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| Module | Linear Algebra |
| Course code | BSCH-LA |
| Credits | 5 |
| Important notes | Please note that this module is not intended for first year students. |
| Allocation of marks | 60% Continuous Assessment |
| | 40% Final Examination |

Intended Module Learning Outcomes

On successful completion of this module learners will be able to:

1. calculate using algebraic expressions
2. define various mathematical structures and perform operations on them
3. solve sets of linear equations using matrices
4. represent graphs in a computer programming language
5. describe certain graph algorithms
6. demonstrate the concept of a one-way function
7. perform calculations using modular arithmetic

Module Objectives

A key objective of this module is to give learners an in depth understanding of those areas of discrete mathematics that are relevant to the study of computing. It builds on the work covered as part of the first year foundations module. The work covered here provides a basis for: the study of relational databases and formal specification (sets, relations and functions); graphics (vectors and matrices); telecommunications (matrices); concurrent programming (matrices).

Module Curriculum

Sets, Relations & Functions

- Sets: definition, typed set theory, equality, sub-set, intersection, union, difference, power set, properties of sets;
- Relations: definition, relation as set of tuples, domain, range, domain restriction and subtraction, range restriction and subtraction, inverse, types of relation: reflexive, symmetric and transitive, equivalence relations
- Functions: definition, domain, range, inverse, domain subtraction and restriction, function overriding, composition of functions, types of function: injective(one-to-one), surjective(onto), bijective

Vectors

- Scalar and vector quantities; equality of vectors; vector addition, unit vector, orthogonal basis, components of a vector in terms of unit vector, scalar product, vector product, angle between two vectors.

Matrices

- Matrix definition, order, types; equality; addition, subtraction, multiplication by a scalar, multiplication, transpose, inverse; solutions of sets of linear equations; transformation matrices.