

## MATHEMATICS

All students at North Sydney Girls High School study the *Mathematics Stage 5.3* course in Year 10. This course forms a suitable foundation upon which to build the Stage 6 Calculus courses: *Mathematics Advanced Year 11* and *Mathematics Extension 1 Year 11*, followed by the corresponding HSC courses *Mathematics Advanced Year 12*, *Mathematics Extension 1 Year 12* and *Mathematics Extension 2 Year 12*.

The *Mathematics Advanced*, *Mathematics Extension 1* and *Mathematics Extension 2* courses form a continuum, to provide opportunities at progressively higher levels, for students to acquire knowledge, skills and understanding in relation to concepts within the area of mathematics that have applications in an increasing number of contexts.

### **MATHEMATICS ADVANCED YEAR 11 and MATHEMATICS ADVANCED YEAR 12**

The *Mathematics Advanced* course is a calculus based course focused on enabling students to appreciate that mathematics is a unique and powerful way of viewing the world to investigate order, relation, pattern, uncertainty and generality. The course provides students with the opportunity to develop ways of thinking in which problems are explored through observation, mathematical modelling, reflection and reasoning.

The *Mathematics Advanced* course provides a basis for further studies in disciplines in which mathematics and the skills that constitute thinking mathematically have an important role. It provides an appropriate mathematical background for those students whose future pathways may involve mathematics and its applications in a range of disciplines at the tertiary level.

The Mathematics Advanced Year 11 course content is comprised of five Topics: Functions, Trigonometric Functions, Calculus, Exponential and Logarithmic Functions and Statistical Analysis. The Mathematics Advanced Year 12 course content includes four of the same Topics and the Topic of Financial Mathematics in place of Exponential and Logarithmic Functions.

Both the Year 11 and Year 12 courses have a 2 unit value and students studying these courses undertake a program of study which includes approximately 7 hours of mathematics teaching over each two week period. In the final HSC examination, students undertaking the Advanced course complete a 3 hour examination paper which is worth 100 marks.

### **MATHEMATICS EXTENSION 1 YEAR 11 and MATHEMATICS EXTENSION 1 YEAR 12**

The *Mathematics Extension 1* course is focused on enabling students to develop a thorough understanding of and competence in further aspects of mathematics. It provides students with opportunities to develop rigorous mathematical arguments and proofs, and to use mathematical models more extensively. Students of *Mathematics Extension 1* will be able to develop an appreciation of the interconnected nature of mathematics, its beauty and its functionality.

*Mathematics Extension 1* provides a basis for progression to further study in mathematics or related disciplines in which mathematics has a vital role at a tertiary level. An understanding and exploration of *Mathematics Extension 1* is also advantageous for further studies in such areas as science, engineering, finance and economics.

The Mathematics Extension 1 Year 11 course content is comprised of four Topics: Functions, Trigonometric Functions, Calculus and Combinatorics. The Mathematics Extension 1 Year 12 course content includes the Topics Trigonometric Functions and Calculus continued from the Year 11 Extension 1 course and introduces three new Topics: Proof, Vectors and Statistical Analysis.

These courses have a 3 unit value, and include the whole of the *Mathematics Advanced Year 11* and *Mathematics Advanced Year 12* courses and include additional extension topics. Students studying these courses undertake a program of study which includes approximately 11 hours of mathematics teaching over each two week period and complete the common 3 hour *Mathematics Advanced* examination paper which is worth 100 marks, and a 2 hour *Mathematics Extension 1* examination paper for a result out of 50 marks. Their combined work in both Mathematics courses could contribute a total mark value of 150 to their HSC results.

## **MATHEMATICS EXTENSION 2**

The *Mathematics Extension 2* course includes the *Mathematics Extension 1* and *Mathematics Advanced* courses. It provides students with the opportunity to develop strong mathematical manipulative skills and a deep understanding of the fundamental ideas of algebra and calculus, as well as an appreciation of mathematics as an activity with its own intrinsic value, involving invention, intuition and exploration.

*Mathematics Extension 2* provides a basis for a wide range of useful applications of mathematics as well as a strong foundation for further study of the subject. It provides an appropriate mathematical background for students whose future pathways will be founded in mathematics and its applications in such areas as science, engineering, finance and economics.

The Mathematics Extension 2 course is comprised of five Topics: Proof, Vectors, Complex Numbers, Calculus and Mechanics.

This course has a 4 unit value and is offered in Year 12 only. It comprises the whole of the *Mathematics Advanced* and *Mathematics Extension 1* courses (which includes the *Year 11* and *Year 12* course work) together with additional *Extension 2* topics listed above. Students studying this course undertake a program of study which includes approximately 15 hours of mathematics teaching over each two week period and complete the common 2 hour *Mathematics Extension 1* examination paper for a result out of 100 marks and a 3 hour *Mathematics Extension 2* examination paper worth 100 marks. Their combined course work in Mathematics could contribute a total mark value of 200 to their HSC results.

### **Choosing a suitable level of Mathematics**

Mathematics is not a compulsory subject in Stage 6. All levels of Mathematics require students to commit a significant amount of individual time to the practice and review of the ideas and techniques explored in lessons. For every hour spent in lessons, students should do at least 45 minutes of homework. This time increases markedly according to the level of Mathematics studied.

It is strongly advised that students choose an appropriate level of Mathematics from the beginning of Year 11. The *Mathematics Advanced* and *Mathematics Extension 1* courses are taught concurrently and there is no advantage in electing to do the *Mathematics Extension 1 Year 11* course and then relinquishing it in Year 12. Students should choose the level of study best suited to both their interest and ability, at the commencement of Year 11, so that they can consolidate their learning and achieve a personal best in the Mathematics course they undertake. At the start of Year 12, students who have studied *Mathematics Extension 1* in Year 11 can elect to study *Mathematics Extension 2* in Year 12. It is recommended that students of outstanding mathematical ability should consider undertaking this course. Students are encouraged to seek advice from their mathematics teacher about the level of mathematics best suited to their ability and interests.