

Faculty	Natural Sciences
Home Department	Mathematics and Applied Mathematics
Module Topic	Differential and Integral Calculus and Linear Algebra
Generic Module Name	Differential and Integral Calculus and Linear Algebra 105
Alpha-numeric Code	MAT105
NQF Level	5
NQF Credit Value	30
Duration	Year
Proposed semester to be offered	Both semesters
Programmes in which the module will be offered	BSc (Mathematical and Statistical Sciences) (3227) BSc (Chemical Sciences) (3220) BSc (Physical Science) (3233) BSc (Computer Science) (3221)
Year level	1
Main outcomes:	<p>On completion of this module students should be able to:</p> <ul style="list-style-type: none"> • Use the basic properties of functions (understand compositions, transformations, combinations and graphs in different contexts). • Use mathematical induction to prove a statement involving a positive integer. • Use the basic properties of numbers including complex numbers in different contexts. • Use the concepts of limits, continuity and derivative with an emphasis on meanings in different mathematical contexts. • Use rates of change, relates rates and differentiation correctly in solving real-world problems. • Use different methods to determine the definite integral as a limit of Riemann sums. • Use the basic methods of integration correctly to solve problems. • Use basic methods for solving matrix equations. • Use vectors and coordinate systems to solve problems in 3-dimensional space.
Main content:	<ul style="list-style-type: none"> • Sets, real and complex numbers, the coordinate system. • Mathematical Induction. • Main types of functions that occur in calculus. • The Binomial Theorem. • Limits, continuity and the derivative of a function. • Differentiation rules and implicit differentiation. • Curve sketching, related rates and optimization. • Properties of the definite integral, the Fundamental Theorem of Calculus, techniques of integration and improper integrals. • Areas under curves, volumes, arc length and average value of a function. • Row-reduced echelon forms and Gauss-Jordan elimination. • Solutions of systems of linear equations using determinants (Cramer's rule) and inverses of matrices. • Vectors, dot product, cross product and equations of lines and planes in 3-dimensional space.
Pre-requisite modules	None
Co-requisite modules	None
Prohibited module	None

Combination				
Breakdown of Learning Time	Hours	Timetable Requirement per week		Other teaching modes that does not require time-table
Contact with lecturer / tutor:	104	<i>Lectures p.w.</i>	4	
Assignments & tasks:	30	<i>Practicals p.w.</i>	0	
Assessment	14	<i>Tutorials p.w.</i>	2	
Practicals:	0			
Selfstudy	100			
Other: Please specify	52			
Total Learning Time	300			
Methods of Student Assessment	Continuous Assessment (CA): 50% Final Assessment (FA): 50%			
Assessment Module type	Continuous and Final Assessment (CFA)			