Module code	SM-4314			
Module Title	Applied Mathematical Methods II			
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-4311 Applied Mathematical Method I			
Anti-requisite	None			

Aims

The module is designed to teach mathematics major students a suite of advanced mathematical tools and techniques essential for applications in mathematical modelling and analysis.

Learning Outcomes

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

Lower order :	40%	- calculate the gradient, divergence, curl and Laplacian of standard multivariate functions, in Cartesian and a selection of curvilinear coordinate systems; calculate the Fourier transforms of standard functions
Middle order :	40%	- use Green's functions or Fourier transforms to solve the standard ordinary and partial differential equations of mathematical physics; solve simple examples of Volterra and Fredholm integral equations
Higher order:	20%	- use index notation to express and prove the standard identities of vector calculus - formulate and solve problems in the physical sciences involving partial differential or integral equations - work independently

Module Contents

- Vectors and Tensors: Review of vector, dyadic and higher order tensor representations; the grad operator, curvilinear coordinates. Generalised Stokes and Divergence theorems, Green identities and Green functions.
- Fourier Transforms and Distribution Theory: Fourier integral theorem; exponential, cosine and sine Fourier transforms. Convolution theorem. Application of integral transforms to boundary value problems. Distribution theory.
- Integral Equations: Volterra and Fredholm integral equations. Solution by integral transforms, or by conversion to differential equations. Neumann iterative method, separable kernels, Fredholm method.

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