Specialist Mathematics 2019 v1.2

General Senior Syllabus

MERIDAN STATE COLLEGE - MAS (possible 4 QCE credits)

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www.qcaa.qld.edu.au.senior/senior-subjects

1 Course overview

1.1 Introduction

1.1.1 Rationale

Mathematics is a unique and powerful intellectual discipline that is used to investigate patterns, order, generality and uncertainty. It is a way of thinking in which problems are explored and solved through observation, reflection and logical reasoning. It uses a concise system of communication, with written, symbolic, spoken and visual components. Mathematics is creative, requires initiative and promotes curiosity in an increasingly complex and data-driven world. It is the foundation of all quantitative disciplines.

To prepare students with the knowledge, skills and confidence to participate effectively in the community and the economy requires the development of skills that reflect the demands of the 21st century. Students undertaking Mathematics will develop their critical and creative thinking, oral and written communication, information & communication technologies (ICT) capability, ability to collaborate, and sense of personal and social responsibility — ultimately becoming lifelong learners who demonstrate initiative when facing a challenge. The use of technology to make connections between mathematical theory, practice and application has a positive effect on the development of conceptual understanding and student disposition towards mathematics.

Mathematics teaching and learning practices range from practising essential mathematical routines to develop procedural fluency, through to investigating scenarios, modelling the real world, solving problems and explaining reasoning. When students achieve procedural fluency, they carry out procedures flexibly, accurately and efficiently. When factual knowledge and concepts come to mind readily, students are able to make more complex use of knowledge to successfully formulate, represent and solve mathematical problems. Problem-solving helps to develop an ability to transfer mathematical skills and ideas between different contexts. This assists students to make connections between related concepts and adapt what they already know to new and unfamiliar situations. With appropriate effort and experience, through discussion, collaboration and reflection of ideas, students should develop confidence and experience success in their use of mathematics.

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, statistics from Mathematical Methods, while vectors, complex numbers and matrices are introduced. Functions and calculus are essential for creating models of the physical world. Statistics are used to describe and analyse phenomena involving probability, uncertainty and variation. Matrices, complex numbers and vectors are essential tools for explaining abstract or complex relationships that occur in scientific and technological endeavours.

Students who undertake Specialist Mathematics will develop confidence in their mathematical knowledge and ability, and gain a positive view of themselves as mathematics learners. They will gain an appreciation of the true nature of mathematics, its beauty and its power.

Assumed knowledge, prior learning or experience

Specialist Mathematics is designed to be taken in conjunction with, or on completion of, Mathematical Methods. It is assumed that work covered in Mathematical Methods will be known before it is required in Specialist Mathematics.

Assumed knowledge refers to the subject matter that teachers can expect students to know prior to beginning this subject. Emphasis is placed on the mastery of content, ensuring key concepts or procedures are learnt fully so they will not need reteaching.

Developing mastery often involves multiple approaches to teaching and conceptualising the same mathematical concept. When students have a good understanding of a key concept or procedure, they are more easily able to make connections to related new subject matter and apply what they already know to new problems.

Subject matter from previous unit/s is assumed for subsequent unit/s.

The following is a non-exhaustive list of assumed knowledge from the P–10 Australian Curriculum that must be learnt or revised and maintained as required:

- describe the results of two- and three-step chance experiments
- determine probabilities of events
- substitute values into formulas to determine an unknown
- solve right-angled triangle problems
- describe, interpret and sketch hyperbolas and circles
- translate word problems to mathematical form
- factorise, expand and simplify algebraic expressions, including monic quadratic expressions using a variety of strategies
- apply the four operations to simple algebraic fractions with numerical denominators.

Recommended knowledge

Recommended knowledge refers to the subject matter from the Year 10A Australian Curriculum that will enhance students' understanding of this subject's foundational content.

The following in a non-exhaustive list of recommended knowledge from the Year 10A Australian Curriculum:

- rational and irrational numbers
- properties of circles
- trigonometry
- sketching functions
- factor and remainder theorem.

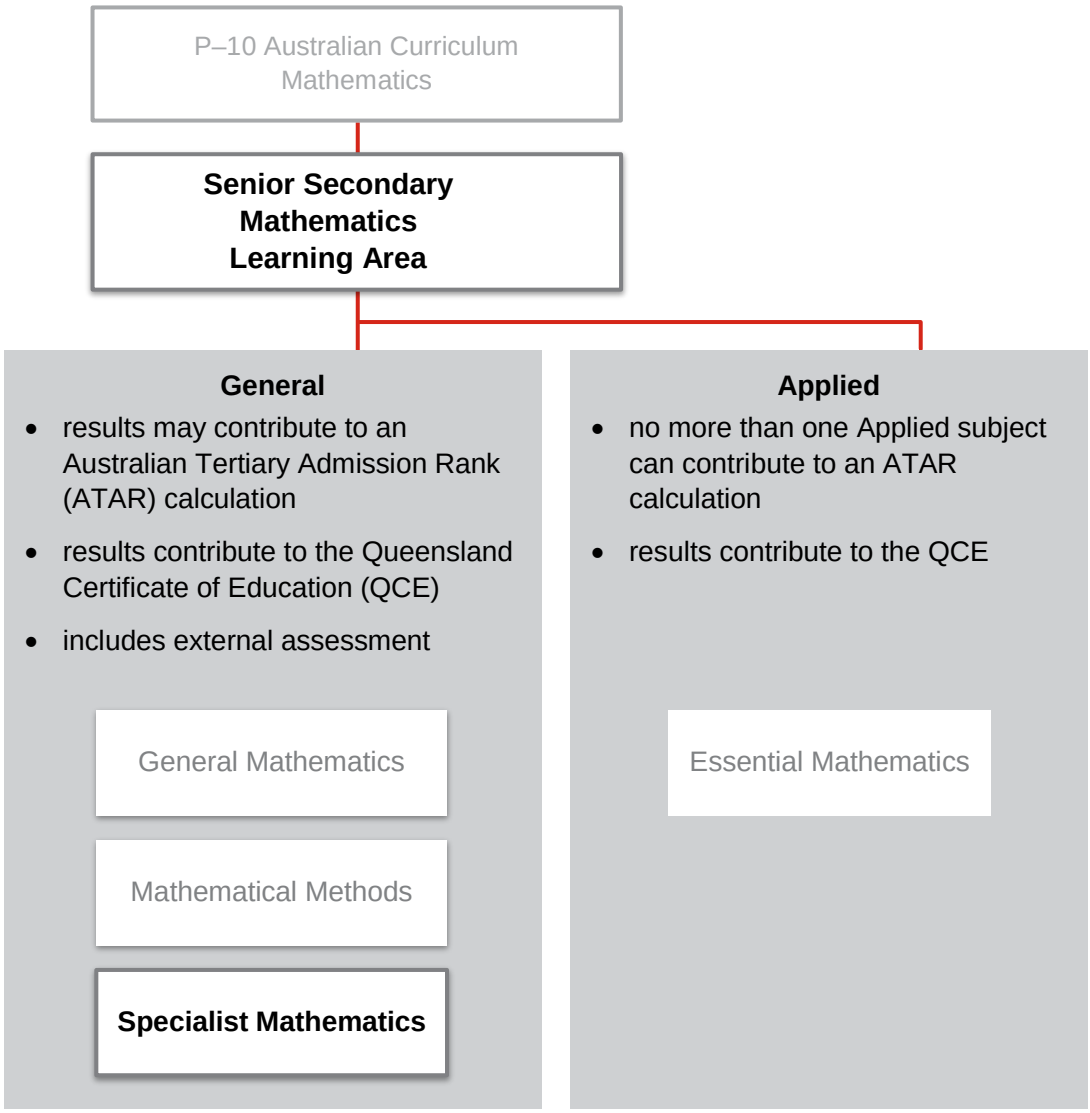
Pathways

Specialist Mathematics is a General subject suited to students who are interested in pathways beyond school that lead to tertiary studies, vocational education or work. A course of study in Specialist Mathematics can establish a basis for further education and employment in the fields of science, all branches of mathematics and statistics, computer science, medicine, engineering, finance and economics.

1.1.2 Learning area structure

All learning areas build on the P–10 Australian Curriculum.

Figure 1: Learning area structure



Specialist Mathematics is to be undertaken in conjunction with, or on completion of, Mathematical Methods.

1.1.3 Course structure

Specialist Mathematics is a course of study consisting of four units. Subject matter, learning experiences and assessment increase in complexity from Units 1 and 2 to Units 3 and 4 as students develop greater independence as learners.

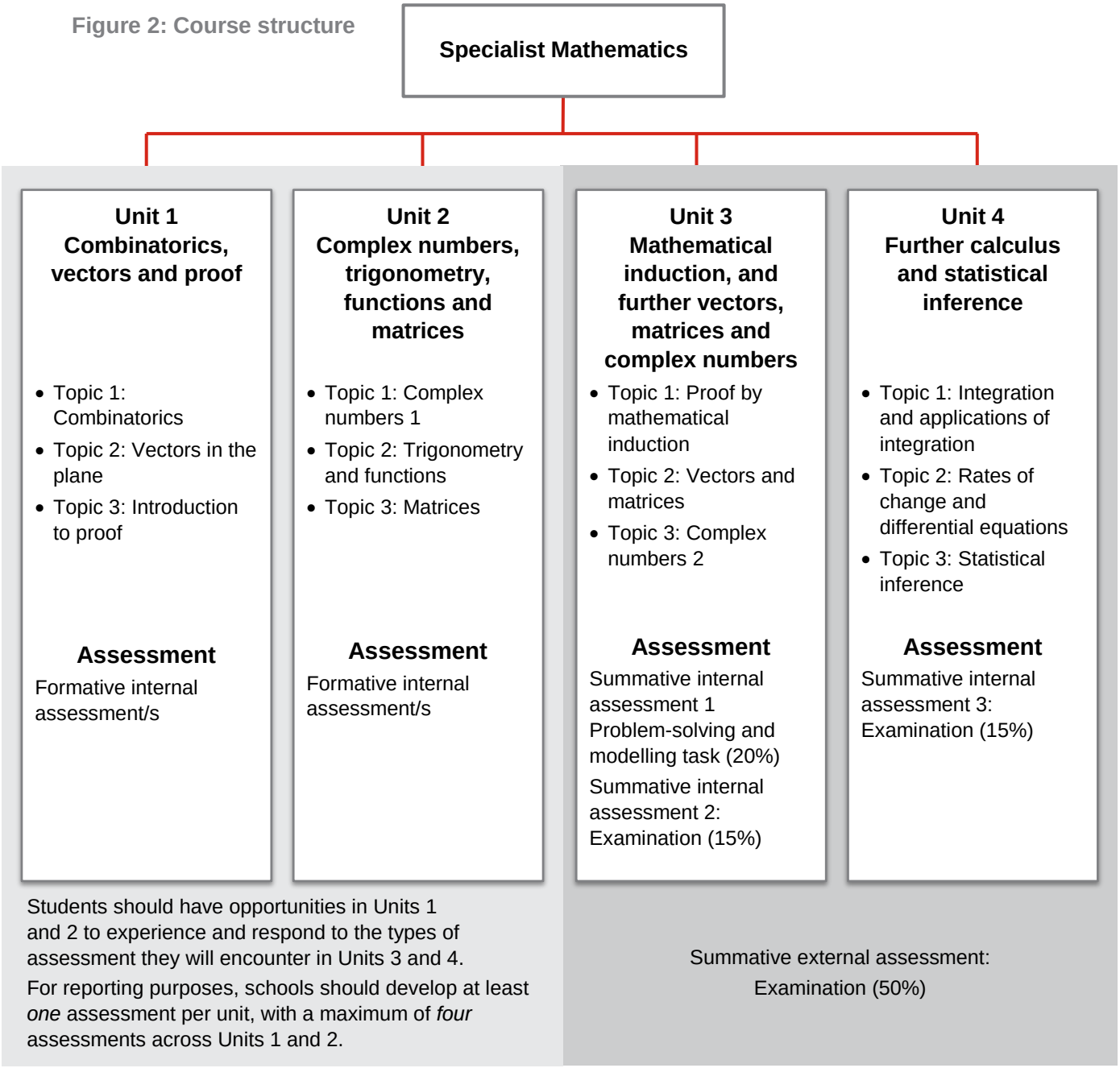
Units 1 and 2 provide foundational learning, which allows students to experience all syllabus objectives and begin engaging with the course subject matter. Students should complete Units 1 and 2 before beginning Unit 3. It is recommended that Unit 3 be completed before Unit 4.

Units 3 and 4 consolidate student learning. Only the results from Units 3 and 4 will contribute to ATAR calculations.

Figure 2 outlines the structure of this course of study.

Each unit has been developed with a notional time of 55 hours of teaching and learning, including assessment.

Figure 2: Course structure



Additional Requirements

Study Requirements	Special Requirements
Being a General subject a significant commitment of time and energy to complete the course successfully is required. This includes: • Three lesson per week face to face teaching • Regular study at least 3 times each week for a minimum of 1 hour per session, possibly in study groups • Significant increase in work load when preparing for assessments.	• A Graphics calculator (TI-84 Plus CE), 30cm ruler