Course descriptions for Mathematics Stage 6

Information for Year 11 ("Preliminary") and Year 12 ("HSC"). [i]

I. Mathematics General

Preliminary Mathematics General/HSC Mathematics General **1** Pathway	Preliminary Mathematics General/HSC Mathematics General **2** Pathway
2 Units per year.	2 Units per year.
NOT EXAMINED AT HSC LEVEL. [ii]	Examined at Year 11 and Year 12 levels.
Prerequisite is Stage 5.1. [iii]	Prerequisite is Stage 5.1; some of Stage 5.2 recommended if continuing to HSC.
Provides students with the opportunity to develop an understanding of and competence in further aspects of mathematics for concurrent HSC studies, such as in vocational education and training courses, other practically oriented courses, and some humanities courses. It also provides an appropriate mathematical background for students entering the workforce and/or undertaking further training.	*Provides students with the opportunity to develop an understanding of and competence in further aspects of mathematics for a range of concurrent HSC studies, such as in the life sciences, the humanities and business studies. The pathway also provides a strong foundation for students entering the workforce and/or undertaking further training, and for university courses in the humanities, nursing and paramedical sciences.*
Preliminary Mathematics General Course • Strand: Financial Mathematics • Strand: Data and Statistics • Strand: Measurement • Strand: Probability • Strand: Algebra and Modelling • Focus Study: Mathematics and Communication • Focus Study: Mathematics and Driving	
HSC Mathematics General 1 Course • Strand: Financial Mathematics • Strand: Data and Statistics • Strand: Measurement • Strand: Probability • Strand: Algebra and Modelling • Focus Study: Mathematics and Design • Focus Study: Mathematics and Household Finance • Focus Study: Mathematics and the Human Body • Focus Study: Mathematics and Personal Resource Usage	**HSC Mathematics General 2 Course** • Strand: Financial Mathematics • Strand: Data and Statistics • Strand: Measurement • Strand: Probability • Strand: Algebra and Modelling • Focus Study: Mathematics and Health • Focus Study: Mathematics and Resources

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II. Mathematics Standard

<table>
<tr><td>Mathematics Standard 1 NEW
(Implemented from 2018)</td><td>Mathematics Standard 2 NEW
(Implemented from 2018)</td></tr>
<tr><td colspan="2">2 Units per year.</td></tr>
<tr><td colspan="2">Examined at Year 11 and Year 12 levels.</td></tr>
<tr><td>Prerequisite is Stage 5.1 and most of Stage 5.2.</td><td>Prerequisite is Stage 5.1 and most of Stage 5.2.</td></tr>
<tr><td>Provides an appropriate mathematical background for students entering the workforce and/or undertaking further community and workplace training.</td><td>Provides an appropriate mathematical background for students entering the workforce or undertaking further tertiary training.</td></tr>
<tr><td colspan="2">Year 11
Topic: Algebra
• Formulae and Equations
• Linear Relationships
Topic: Measurement
• Applications of Measurement
• Working with Time
Topic: Financial Mathematics
• Money Matters
Topic: Statistical Analysis
• Data Analysis
• Relative Frequency and Probability</td></tr>
<tr><td>Year 12
Topic: Algebra
• Types of Relationships
Topic: Measurement
• Right-angled Triangles
• Rates
• Scale Drawings
Topic: Financial Mathematics
• Investment
• Depreciation and Loans
Topic: Statistical Analysis
• Further Statistical Analysis
Topic: Networks
• Networks and Paths</td><td>Year 12
Topic: Algebra
• Types of Relationships
Topic: Measurement
• Non-right-angled Trigonometry
• Rates and Ratios
Topic: Financial Mathematics
• Investments and Loans
• Annuities
Topic: Statistical Analysis
• Bivariate Data Analysis
• The Normal Distribution
Topic: Networks
• Network Concepts
• Critical Path Analysis</td></tr>
</table>

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III. Mathematics / Mathematics Advanced

Mathematics	Mathematics Advanced NEW (Implemented from 2019)
2 Units per year.	
Examined at Year 11 and Year 12 levels.	
Recommended is some or all of Stage 5.3.	Prerequisite are Stage 5.1, Stage 5.2 and most of the "substrands" in Stage 5.3.
It has general educational merit and is also useful for concurrent studies in science and commerce. The course is a sufficient basis for further studies in mathematics as a minor discipline at tertiary level in support of courses such as the life sciences or commerce.	*Provides an appropriate mathematical background for students whose future pathways may involve mathematics and its applications in a range of disciplines at the tertiary level.*
Preliminary Course • Basic arithmetic and algebra • Real functions • Trigonometric ratios • Linear functions • The quadratic polynomial and the parabola • Plane geometry – geometrical properties • Tangent to a curve and derivative of a function	**Year 11** Topic: Functions • Working with Functions Topic: Trigonometric Functions • Trigonometry and Measure of Angles • Trigonometric Functions and Identities Topic: Calculus • Introduction to Differentiation Topic: Exponential and Logarithmic Functions • Logarithms and Exponentials Topic: Statistical Analysis • Probability and Discrete Probability Distributions
HSC Course • Coordinate methods in geometry • Applications of geometrical properties • Geometrical applications of differentiation • Integration • Trigonometric functions • Logarithmic and exponential functions • Applications of calculus to the physical world • Probability • Series and series applications	**Year 12** Topic: Functions • Graphing Techniques Topic: Trigonometric Functions • Trigonometric Functions and Graphs Topic: Calculus • Differential Calculus • The Second Derivative • Integral Calculus Topic: Financial Mathematics • Modelling Financial Situations Topic: Statistical Analysis • Descriptive Statistics and Bivariate Data Analysis • Random Variables

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IV. Mathematics Extension 1

Mathematics Extension 1	Mathematics Extension 1 NEW (Implemented from 2019)
1 Unit per year. [iv]	
Examined at Year 11 and Year 12 levels.	
Recommended are certain "optional topics" from Stage 5.3.	Prerequisite are Stage 5.1, Stage 5.2 and Stage 5.3, including certain "optional substrands".
This course is intended for students who have demonstrated a mastery of the skills of Stage 5 Mathematics and are interested in the study of further skills and ideas in mathematics. *It has general educational merit and is also useful for concurrent studies of science, industrial arts and commerce. The course 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 and engineering sciences.*	*Provides a basis for progression to further study in mathematics or related disciplines and in which mathematics has a vital role at a tertiary level.* *Provides an appropriate mathematical background for students whose future pathways may involve mathematics and its applications in such areas as science, engineering, finance and economics.*
Preliminary Course • Other inequalities • Further geometry • Further trigonometry • Angles between two lines • Internal and external division of lines into given ratios • Parametric representation • Permutations and combinations • Polynomials • Harder applications of the Mathematics Preliminary course topics	**Year 11** Topic: Functions • Further Work with Functions • Polynomials Topic: Trigonometric Functions • Inverse Trigonometric Functions • Further Trigonometric Identities Topic: Calculus • Rates of Change Topic: Combinatorics • Working with Combinatorics
HSC Course • Methods of integration • Primitive of $\sin^2 x$ and $\cos^2 x$ • Equation $\frac{dN}{dt} = k(N - P)$ • Velocity and acceleration as a function of x • Projectile motion • Simple harmonic motion • Inverse functions and inverse trigonometric functions • Induction • Binomial theorem • Further probability • Iterative methods for numerical estimation of the roots of a polynomial equation • Harder applications of Mathematics HSC course topics	**Year 12** Topic: Proof • Proof by Mathematical Induction Topic: Vectors • Introduction to Vectors Topic: Trigonometric Functions • Trigonometric Equations Topic: Calculus • Further Calculus Skills • Applications of Calculus Topic: Statistical Analysis • The Binomial Distribution

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V. Mathematics Extension 2

Mathematics Extension 2	Mathematics Extension 2 NEW (Implemented from 2019)
1 Unit, in Year 12 ("HSC") only. [v]	
Examined at Year 12 level.	
[Prerequisites are the "Mathematics" Year 11 course and the "Mathematics Extension 1" Year 11 course.]	Prerequisites are the "Mathematics Advanced" Year 11 course and the "Mathematics Extension 1" Year 11 course.
The course is designed for students with a special interest in mathematics who have shown that they possess special aptitude for the subject. *The course offers a suitable preparation for study of mathematics at tertiary level, as well as a deeper and more extensive treatment of certain topics than is offered in other mathematics courses.*	*Provides a basis for progression to further study in mathematics or related disciplines and in which mathematics has a vital role at tertiary level.* *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.*
Preliminary Course N/A	**Year 11** N/A
HSC Course • Graphs • Complex Numbers • Conics • Integration • Volumes • Mechanics • Polynomials • Harder Mathematics Extension 1 topics	**Year 12** Topic: Proof • The Nature of Proof • Further Proof by Mathematical Induction Topic: Vectors • Further Work with Vectors Topic: Complex Numbers • Introduction to Complex Numbers • Using Complex Numbers Topic: Calculus • Further Integration Topic: Mechanics • Applications of Calculus to Mechanics

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VI. Mathematics Life Skills [vi]

Mathematics Life Skills	Mathematics Life Skills NEW (Implemented from 2018)
2 Units per year.	
Students are assessed in relation to the selected Mathematics Life Skills outcomes and content. Students may achieve Life Skills outcomes independently or with support.	Students are expected to address or achieve one or more of the Stage 6 Mathematics Life Skills outcomes. They need not address or complete all of the content to demonstrate achievement of an outcome.
Prerequisite is for the principal to certify that the student is eligible and that the decision is the result of the collaborative curriculum planning process.	Prerequisite is for the principal to certify that the student is eligible and that the decision is the result of the school's collaborative curriculum planning process.
The Stage 6 Mathematics Life Skills course focuses on the development of students' ability to apply mathematics in a variety of contexts in order to enhance and encourage their participation in post-school life. *Study in the Stage 6 Mathematics Life Skills course should enhance students' access to community living, further education, training and employment.*	*The Stage 6 Mathematics Life Skills course focuses on the development of students' ability to apply mathematics in a variety of contexts in order to enhance and encourage their participation in post-school contexts.* *Study in the Stage 6 Mathematics Life Skills course enhances students' access to community living, further education, training and employment.*
The structure of the Mathematics Life Skills course allows teachers to provide a broad and balanced program that reflects the needs of individual students within the context of the collaborative curriculum planning process. Students may study outcomes and content selected from one or more of the following six modules: • Numeration • Operations • Time • Space • Money • Measurement. Teachers will design a program based on the selected syllabus outcomes and appropriate to the students' priorities, needs and interests.	Topic: Number and modelling (Algebra) • Review of number properties • Mathematical modelling Topic: Measurement • Everyday measurement • Measuring two-dimensional and three-dimensional shapes Topic: Financial Mathematics • Decimals, Percentages and Money • Earning Money • Spending Money Topic: Statistics and Probability (Statistical analysis) • Statistics • Probability Topic: Plans, Maps and Networks (Networks) • Using Plans, Maps and Networks The topics provide possible frameworks, and are suggestions only. The course provides flexibility to develop programs appropriate to the needs, strengths, goals, interests and prior learning of students.

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VII. Notes

The above material is a summary intended as a convenient aid only. The reader must obtain full, up-to-date information from the relevant authority:

http://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/stage-6-learning-areas/stage-6-mathematics/course-descriptions/

This document was produced on 12 February 2018.

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i SOURCE: http://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/stage-6-learning-areas/stage-6-mathematics/course-descriptions/

ii As for other Content Endorsed Courses, the HSC Mathematics General 1 course will be subject to internal assessment only, and not formal examination at the HSC. Also, the two units of study for the HSC Mathematics General 1 course cannot be counted in the 10 units required for the calculation of an ATAR.

iii This refers to "the content and outcomes of [...] Stage 5.1" of "the NSW *Mathematics Years 7–10 Syllabus*". Similar abbreviated notation will be used herein for Stage 5.2 and Stage 5.3.
Generally speaking, Stage 5.1 is considered the least challenging option, and Stage 5.3 is the most challenging option.

iv Always taken in conjunction with "Mathematics"/"Mathematics Advanced". Thus the combination totals ***3 units*** in each year.

v Always taken in conjunction with "Mathematics"/"Mathematics Advanced" and "Mathematics Extension 1". Thus the combination totals ***4 units*** in Year 12.

vi This option is designed for students with 'special needs':
"*Life Skills courses are for students with special education needs, particularly those with an intellectual disability, who are unable to access the outcomes of the regular courses, even with adjustments to teaching, learning and assessment.*"
SOURCE: http://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/stage-6-learning-areas/stage-6-mathematics/course-descriptions/
"*A few students with special education needs may find Life Skills courses are the most appropriate courses to follow for the RoSA or HSC. These are particularly students with an intellectual disability.*"
"*Before deciding that a student should study a Life Skills course, consider other ways of helping the student to engage with regular course outcomes.*"
"*Life Skills courses are not an appropriate option for students: performing below their cohort; who could be helped with appropriate adjustments and support.*"
SOURCE: http://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/Diversity-in-learning/stage-6-special-education/life-skills/eligibility

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