# **General Mathematics**

# **Course Description**



General Mathematics provide for the study of non-calculus and discrete mathematics topics. They are designed to be widely accessible and provide preparation for general employment, business or further study, in particular where data analysis, recursion and financial modelling, networks and matrices are important. In undertaking these units, students are expected to be able to apply techniques, routines and processes involving rational and real arithmetic, sets, lists, tables and matrices, diagrams and geometric constructions, algorithms, algebraic manipulation, recurrence relations, equations and graphs, with and without the use of technology. They should have facility with relevant mental and by-hand approaches to estimation and computation. The use of numerical, graphical, geometric, symbolic, financial and statistical functionality of technology for teaching and learning mathematics, for working mathematically, and in related assessment, is to be incorporated throughout each unit as applicable.

## **Course structure**

## Unit 1 and 2

## Area of Study 1 – Data analysis, probability and statistics

In this area of study students cover types of data, display and description of the distribution of data, summary statistics for centre and spread, and the comparison of sets of data.

## Area of Study 2 – Algebra, number and structure

In this area of study students cover the concept of a sequence and its representation by rule, table and graph, arithmetic or geometric sequences as examples of sequences generated by first-order linear recurrence relations, and simple financial and other applications of these sequences.

## Area of Study 3 – Functions, relations and graphs

In this area of study students cover linear function and relations, their graphs, modelling with linear functions, solving linear equations and simultaneous linear equations, line segment and step graphs and their applications.

## Area of Study 4 – Discrete Mathematics

In this area of study students cover the concept of matrices and matrix operations to model and solve a range of practical problems, including population growth and decay.

## Unit 2

## Area of Study 1 – Data analysis, probability and statistics

In this area of study students cover association between two numerical variables, scatterplots, and lines of good fit by eye and their interpretation.

## Area of Study 2 – Discrete Mathematics

In this area of study students cover the use of graphs and networks to model and solve a range of practical problems, including connectedness, shortest path and minimum spanning trees.

## Area of Study 3 – Functions, relations and graphs

In this area of study students cover direct and inverse variation, transformations to linearity and modelling of some non-linear data.

#### Area of Study 4 – Shape and measurement

In this area of study students cover units of measurement, accuracy, computations with formulas for different measures, similarity and scale in two and three dimensions, and their practical applications involving simple and composite shapes and objects, trigonometry, problems involving navigation and Pythagoras' theorem and their applications in the plane.

## Unit 3

## Area of Study 1 – Data analysis, probability and statistics

Students cover data types, representation and distribution of data, location, spread, association, correlation and causation, response and explanatory variables, linear regression, data transformation and goodness of fit, times series, seasonality, smoothing and prediction.

## Area of Study 2 – Discrete Mathematics

Students cover the use of first-order linear recurrence relations and the time value of money (TVM) to model and analyse a range of financial situations, and using technology to solve related problems involving interest, appreciation and depreciation, loans, annuities and perpetuities.

## Unit 4

## Area of study 1 – Data analysis, probability and statistics

Students cover the definition of matrices, different types of matrices, matrix operations, transition matrices and the use of first-order linear matrix recurrence relations to model a range of situations and solve related problems.

#### Area of study 2 – Discrete Mathematics

Students cover the definition and representation of different kinds of undirected and directed graphs, Eulerian trails, Eulerian circuits, bridges, Hamiltonian paths and cycles, and the use of networks to model and solve problems involving travel, connection, flow, matching, allocation and scheduling.

## **Entry and Recommendations**

There are no prerequisites for entry to Unit 3; however, students must undertake Unit 3 prior to undertaking Unit 4.

## Assessment

#### Satisfactory Completion

Demonstration of achievement of outcomes and satisfactory completion of a unit are determined by evidence gained through the assessment of a range of learning activities and tasks.

## Level of Achievement

#### Unit 1 and 2

- Coursework
  - o Assignments
  - o Tests
  - o Summary or review notes
  - o Modelling tasks
  - o Problem-solving tasks
  - o Mathematical investigations
  - o Examination

- Unit 3 School-assessed Coursework: (24 %)
  - o Data analysis, probability and statistics task
  - Recursion and financial modelling task
  - Unit 4 School-assessed Coursework: (16 %)
    - o Matrices task
    - $\circ$   $\;$  Networks and decision task
- Examination 1: (30 %)
- Examination 2: (30 %)

