

# UNIT 3 & 4 MATHEMATICAL METHODS

Mathematical Methods Units 1 and 2 provide an introductory study of simple elementary functions of a single real variable, algebra, calculus, probability and statistics and their applications in a variety of practical and theoretical contexts.

## UNIT 3

In this unit students cover transformations of the plane and key features of elementary functions and their graphs. The behavior of these functions and their graphs will also be linked to applications in practical situations. Students will cover the algebra of functions and study the identification of appropriate solution processes for solving equations, and systems of simultaneous equations, presented in various forms. Graphical and numerical approaches for problems involving equations where exact value solutions are not required or which are not solvable by other methods will be investigated. Students will be introduced to the graphical treatment of limits, continuity and differentiability of functions and differentiation of these functions whilst linking these processes to application in practical

### AREA OF STUDY

- Functions, relations and graphs
- Algebra, number and structure

### OUTCOMES

**Outcome 1:** Define and explain key concepts as specified in the content from the areas of study and apply a range of related mathematical routines and procedures.

**Outcome 2:** Apply mathematical processes in non-routine contexts, including situations with some open-ended aspects requiring investigative, modelling or problem-solving techniques or approaches, and analyse and discuss these applications of mathematics.

**Outcome 3:** Apply computational thinking and use numerical, graphical, symbolic and statistical functionalities of technology to develop mathematical ideas, produce results and carry out analysis in situations requiring investigative, modelling or problem-solving techniques or approaches.

## UNIT 4

In this unit students will continue with the study of calculus, in particular with the anti-differentiation and integration of functions of a single real variable and be introduced to their application of practical situations. Students will be introduced to pseudocode and use algorithms to implement Newton's methods for finding roots of non-elementary functions. They will cover discrete and continuous random variables, their representation using tables, probability functions; the calculation and interpretation of central measures and measures of spread; and statistical inference for sample proportions. The focus is on understanding the notion of a random variable, related parameters, properties and application and interpretation in context for a give probability distribution.

### AREA OF STUDY

- Calculus
- Data analysis, probability and statistics

### OUTCOMES

**Outcome 1:** Define and explain key concepts as specified in the content from the areas of study and apply a range of related mathematical routines and procedures.

**Outcome 2:** Apply mathematical processes in non-routine contexts, including situations with some open-ended aspects requiring investigative, modelling or problem-solving techniques or approaches, and analyse and discuss these applications of mathematics.

**Outcome 3:** Apply computational thinking and use numerical, graphical, symbolic and statistical functionalities of technology to develop mathematical ideas, produce results and carry out analysis in situations requiring investigative, modelling or problem-solving techniques or approaches.