Mathematics

To cater for the varied abilities of students, four Mathematics courses are offered. There are three T courses and one A course.

They are:

Specialist Mathematics (T)
Mathematical Methods (T)
Mathematical Applications (T)
General Mathematics (A)

It is important to note that when a Course Score for Mathematics is calculated, all three tertiary mathematics courses are merged and compared.

Some units are prerequisites for others. Students should check with the faculty before enrolling in the next unit.

Students of all T courses will be expected to have access to graphics calculators for class use as well as for all their other mathematics work.

Change of Package

Students who wish to transfer from one course to another must seek course counselling from their teacher and approval from the Executive Teacher of Mathematics.

Specialist Mathematics (T)

This course Specialist Mathematics (SM) is available as a Double Major, Major/Minor or Major. It is intended for students of above-average scholastic ability and performance in mathematics. Students intending to study a major in mathematics at university would be advised to study a Double Major course. Students who find the course too difficult will be allowed to move to Mathematical Methods or Mathematical Applications.

LIST OF UNITS

SM: Numbers, Patterns & Relations - Core

This first unit is similar to the first unit in Mathematical Methods. However, a significant amount of algebra review has been included to ensure adequate preparation for later units.
The unit involves the development of matrix operations to solve problems. Students also study sequences and series with applications leading to annuities. The unit also covers further development of mathematical models using linear functions and provides an opportunity for students to investigate a wide range of functions and relations.

SM 2: Trigonometry & Derivatives - Core

This unit provides further development of functions including polynomials and trigonometry. Students also study limits leading to differentiation of polynomials with applications including graphing.

SM: Integrals & Special Functions – Core

Students revise earlier concepts on anti-differentiation and then move on to study areas enclosed by functions and volumes of solids of revolution. The unit then covers the further study of calculus to include exponential, logarithmic and trigonometric functions. For the final topic in this unit students study inverse trigonometric functions.

SM: Probability & Statistics – Core
Students study probability which formalises the intuitive work done in previous years. They are introduced to the mathematics of statistical analysis which builds clear links with probability theory. The unit then provides students with the opportunity to extend their knowledge to probability distributions.

SM: Reasoning, Geometry & Matrices - Option
This unit emphasizes rigorous logical arguments by providing opportunities for students to refine their abstract reasoning and enhance their skills in justifying and supporting their conclusions and solutions. In the second part of the unit students study Euchlidean Geometry and develop algebraic strategies with matrices.

SM: Conics & Complex Numbers – Option
Students extend their knowledge of and their techniques for graphing functions, and apply coordinate geometry and number theory to the study of conic sections. In the second part of the unit, complex numbers and their basic operations with applications to algebraic and geometric problems are defined.

SM; Further Trigonometry and Vectors – Option
In this unit students extend their knowledge of trigonometric relationships and solve trigonometric equations. In vectors, students learn how vector operations simplify the analysis of problems in dynamics and geometry.

SM: Further calculus and Networks – Option
Students extend their knowledge of calculus by studying inverse circular functions and the analytical techniques of integration. In the second part of the unit they develop an understanding of the methodology of graph theory and its application to real life problems.

COURSE PATTERNS

- Major: three semester units and at least one half semester unit of sequential core units.
- Minor: two semester units of the year 11 core units.
- Major-minor: 3.5 or 4 sequential core units to form the major and at least two option units.
- Double major: 3.5 to 4 sequential core units to form the major and at least 3.5 option units

where the combined total of all units is at least 7 semester units.

Specialist Mathematics (T)

Experience by the end of Year 10	Year 11 Semester 1	Later Units
Level 1 Grade : A or B	For Major: SM: Numbers, Patterns & Relations - Core	SM: Trigonometry & Derivatives - Core
	For Major Minor or Double Major: SM: Numbers, Patterns & Relations - Core **and** SM: Reasoning, Geometry & Matrices - Option	SM: Trigonometry & Derivatives - Core **and** SM: Conics & Complex Numbers - Option

Mathematical Methods (T)

The course Mathematical Methods (MM) can only be taken as a Major or a Minor. It is expected that students will have demonstrated a high level of aptitude and achievement in high school mathematics studies. It will prepare students who need a one year service unit in Mathematics at university and whose academic interests are in areas such as Economics, Psychology, Biology, Geography or Information Technology.

LIST OF UNITS

MM: Numbers, Patterns, Relations & Functions

This first unit is very similar to the first unit in Mathematical Applications, however, a significant amount of algebra revision is included. Students study sequences and series with applications leading to annuities. The unit also involves the development of matrix operations to solve problems. The second half of the unit covers further develpment of mathematical models using linear functions and provides an opportunity for students to investigate a wide range of functions and relations. This unit is available as two half units MM: Numbers & Patterns and MM: Relations & Functions.

MM: Introductory & Differential Calculus

The unit involves further development of functions including polynomials and trionometry. Students also study limits leading to differentiation of polynomials with applications including graphing.

MM: Integral Calculus & Special Functions

This unit is further study of calculus extending differentiation to trigonometric, exponential and logarithmic functions and completes the formal study of calculus in the Mathematical Methods course with the topic integration. Students revise earlier concepts on anti differentiation and then move to study areas enclosed by functions and volumes of solids of revolution with further applications.

MM: Probability, Statistics & Applications

Students are introduced to the mathematics of statistical analysis and builds clear links with probability theory which underlies social and commercial decision making. It provides students with the opportunity to extend their knowledge to probability distributions and further matrices. It is also available as two half units MM: Probability & Statistics and MM:Further Applications.

COURSE PATTERNS

- Major: Three semester units and at least one half semester unit of study are required.
- Minor: Two semester units of study.
- The units in this course should be completed sequentially.
- Completion of MA: Matrices, Sequences, Series & Mensuration or MM: Numbers, Patterns, Relations & Functions or SM: Numbers, Patterns & Relations (but not any two).
- A minor in Mathematical Methods (T) can be made up from: MM: Numbers, Patterns, Relations & Functions or MA: Matrices, Sequences, Series & Mensuration (but not both).

Mathematical Methods (T) is available as a Major or Minor (only as an individual course).

Experience by the end of Year 10	Year 11 Semester 1	Later Units
Level 1 Grade: A, B or C	MM: Numbers, Patterns, Relations & Functions	MM: Introductory & Differential Calculus plus other units as above

Mathematical Applications (T)

The course Mathematical Applications (MA) can only be taken as a Major or Minor. It is expected that students will have demonstrated an interest in high school mathematics and a moderate to high level of achievement. This course is suitable for students who intend to undertake tertiary study in areas where mathematics plays a supportive role. The course emphasises the use of quantitative techniques, including the exploration and analysis of mathematical and statistical modelling.

LIST OF UNITS

MA: Matrices, Sequences, Series & Mensuration

The first part of this unit is very similar in content to the first part of MM: Numbers, Patterns, Relations & Functions but with a more practical approach. The unit enables students to generate terms of a sequence; study matrix operations; use matrices to solve problems. It also gives an opportunity for students to experience practical situations where an understanding of techniques of measurement and calculations are used. It will also introduce or extend the content to the study of trigonometry including Pythagoras' Theorem. The emphasis will be on real life examples. This unit is available as two half units MA: Matrices, Sequences & Series and MA: Mensuration .

MA: Modelling, Matrices & Networks

The first part of this unit presents to students realistic and applicable problems that involve linear equations and inequations. The second half of the unit aims to make students aware of some techniques of modelling and their application to real life situations as it applies to matrices and networks.

MA:Financial Modelling & Trigonometry

This unit will enable students to make sensible decisions by using linear and exponential models to explore common forms of investment and expenditure. It includes financial calculations such as returns on investments and loans, depreciation and hire purchase repayments. It will also extend the content of applying trigonometric procedures to such topics as surveying, navigation and orienteering.

MA: Statistics & Probability

In the first half of this unit, students should develop an understanding of data analysis as an important tool in our society. Statistical and other numerical methods are also studied. Students should be able to critically interpret and analyse statistical claims presented to them by the media. The probability section should enable students to use mathematics to analyse random events, to introduce concepts that will prove useful in further studies of probability. This unit is available as two half units MA: Statistics and MA: Probability

COURSE PATTERNS

- Mathematical Applications (T) can only be studied as a major or a minor.
- A course in Mathematical Applications (T) can include MM: Numbers, Patterns, Relations & Functions

Mathematical Applications (T) is available as a Major or Minor only

Experience by the end of Year 10	Year 11 Semester 1	Later Units
Level 1 Grade: A, B or C Level 2 Grade: A, B	MA: Matrices, Sequences, Series & Mensuration	MA: Modelling, Matrices & Network and other units as above

General Mathematics (A)

This course is intended for students who wish to study mathematics in a more practical way. It is suitable preparation for entry to the workforce and for many apprenticeships. It offers a range of topics which enable students to examine situations in practical, social and physical contexts. All semester units are available as half units.

LIST OF UNITS

GM: Food, Hospitals, Earning & Travel

In this unit students learn to calculate and interpret graphs and statistics associated with topics such as food, hospitals and travel. For the second part of the unit, students study a wide range of ways in which money is earned and managed.

GM: Travel, Statistics & Trigonometry

During this unit, students learn to interpret and display statistical data by studying topics such as planning a holiday, and other real world situations. Students also study the fundamentals of trigonometry with a practical emphasis.

GM: Cars, Chance, Moving Out & Finance

During this unit students study costs and risks associated with borrowing money, running a car and living away from home.They also will conduct experiments to discover the properties of probability and be able to interpret their results.

GM: Travel, Property and Applicable Maths

In this unit students study topics which deal with exploring environmental issues mathematically, developing skills in Earth Geometry, calculating the costs in starting a Business and being able to read maps associated with Land and Coastal Navigation.

General Mathematics (A) is available as a Major or Minor only.

Experience by the end of Year 10	Year 11 Semester 1	Later Units
Level 2 or Level 3	GM: Food, Hospitals, Earning & Travel	GM: Travel, Statistics & Trigonometry