

## Mathematics

The NSS Mathematics curriculum consists of a Compulsory Part and an Extended Part. In order to broaden students' choices for further study and work, two modules in the Extended Part are provided to further develop their knowledge of mathematics.

These modules are designed to cater for students who intend to:

- . pursue further studies which require more mathematics; or
- . follow a career in fields such as natural sciences, computer sciences, technology or engineering.

**Module 1 (Calculus and Statistics)** is intended to cater for those students who will be involved in discipline or careers which demand a wider scope and deeper understanding of mathematics, and for those who would like to learn more mathematical applications at the senior secondary level. It aims to:

- . provide students with skills and concepts beyond the Compulsory Part;
- . emphasise applications rather than mathematics rigour with a view to widening students' perspectives on mathematics; and
- . provide students with intuitive concepts of calculus and statistics, related basic skills and useful tools for their future studies and careers.

**Module 2 (Algebra and Calculus)** is designed to suit the needs of students who will be involved in mathematics-related fields and careers, and those who like to learn more in-depth mathematics at the senior secondary level. It aims to:

- . provide students with skills and concepts beyond the Compulsory Part;
- . emphasise understanding of mathematics for further progress in mathematically inclined disciplines; and
- . provide students with a concrete foundation in algebra and calculus for their future studies and career.

The students of our school can choose one of the following options for Mathematics:

- (1) Compulsory Part only; or
- (2) Compulsory Part and Module 1; or
- (3) Compulsory Part and Module 2.

Here are a brief outline of the content of Module 1 and 2.

**Learning Targets of Module 1 (Calculus and Statistics)**

Foundation Knowledge	Calculus	Statistics
Students are expected to:		
<ul style="list-style-type: none"> <li>• apply binomial expansion for the study of probability and statistics;</li> <li>• model, graph and apply exponential functions and logarithmic functions to solve problems; and</li> <li>• understand the relationships between exponential and logarithmic functions and hence apply the two functions to solve real-life problems.</li> </ul>	<ul style="list-style-type: none"> <li>• recognise the concept of limits as the basis of differential and integral calculus;</li> <li>• understand the idea of differentiation and integration through consideration of concrete phenomena; and</li> <li>• find the derivatives, indefinite integrals and definite integrals of simple functions.</li> </ul>	<ul style="list-style-type: none"> <li>• understand the concepts of probability, random variables, and discrete and continuous probability distributions;</li> <li>• understand the fundamental ideas of statistical reasoning based on the Binomial, Poisson, Geometric and Normal Distributions;</li> <li>• use statistical ways of observing and thinking, and then make inferences; and</li> <li>• develop the ability to think mathematically about uncertainty and then apply such knowledge and skills to solve problems.</li> </ul>

## Learning Targets of Module 2 (Algebra and Calculus)

Foundation Knowledge	Algebra	Calculus
Students are expected to:		
<ul style="list-style-type: none"> <li>• rationalise surd expressions;</li> <li>• understand the principle of mathematical induction;</li> <li>• expand binomials using the Binomial Theorem;</li> <li>• understand simple trigonometric functions and their graphs;</li> <li>• understand important trigonometric identities and formulae involving compound angles; and</li> <li>• understand the number <math>e</math>.</li> </ul>	<ul style="list-style-type: none"> <li>• understand the concepts, operations and properties of matrices and the inverses of square matrices up to order 3;</li> <li>• solve systems of linear equations;</li> <li>• understand the concept, operations and properties of vectors; and</li> <li>• apply the knowledge of vectors to solve problems in 2-dimensional space and 3-dimensional space.</li> </ul>	<ul style="list-style-type: none"> <li>• understand the concept of limits as the basis of differential and integral calculus;</li> <li>• understand the concepts and properties of derivatives, indefinite integrals and definite integrals of functions;</li> <li>• find the derivatives, indefinite integrals and definite integrals of simple functions;</li> <li>• find the second derivatives of functions; and</li> <li>• apply the knowledge of differentiation and integration to solve real-life problems.</li> </ul>

\*Information extracted from Mathematics Curriculum and Assessment Guide (S4-S6).