SPECIALIST MATHEMATICS

WHAT TYPE OF SUBJECT IS SPECIALIST MATHEMATICS?

Specialist Mathematics is a General subject that contributes to an Australian Tertiary Admission Rank (ATAR) calculation and to the attainment of a Queensland Certificate of Education (QCE).

WHAT IS SPECIALIST MATHEMATICS?

Specialist Mathematics is designed to be taken in conjunction with Mathematical Methods because the work covered in Mathematical Methods will be required and used in Specialist Mathematics. Functions and calculus are essential for developing an understanding of the physical world. This subject will prepare students for understanding their physical world by developing the ability to formulate and use effective models, use statistical analysis to discuss given and collected data, reach reasonable conclusions and solve complex and abstract mathematical problems using various analytical and technological tools.

WHERE DOES THE STUDY OF SPECIALIST MATHEMATICS LEAD?

A course of study in Specialist Mathematics can establish a basis for further education and employment in fields such as science, all branches of mathematics and statistics, computer science, medicine, engineering, finance and economics.

WHAT IS THE PREREQUISITE KNOWLEDGE FOR SPECIALIST MATHEMATICS IN YEAR 11?

Students are required to achieve an overall grade of at least a B in Year 10 Mathematics to be eligible to select Mathematical Methods in senior schooling. The following is a list of some prerequisite knowledge that must be learnt or revised and maintained from Year 10 Mathematics as required:

- Factorising expanding and simplifying algebraic expressions including quadratic expressions using a variety of strategies
- Applying the four operations to simple algebraic fractions
- Substituting values into formulas to determine an unknown
- Solving problems involving linear equations including those derived from formulas and those that involve simple algebraic fractions
- The equation of a line in the form y=mx+c
- Parallel and perpendicular lines
- Exploring the connection between algebraic and graphical representations of relations such as simple quadratics, circles and exponentials using digital technology as appropriate
- Solving quadratic equations using a range of strategies
- Solving linear simultaneous equations using a range of strategies

- Solving linear inequalities and graphing their solutions on a number line
- Solving right-angled triangle problems using trigonometric skills
- Describing the results of two and three-step chance experiments to determine probabilities of events and investigating the concept of independence and conditional probability
- Obtaining simple statistics from discrete and continuous data, including mean, median, mode, quartiles, range and interquartile range
- Using scatterplots to investigate and comment on relationships between two numerical variables where the independent variable is time.

WHAT DO I STUDY?

The major domains of mathematical knowledge in Specialist Mathematics are Vectors and matrices, Real and complex numbers, Trigonometry, Statistics, and Calculus. Topics are developed systematically, with increasing levels of sophistication, complexity and connection, building on functions, calculus and statistics from Mathematical Methods, while vectors, complex numbers and matrices are introduced. The topics of study are organised into units and students will study at least one full unit each semester, as set out below:

Unit 1: Combinatorics, Vectors in the Plane, Introduction to Proof

Unit 2: Complex Numbers, Trigonometry & Functions, Matrices

Unit 3: Proof by Mathematical Induction, Vectors & Matrices, Complex Numbers

Unit 4: Integration & Applications of Integration, Rates of Change & Differential Equations, Statistical Inference

HOW AM I ASSESSED?

In Year 11, all assessment is formative. However, the assessment in Units 1 and 2 models that which the students will encounter in Units 3 and 4. In Units 1 and 2, each assessment's mark contributes to the overall grade in the subject (A to E) and the ATAR calculation. Tests will comprise short response questions that are simple familiar, complex familiar and complex unfamiliar in nature. Problem-solving and modelling tasks will be based on answering an inquiry question in which students will formulate, solve, evaluate and communicate their response, showcasing their knowledge of mathematical concepts. A mark will be given in each assessment and weighted according to Queensland Curriculum and Assessment Authority (QCAA) guidelines.

The formative internal assessment for Units 1 and 2 comprise:

- A problem-solving and modelling task (20% weighting, Unit 1)
- An internal examination (15% weighting, Unit 1)
- An internal examination (15% weighting, Unit 2)

- Two internal examinations that will mimic the external examinations; Paper 1: technology free (25% weighting) and Paper 2: technology active – (25% weighting) which requires a TI- Nspire CX II (non-CAS) graphics calculator). Both papers will examine content from Units 1 and 2.

The summative internal and external assessment for Units 3 and 4 comprise:

- A problem-solving and modelling task (20% weighting, Unit 3)
- An internal examination (15% weighting, Unit 3)
- An internal examination (15% weighting, Unit 4)
- Two external examinations (Paper 1: technology free - 25% weighting and Paper 2: technology active - 25% weighting which requires a TI- Nspire CX II (non-CAS) graphics calculator). Both papers will examine content from Units 3 and 4.

WHAT IS THE LEVEL OF TECHNOLOGY REQUIRED IN THIS SUBJECT?

Students will require a TI-Nspire CX II (non-CAS) graphics calculator for their unit examinations and for the technology active examinations. They also require TI-Nspire CX software on their computers.