

<b>MODULE</b>	<b>MATHEMATICS FOR COMPUTING</b>	
<b>CODE</b>	BSCH-1-2-09	
<b>STAGE</b>	I	
<b>NUMBER OF CREDITS</b>	4 semester credits / 6 quarter units	
<b>STATUS</b>	CORE	
<b>THEMES</b>	Computational Mathematics	
<b>ASSESSMENT</b>	Continuous Assessment	20%
	Examination	80%

### **Aims**

This module aims to introduce students to the mathematical concepts and notations that are relevant to computing and develop their analytical, problem solving and modelling skills.

### **Learning Outcomes**

On completion of this module the student will:

- Demonstrate and ability to apply the mathematical laws that govern computing science.
- Identify and perform operations on matrices.
- Solve linear equations using matrices techniques.
- Evaluate sides and angles missing from triangles by applying correct formulae.
- Differentiate mathematical functions from first principles and through the application of rules of differentiation.
- Integrate trigonometric functions, definite and indefinite integrals.
- Distinguish between scalar and vector quantities.
- Graphically describe a vector quantity and perform operations.
- Distinguish between number sets and operations.
- Perform Boolean algebraic operations and evaluate Boolean expressions.
- Formulate a knowledge and application of Boolean expressions and numeric representations relating to computer programming.

## Indicative Content

Topic	Description
<b>Algebra</b>	Basic laws of arithmetic: integers, Special factors, remainder theorem, rational functions, solution sets; Solving polynomials – quadratic, cubic; Indices; Logarithms; Inequalities
<b>Matrix Algebra</b>	Introduction: definition, order, types; Operations: addition, subtraction, multiplication-scalar and matrix, transpose, inverse; Solutions of sets of linear equations;
<b>Trigonometry</b>	Angle measurements: Radian, degrees; Trigonometric ratios, functions & identities; Sine and Cosine rules; Solving triangles; Compound angles and associated formulae; Inverse trigonometric functions;
<b>Limits</b>	Periodic functions: range and period, graphs, sine and cosine waves; Limits: laws of limits; Differentiation from first principles; Differentiating reciprocals and roots;
<b>Differentiation</b>	Differentiation by rule: Product, Quotient and Chain; Differentiating trigonometric functions; Implicit and Parametric differentiation; Higher derivatives; Exponential functions; Logarithm functions; Inverse trigonometric functions;
<b>Integration</b>	Indefinite and Definite integral; Integration by substitution; Integration of Rational and trigonometric functions; Areas and Volumes by Integration;
<b>Vector Algebra</b>	Scalar and vector quantities; Vector spaces and operations; Linear operations; Geometrical interpretations (2D, 3D); Orthonormal Basis;
<b>Computer Algebra</b>	Number Sets and Operations; Finite Arithmetic; Computer Representations: integer, floating-point numbers
<b>Boolean Algebra</b>	Boolean values; operators: and, or, xor, not; boolean expressions; writing boolean expressions; evaluation of boolean expressions, truth-tables, laws of boolean algebra.

## Teaching and Learning Methods

This Module will be taught using a combination of lectures, tutorials, study of sample solutions, handouts and interactive teaching.

## Assessment Methods

Assessment will use both an assessment component and an end of semester examination. The assessment component is used to develop practical skills of mathematics applied to computing.

## Primary Reading List

<b>Title</b>	<b>Author</b>	<b>Publisher</b>
Essential Computer Mathematics	Seymour Lipschutz	McGraw Hill 1982
Engineering Mathematics	K.A. Stroud	MacMillan Press 2001
Discrete Mathematics in Computer Science	Stanat & McAllister	Prentice-Hall 1977

## Recommended Reading List

<b>Title</b>	<b>Author</b>	<b>Publisher</b>
Foundations of Computer Science	Aho & Ullman	WH Freeman & CO 1995
Calculus & Analytic Geometry	G. Thomas, R. Finney	Addison-Wesley 1991