expansion of functions in orthonormal functions, Fourier series, full range and half range sine and cosine series, convergence. - Sturm-Liouville Problems: Characteristic values and characteristic functions. Basic theorem, orthogonality of characteristic functions. - Ordinary Differential Equations: Solution in power series, method of Frobenius, Legendre differential equation, introduction to Legendre and Bessel functions and some important properties. - First Order Partial Differential Equations: Characteristic curves. Solution of initial value problems by the method of characteristics. 			
Assessment	Formative assessment	Tutorial and feedback.	
	Summative assessment	Examination: 60% Coursework: 40% - 3 tests (40%)	