

## Mathematics

At Inaburra, Year 11 students are required to complete any two units of Mathematics: **Numeracy, Mathematics Standard or Mathematics Advanced**. Students electing to complete Mathematics Advanced in Year 11 may also choose to study **Mathematics Extension 1**.

Mathematics Extension students can continue with HSC Mathematics Extension 1 in Year 12. They may also choose to undertake HSC Mathematics Extension 2. The Mathematics Extension 2 Year 12 course assumes that students are concurrently studying the Mathematics Advanced Year 12 course and the Mathematics Extension 1 Year 12 course.

### Choosing a Course

Students are advised to discuss their academic progress with their Year 10 Mathematics teacher and/or the Learning Leader Mathematics before making their course selection.

Who should do the **Mathematics Extension 1** course?

- This course is suitable for students who have demonstrated extensive knowledge and understanding of the Stage 5.3 Outcomes in Stream A in Years 9 and 10; who are keen, independent workers with a love of mathematics, and who are able problem solvers having demonstrated perseverance in their mathematical work.
- This course requires a consistent, mature approach to study; and the ability to learn at a fast pace.
- Only those students who have *already* achieved to a very high level in Stream A, from class 10A1 should attempt this level.

Who should do the **Mathematics Advanced** course?

- In order to enter Mathematics Advanced it is expected that students have *already* demonstrated excellence in algebra in their Stage 5.2/5.3 course work in Stream 10A i.e. class 10A1 and some from classes 10A2 and 10A3.
- This course is suitable for students who are keen, independent workers with a love of mathematics.

Who should do the **Mathematics Standard** course?

- Students from any class in Year 10, Stream A or B, who want to follow an interesting and broad area of study in mathematics,
- Students who can work steadily and benefit from a course of mathematics that uses relevant and everyday examples,
- Students who want to study a level of mathematics that is conceptually less difficult than the calculus-based courses,
- Students who do not require, nor desire to study a higher level of mathematics.

Who should do the **Numeracy** course?

- The Numeracy course is ideal for those students who want mathematics units to contribute to their HSC but not to their ATAR.
- The Numeracy course gives students who are not studying Mathematics Advanced or Mathematics Standard an opportunity to continue developing their numeracy skills.
- Entry to the Numeracy course is decided in discussion between students, parents and the Learning Leader Mathematics.

## Numeracy

A new Numeracy course has been developed by NESA for students who would benefit from further opportunities to develop essential numeracy skills required for everyday life, including work, learning, community engagement and personal contexts. This course aims to develop their ability to apply mathematical skills through practical and relevant experiences. It will also support students with the numeracy demands of their other subjects. This course is not externally examined.

## Year 11 Mathematics Standard

Mathematics Standard is a **non-calculus-based course** designed to promote the development of skills, knowledge and understanding in areas of mathematics that have direct application to the broad range of human activity.

The Mathematics Standard Year 11 course content comprises four Topics, with the Topics divided into Subtopics.

TOPIC	SUBTOPICS
Algebra	<ul style="list-style-type: none"><li>• Formulae and Equations</li><li>• Linear Relationships</li></ul>
Measurement	<ul style="list-style-type: none"><li>• Applications of Measurement</li><li>• Working with Time</li></ul>
Financial Mathematics	<ul style="list-style-type: none"><li>• Money Matters</li></ul>
Statistical Analysis	<ul style="list-style-type: none"><li>• Data Analysis</li><li>• Relative Frequency and Probability</li></ul>

In Year 12, students can select from two Mathematics Standard courses:

- Mathematics Standard 2, a Category A course
- Mathematics Standard 1, a less demanding, Category B course – the content of this course is a subset of Mathematics Standard 2
  - If the HSC examination is sat, Mathematics Standard 1 can contribute as a Category B subject to an ATAR.
  - There is an option of not sitting the HSC Examination, in which case, it would not contribute to an ATAR.

## Year 12 Mathematics Standard 2

The purpose of Mathematics Standard 2 is to provide an appropriate mathematical background for students who wish to enter **occupations that require the use of practical mathematical and statistical techniques**. The direction taken by the course, in focusing on mathematical skills and techniques that have direct application to everyday activity, contrasts with the more abstract approach taken by the other Stage 6 mathematics courses.

Students who undertake Mathematics Standard 2 will develop:

- an appreciation of the relevance of mathematics,
- the ability to apply mathematical skills and techniques to interpret practical situations,
- the ability to communicate mathematics in written and/or verbal form,
- skills, knowledge and understanding in algebra, measurement, financial mathematics, statistical analysis and networks.

Course Structure:

TOPIC	SUBTOPICS
Algebra	<ul style="list-style-type: none"><li>• Types of Relationships</li></ul>
Measurement	<ul style="list-style-type: none"><li>• Non-right-angled Trigonometry</li><li>• Rates and Ratios</li></ul>
Financial Mathematics	<ul style="list-style-type: none"><li>• Investments and Loans</li><li>• Annuities</li></ul>
Statistical Analysis	<ul style="list-style-type: none"><li>• Bivariate Data Analysis</li><li>• The Normal Distribution</li></ul>
Networks	<ul style="list-style-type: none"><li>• Network Concepts</li><li>• Critical Path Analysis</li></ul>

Students are advised to check published information regarding specific university courses. The Mathematics Advanced course may be 'assumed knowledge' or 'recommended study'; whereas many tertiary courses recommend 'any 2 units of mathematics', meaning Mathematics Standard 2 is sufficient.

## Mathematics Standard 1 (Group B subject)

The study of Mathematics Standard 1 enables students to develop their knowledge, understanding and skills in working mathematically and in communicating concisely and precisely.

It provides opportunities for students who found the Mathematics Standard course in Year 11 challenging but still wish to include a study of mathematics in their HSC, to consider various applications of mathematics in a broad range of contemporary contexts using mathematical modelling and to solve problems related to their present and future needs.

- Students who wish this course to contribute to their ATAR sit the optional external examination. Students who do not sit this examination will receive their school-based assessment result with their HSC.
- Additional consideration for students considering Mathematics Standard 1: only 2 units of Category B courses can be included in the ATAR calculation.

This course also provides an appropriate mathematical background for students entering the workforce and/or undertaking further community and workplace training.

Course Structure:

TOPIC	SUBTOPICS
Algebra	<ul style="list-style-type: none"><li>• Types of Relationships</li></ul>
Measurement	<ul style="list-style-type: none"><li>• Right-angled Triangles</li><li>• Rates</li><li>• Scale Drawings</li></ul>
Financial Mathematics	<ul style="list-style-type: none"><li>• Investment</li><li>• Depreciation and Loans</li></ul>
Statistical Analysis	<ul style="list-style-type: none"><li>• Further Statistical Analysis</li></ul>

See the NESA Mathematics syllabus on the website below for more information.

<https://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/stage-6-learning-areas/stage-6-mathematics/mathematics-standard-2017>

## Mathematics Advanced

Mathematics Advanced is a **calculus-based course** that is more abstract in nature and **significantly more demanding** than the Mathematics Standard 2 course. It is intended to give students an understanding of, and competence in, some further aspects of mathematics that are applicable to the real world.

University of Sydney has implemented a policy of prerequisites as explained in a statement from their website below. Other universities may follow such a pattern.

'A course prerequisite of Mathematics Advanced (Band 4) is indicated for a number of courses in advanced computing, agriculture, commerce, economics, engineering, health, medicine, pharmacy, psychology, science and veterinary science.' (Source <https://courseseeker.edu.au/institutions/the-university-of-sydney>)

Students are advised to research the prerequisites, assumed knowledge or recommended study published by tertiary institutions before selecting their mathematics course. Such information can be found on university websites and at UAC, <https://www.uac.edu.au>.

In this course students will develop higher order thinking skills, and

- an appreciation of the scope, usefulness, beauty and elegance of mathematics
- the ability to reason in a broad range of mathematical contexts
- skills in applying mathematical techniques to the solution of practical problems
- understanding of the key concepts of calculus and the ability to differentiate and integrate a range of functions
- the ability to interpret and communicate mathematics in a variety of forms.

The Year 11 Mathematics Advanced course studies:

- Functions
- Trigonometric Functions: measure of angles, functions and identities
- Calculus: introduction to differentiation
- Exponential and Logarithmic Functions
- Statistical Analysis: probability and discrete probability distributions

The Year 12 Mathematics Advanced course studies:

- Functions: graphing techniques
- Trigonometric Functions: graphs
- Calculus: differential, applications of differentiation and integral calculus
- Financial Mathematics: modelling financial situations
- Statistical Analysis: descriptive statistics, bivariate data analysis and random variables

The course has general educational merit and is also useful for concurrent studies in science courses, Engineering Studies and Economics. It is a basis for further studies in mathematics as a discipline at tertiary level and in support of courses such as the life sciences or commerce. Students are advised to check published information regarding specific university courses.

See the NESA Mathematics syllabus on the website below for more information.

<https://syllabus.nesa.nsw.edu.au/mathematics-advanced-stage6/>

## Mathematics Extension 1

The content of this course includes the whole of the Mathematics Advanced course and extends it further. The depth of treatment in Extension 1 indicates that it is intended for students who have demonstrated a **mastery of the skills** included in the stage 5.3 level Year 10 Mathematics course and who are interested in the study of further concepts and skills in mathematics. The Mathematics Extension 1 course is intended to give these students a thorough understanding of, and competence in, various aspects of mathematics.

The Year 11 Mathematics Extension 1 course studies the following areas:

- Functions: further work and polynomials
- Trigonometric Functions: inverse and further identities
- Calculus: rates of change
- Combinatorics

The Year 12 Mathematics Extension 1 course studies the following areas:

- Proof by mathematical induction
- Vectors: introduction
- Trigonometric Functions: trigonometric equations
- Calculus: further calculus skills and applications
- Statistical Analysis: the binomial distribution

The Mathematics Extension 1 course has general educational merit and is also useful for concurrent studies of Sciences, Economics and TAS including Engineering Studies. It is a recommended minimum basis for further studies in mathematics as a major discipline at a tertiary level, and for the study of mathematics in support of the physical sciences, computer science or engineering. Students are advised to check published information regarding specific university courses. The Mathematics Extension 1 course may be 'assumed knowledge' or 'recommended study' in some university courses.

See the NESA Mathematics syllabus on the website below for more information.

<http://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/stage-6-learning-areas/stage-6-mathematics/mathematics-extension-1-new>

## Year 12 HSC Mathematics Extension 2

It is recommended that students of outstanding mathematical ability already completing the Mathematics Extension 1 consider undertaking the Extension 2 course. Students are invited or may seek approval for this at the end of Term 3 of Year 11.

Lessons for Mathematics Extension 2 are usually timetabled outside of normal school hours.

The NESA Syllabus can be found at:

<http://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/stage-6-learning-areas/stage-6-mathematics/mathematics-extension-2-new>