Foundation Maths

Year 11 - Units 1 & 2:
Foundation Mathematics provides for the continuing mathematical development of students entering VCE, who need mathematical skills to support their other VCE subjects, including VET studies, and who do not intend to undertake Unit 3 and 4 studies in VCE Mathematics in the following year. Provision of this course is intended to complement General Mathematics and Mathematical Methods (CAS). It is specifically designed for those students who are not provided for in these two courses. Students completing this course would need to undertake further mathematical study in order to attempt Further Mathematics Units 3 and 4.
In Foundation Mathematics there is a strong emphasis on using mathematics in practical contexts relating to everyday life, recreation, work and study. Students are encouraged to use appropriate technology in all areas of their study. These units will be especially useful for students undertaking VET studies.
The areas of study for Units 1 and 2 of Foundation Mathematics are ‘Space, shape and design’, ‘Patterns and number’, ‘Handling data’ and ‘Measurement’.
At the end of Unit 1, students will be expected to have covered material equivalent to two areas of study. All areas of study will be completed over the two units. Unit 2 can be used to complement Unit 1 in development of the course material.

General Mathematics

Year 11 - Units 1 & 2
General Mathematics provides courses of study for a broad range of students and may be implemented in a number of ways. Some students will not study Mathematics beyond Units 1 and 2, while others will intend to study Further Mathematics Units 3 and 4. The areas of study for Unit 1 and Unit 2 of General Mathematics are ‘Arithmetic’, ‘Data analysis and simulation’, ‘Algebra’, ‘Graphs of linear and non-linear relations’, ‘Decision and business mathematics’ and ‘Geometry and trigonometry’.
Units 1 and 2 are to be constructed to suit the range of students entering the study by selecting material from the six areas of study using the following rules:
• for each unit, material covers four or more topics selected from at least three different areas of study;
• courses intended to provide preparation for study at the Units 3 and 4 level should include selection of material from areas of study which provide a suitable background for these studies;
• selected material from an area of study provide a clear progression in key knowledge and key skills from Unit 1 to Unit 2.
The appropriate use of technology to support and develop the teaching and learning of mathematics is to be incorporated throughout the course. This will include the use of some of the following technologies for various areas of study or topics: graphics calculators, spreadsheets, graphing packages, dynamic geometry systems, statistical analysis systems, and computer algebra systems.
Mathematical Methods CAS

Year 11 - Unit 1:
Mathematical Methods (CAS) Units 1 and 2 are designed as preparation for Mathematical Methods (CAS) Units 3 and 4. The areas of study for Unit 1 are ‘Functions and graphs’, ‘Algebra’, ‘Rates of change and calculus’ and ‘Probability’. At the end of Unit 1, students will be expected to have covered the material outlined in each area of study given below, with the exception of ‘Algebra’ which should be seen as extending across Units 1 and 2. This material should be presented so that there is a balanced and progressive development of skills and knowledge from each of the four areas of study with connections among and across the areas of study being developed consistently throughout both Units 1 and 2.

Students are expected to be able to apply techniques, routines and processes involving rational and real arithmetic, algebraic manipulation, equation solving, graph sketching, differentiation and integration with and without the use of technology, as applicable. Students should be familiar with relevant mental and by hand approaches in simple cases.

The appropriate use of computer algebra system (CAS) technology to support and develop the teaching and learning of mathematics, and in related assessments, is to be incorporated throughout the unit.

Unit 2:
The areas of study for Unit 2 are ‘Functions and graphs’, ‘Algebra’, ‘Rates of change and calculus’, and ‘Probability’. At the end of Unit 2, students will be expected to have covered the material outlined in each area of study. Material from the ‘Functions and graphs’, ‘Algebra’, ‘Rates of change and calculus’, and ‘Probability’ areas of study should be organized so that there is a clear progression of skills and knowledge from Unit 1 to Unit 2 in each area of study. Students are expected to be able to apply techniques, routines and processes involving rational and real arithmetic, algebraic manipulation, equation solving, graph sketching, differentiation and integration with and without the use of technology, as applicable. Students should be familiar with relevant mental and by hand approaches in simple cases.

The appropriate use of computer algebra system (CAS) technology to support and develop the teaching and learning of mathematics, and in related assessments, is to be incorporated throughout the unit.

General Mathematics Tertiary

Year 11 - Units 1 & 2
General Maths Tertiary is a course designed to be completed in conjunction with Mathematical Methods CAS with many of the concepts covered in the latter seen as assumed knowledge. It is specifically designed to prepare students for entry into Specialist Maths units ¾. Unit 1 involves the study of selected material from the areas of study: algebra, number systems, variation, circular functions, sequences and series, functions and their graphs. Unit 2 involves studies of the concepts covered in trigonometric proofs, kinematics, statics of a particle, calculus, vectors and complex numbers. Students practise mathematical algorithms, routines and techniques and use them to solve standard problems; apply mathematical knowledge and skills in unfamiliar situations which require investigative, modelling or problem-solving approaches and use technology appropriately and effectively to learn mathematics and apply it in different contexts.
Mathematical Methods CAS

Year 12 - Unit 3/4:
Mathematical Methods (CAS) Units 3 and 4 consists of the following areas of study: ‘Functions and graphs’, ‘Calculus’, ‘Algebra’ and ‘Probability’, which must be covered in progression from Unit 3 to Unit 4, with an appropriate selection of content for each of Unit 3 and Unit 4. Assumed knowledge and skills for Mathematical Methods (CAS) Units 3 and 4 are contained in Mathematical Methods Units (CAS) Units 1 and 2, and will be drawn on, as applicable in the development of related content from the areas of study, and key knowledge and skills for the outcomes of Mathematical Methods (CAS) Units 3 and 4.
In Unit 3, a study of Mathematical Methods (CAS) would typically include a selection of content from the areas of study ‘Functions and graphs’, ‘Algebra’ and applications of derivatives and differentiation, and identifying and analyzing key features of the functions and their graphs from the ‘Calculus’ area of study. In Unit 4, this selection would typically consist of remaining content from the areas of study: ‘Functions and graphs’, ‘Calculus’, ‘Algebra’ and the study of random variables and discrete and continuous probability distributions and their applications. For Unit 4, the content from the ‘Calculus’ area of study would be likely to include the treatment of anti-differentiation, integration, the relation between integration and the area of regions specified by lines or curves described by the rules of functions, and simple applications of this content.
Students are expected to be able to apply techniques, routines and processes involving rational and real arithmetic, algebraic manipulation, equation solving, graph sketching, differentiation and integration with and without the use of technology, as applicable. Students should be familiar with relevant mental and by hand approaches in simple cases.
The appropriate use of computer algebra system technology (CAS) to support and develop the teaching and learning of mathematics, and in related assessments, is to be incorporated throughout the course.

Specialist Mathematics

Year 12 - Unit 3/4
Specialist Mathematics consists of the following areas of study: ‘Functions, relations and graphs’ ‘Algebra’, ‘Calculus’, ‘Vectors’ and ‘Mechanics’. The development of course content should highlight mathematical structure and proof. All of this material must be covered in progression from Unit 3 to Unit 4, with an appropriate selection of content for each of Unit 3 and Unit 4. The selection of materials for Unit 3 and Unit 4 should be constructed so that there is a balanced and progressive development of knowledge and skills with connections among the areas of study being developed as appropriate across Unit 3 and Unit 4. Specialist Mathematics Units 3 and 4 assumes concurrent or previous study of Mathematical Methods (CAS) Units 3 and 4. They contain assumed knowledge and skills for Specialist Mathematics, which will be drawn on as applicable in the development of content from the areas of study and key knowledge and skills for the outcomes.
In Unit 3 a study of Specialist Mathematics would typically include content from ‘Functions, relations and graphs’ and a selection of material from the ‘Algebra’, ‘Calculus’ and ‘Vectors’ areas of study. In Unit 4 this selection would typically consist of the remaining content from the
‘Algebra’, ‘Calculus’, and ‘Vectors’ areas of study and the content from the ‘Mechanics’ area of study. Students are expected to be able to apply techniques, routines and processes, involving rational, real and complex arithmetic, algebraic manipulation, diagrams and geometric constructions, solving equations, graph sketching, differentiation and integration related to the areas of study, as applicable, both with and without the use of technology. The appropriate use of technology to support and develop the teaching and learning of mathematics is to be incorporated throughout the units.

Familiarity with those concepts covered in General Maths Tertiary Units 1 & 2 is assumed and students seeking to attempt Specialist Mathematics without the required grounding are required to consult with the relevant teachers.

Assessment: Each Unit in VCE mathematics consists of three Outcomes that students need to satisfactorily complete in order to gain an S for each Unit of the subject. These Outcomes can be of the form of Analysis Tasks, Tests and a Long Application Task. Unit 1 & 2 subjects will have assessments, which are designed to complement the successive unit 3/4 assessment tasks.

Each task will have effective use of the CAS enabled technology as one of the outcomes.

Suggested Pre-requisites: There are no prerequisites for entry to Foundation Mathematics Units 1 and 2, General Mathematics Units 1 and 2 or Mathematical Methods (CAS) Units 1 and 2. However, students attempting Mathematical Methods (CAS) are expected to have a sound background in number, algebra, function, and probability. Some additional preparatory work will be advisable for any student who is undertaking Mathematical Methods (CAS) Unit 2 without completing Mathematical Methods (CAS) Unit 1.

Units 3 and 4 of a study are designed to be taken as a sequence. Students must undertake Unit 3 of a study before entering Unit 4 of that study.

Enrolment in Specialist Mathematics Units 3 and 4 assumes a current enrolment in, or previous completion of, Mathematical Methods (CAS) Units 3 and 4.

Units 1 to 4 are designed to a standard equivalent to the final two years of secondary education. All VCE studies are benchmarked against comparable national and international curriculum.