

Module code	SM-2203		
Module Title	Linear Algebra and its Applications		
Degree/Diploma	Bachelor of Science (Mathematics)		
Type of Module	Major Core		
Modular Credits	4	Total student Workload	10 hours/week
		Contact hours	4 hours/week
Prerequisite	SM-1201 Mathematical Methods for the Sciences		
Anti-requisite	None		
Aims			
<p>Linear algebra is one of the most important branches of modern mathematics, with extensive applications in the natural sciences and the social sciences. This course covers basic linear algebra needed in mathematics and its applications.</p>			
Learning Outcomes			
<i>On successful completion of this module, a student will be expected to be able to:</i>			
Lower order :	30%	- To perform standard operations with matrices, solve systems of linear equations using the fundamental method of Gaussian elimination and Cramer's Rule	
Middle order :	60%	- To describe elementary properties of finite dimensional vector spaces and linear transformations	
Higher order:	10%	- To apply linear algebra to problems drawn from business, economics, ecology, demography and computer science	
Module Contents			
<ul style="list-style-type: none"> - Matrix algebra: addition, scalar multiplication, multiplication, transpose, elementary row operations, echelon forms, elementary matrices, inverses, determinants, adjoint. - Systems of linear equations: Gauss-elimination, Cramer's rule. - General finite-dimensional vector spaces: definition, examples, subspaces, linear combinations, spanning sets, linear dependence and independence, basis, dimension. - Linear transformations: definition, kernel, image, nullity, rank, the matrix of a linear transformation, geometric transformations (reflections, rotations, scaling, shears), change of basis, transition matrices, similar matrices, eigenvalues and eigenvectors, diagonalization. - Inner product spaces: orthonormal basis, orthogonal projections, the Gram-Schmidt algorithm. - Applications: least square solutions and curve fitting, approximation problems, power matrices, differential equations, computer graphics. 			
Assessment	Formative assessment	Tutorial and feedback.	
	Summative assessment	Examination: 60%	
		Coursework: 40%	
		- 2 tests and 2 assignments (40%)	