MATHEMATICS FOR COMPUTER SCIENCE

UNIT CODE: ICT/CU/CS/CR/03/6/B

Relationship to Occupational Standards

This unit addresses the unit of competency: Understand Mathematics for Computer Science

Duration of Unit: 140 hours

Unit description

This unit specifies the competencies required to understanding linear algebra, understanding Boolean algebra, understanding set theory, understanding calculus and understanding probability and statistics.

Summary of Learning Outcomes

1. Understand Linear Algebra
2. Understand Boolean Algebra
3. Understand Set Theory
4. Understand Calculus
5. Understand Probability and Statistics

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods

1. Understand Linear Algebra	• Linear Equations
	• Definition
	• Types
	• Solving linear equations
	  • Methods of solving
	  • Formation
	• Vectors
	  • Definition
	  • Types
	• Vector operations
	  • Addition
	  • Subtraction
	  • Multiplication
	  • Scalar
	  • Dot product
		• Practical tests
		• Oral tests
		• Written tests

	• Matrices
	  • Definition
	  • Types
	  • Determinant
	  • Application
	• Matrix operations
	  • Addition
	  • Scalar multiplication
	  • Transposition
	• Inverse of square matrix	

2. Understand Boolean Algebra	• Boolean algebra
	  • Definition of Boolean algebra
	  • Uses of Boolean algebra
	• Key Terminology
	  • Boolean value
	  • Boolean function
	  • Digital logic
	• Basic Boolean operations
	  • AND
	  • OR
	  • NOT
	• Secondary operations
	  • NAND
	  • NOR
	  • EX-OR
	  • EX-NOR
	• Writing Boolean Expressions
	  • Order of basic operations
	  • Symbols
	• Simplification of Boolean expressions
	  • Using algebraic functions
	  • Using Truth tables
	  • Using Karnaugh Maps
		• Practical tests
		• Oral tests
		• Written tests

	• Boolean Laws and Theorems
	  • AND law
	  • OR law
	  • Inversion law
	  • Commutative
	  • Associative
	  • Distributive
	  • De-Morgan's Theorems
	• Simplification (Reduction) Rules for Boolean expressions	

3. Understand Set Theory	• Sets Theory
	  • Definition of a Set
	  • Characteristics of sets
	• Methods of Set representation
	  • Statement form
	  • Tabular form
	  • Set builder notation
	• Cardinality of a set
	• Types of sets
	  • Finite
	  • Infinite
	  • Subset
	  • Universal
	  • Proper
	  • Singleton set
	• Venn Diagrams
	• Set Operations
	  • Set Union
	  • Set Intersection
	  • Set Difference
	  • Complement of Set
	  • Cartesian Product
		• Practical tests
		• Oral tests
		• Written tests

4. Understand Calculus	• Functions
	  • Definition of function
	  • Domain
	  • Range
	  • Linear functions
	  • Power functions
		• Oral
		• Observation
		• Written

	• Evaluation
	• Graphing of functions
	  • Intercepts
	  • Limits
	• Differential calculus
	  • Rate of change
	  • Rules of derivatives
	  • Optimization
	• First and second order differential equations
	• Integral calculus
	  • Definite
	  • Indefinite
	• Techniques of integration
	  • By parts
	  • Reserve chain rule
	  • u-substitution	

5. Understand Probability and Statistics	• Key terminologies in probability
	  • Samples spaces
	  • events
	  • sets
	  • outcomes
	• Probability axioms and counting problems
	• Permutations and combinations
	• Conditional probability and multiplication rule
	• Data representation techniques
	  • Histogram
	  • Pie charts
	  • Scatter plot
	  • Bar graph
	• Measures of central tendency
	  • Mean
	  • Mode
	  • Median
	• Measures of spread
		• Practical tests
		• Oral tests
		• Written tests

	• Variance • Standard deviation • Measure of Location • Quartile • Percentile	

Suggested Methods of Instruction

- Presentations by trainer;
- Guided learner activities and research to develop underpinning knowledge;
- Visiting lecturer/trainer from the Mathematics field.
- Industrial visits

Recommended Resources

Tools

- Internet

Equipment

- Calculator
- Computer

Materials and supplies

- Instructional material
- Stationery

Reference materials

Trainer-recommended reference material including text books and web resources