



The National University  
of Singapore  
High School  
of Mathematics and Science

Programme of Studies  
2009

# Programme of Studies 2009

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The School Logo is made up of a test tube, symbolizing science, combined with  $\pi$ , symbolizing mathematics. A third element – the 'effervescence' shows the dynamism of bringing the two disciplines together and the creativity that is to be found within NUS High School of Mathematics and Science. The green colour symbolizes the solid base upon which the institution is built.

## **School Vision**

To be a Wellspring of Inspiration for Math & Science Education and Research.

## **School Mission**

The NUS High School will nurture well-rounded and world-ready scientific minds to make distinguished contributions as Pioneers, Achievers, Thinkers & Humanitarians.

## **School Motto**

Experiment. Explore. Excel.

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# Our Programme

NUS High School of Mathematics and Science is a specialised independent school that aims to nurture well-rounded and world-ready scientific minds through its academic programme, affective education and co-curricula activities. Our students are provided with a broad-based curriculum that is conducted in technologically well-equipped classrooms and laboratories. Innovative and interesting teaching methods are used, and emphasis is given to higher level cognitive learning. Upon successful completion of our six-year programme, our students graduate with the NUS High School Diploma that is recognized by both local and renowned overseas universities. NUS High School is indeed a place where students are nurtured to make distinguished contributions as Pioneers, Achievers, Thinkers & Humanitarians in the years to come.

## Curriculum Framework

### Curriculum Structure

The curriculum is organised around a 2-2-2 structure which allows students more flexibility in meeting the requirements to move up to the next phase. This is different from the yearly promotion system that is practiced widely in the mainstream schools:

<b>Foundation Years</b>	Years 1 & 2	Students will be taught the fundamentals of the subjects
<b>Advancement Years</b>	Years 3 & 4	Students will enhance their knowledge and have the opportunity to apply their knowledge
<b>Specialisation Years</b>	Years 5 & 6	Students will be engaged in doing advanced courses in the areas of their specialisation.

### Subject Domains

Our Programme adopts an integrated approach to teaching and learning the six domains in which the subjects are grouped into. This is to ensure that our students are provided with a holistic and well-rounded education.

- Mathematics and the Sciences
- Languages
- Humanities, Fine Art and Music
- Affective and Character Education
- Physical Education
- Co-Curricula Activity

### Da Vinci Programme

Da Vinci Programme is one of the keystone programmes in NUS High School and it complements the curriculum to develop the scientific minds of our students. The 6-year programme will develop skills for research, innovation and enterprise in multiple disciplines.

Da Vinci programme will nurture students' appreciation and understanding of the multi- and inter-disciplinary nature of knowledge and research so that they can be a polymath in this fast-changing world especially at the frontier of research and innovation.

### School Calendar

The school calendar begins in January and goes by two semester-blocks. Each semester has about 15 weeks of curriculum time. There is a one-week break in the middle of the semester and a one month break between the semesters.

### Modular System

NUS High School curriculum is based on a modular system which aims to provide a healthy diversity of learning opportunities so that students can develop to their full potential.

### **Types of Modules**

- CORE modules** Essential modules that students must pass
- ELECTIVE modules** Modules that build on the Core modules to give a greater exposure to the subject
- ENRICHMENT modules** Modules that are offered to students who wish to broaden their interest
- HONOURS modules** Advanced modules designed at university undergraduate level for students who plan to do a Major with Honours in specific subject area upon graduation with the NUS High School Diploma.

### **Module Code**

Each module of study has a unique module code consisting of a two-letter prefix that denotes the discipline and four digits. The first digit indicates the academic level of the module. The second digit of each module code is used to indicate the type of module: 1 is for Core, 2 is for Elective, 3 is for Enrichment and 4 is for Honours. The last two digits indicate the module number. For some Modules, there is a suffix which indicates that the module is conducted by external agencies (e.g. universities, research institutes, etc).

Example: **MA3104N** is a Mathematics module (**MA**) taught at academic level three (**3**). It is a core module (**1**) and it is conducted by NUS (**N**).

### **Pre-requisite/Co-requisites/Preclusions**

- Pre-requisites** Modules which have to be satisfactorily completed in order to qualify to read the module that the student wants to register for. (Modules equivalent to the pre-requisites may also be accepted – please consult the relevant Department)
- Co-requisites** Modules that are to be taken concurrently
- Preclusions** Modules which have similar emphases and should not be taken together within a student's candidature

### **Assessment**

Students are assessed through a combination of Continual Assessments (CA) and end-of-semester examination. Continual Assessment can be based on quizzes, assignments, tests, laboratories, projects, reports and presentations. Students' academic progress will be noted by their subject teachers and mentors, who will be able to identify areas of difficulty and advise appropriate action.

### **Grade Point System**

Academic performance for **Core** and **Elective** modules is measured by Grade Points on a 5-point scale:

<b>Grade</b>	<b>Grade Point</b>
A+	5.0
A	5.0
A-	4.5
B+	4.0
B	3.5
B-	3.0
C+	2.5
C	2.0
D+	1.5

D	1.0
F	0

No Grade Points are given for the following:

<b>Enrichment Modules</b>	Will be awarded <i>Distinction, Merit, Pass</i> or <i>Fail</i> according to performance
<b>Projects completed under the Da Vinci Programme</b>	Will be awarded <i>Excellent, Merit, Satisfactory</i> or <i>Unsatisfactory</i> according to performance
<b>Exempted Modules (EXE)</b>	Students exempted from taking a core module by the relevant academic Department will be awarded the Modular Credit(s), but will not get a Grade Point.
<b>Modules in Progress</b>	For modules that extend more than one semester, the Grade Point will be given at the end of the final semester of the module. The status “In Progress” is assigned during the intervening semesters.

Hence, the performance of these non-Core/Elective modules is not used in the computation of *Cumulative Average Point (CAP)*.

### **Cumulative Average Point (CAP)**

CAP is the weighted average grade point of the modules taken by a student and is calculated as follows:

$$\text{CAP} = \frac{\text{sum (module grade point x MC assigned to module)}}{\text{sum (MC assigned to modules)}}$$

The grade points attained for Core modules have to go into the calculation of the CAP.

The grade points attained for Elective modules also go into the calculation of the CAP in the semestral progress reports. However, students can choose to include or exclude them in the calculation of the CAP in their transcripts.

Modules with no assigned grade points and associated MCs are excluded from the calculation of CAP.

### **Exemption of Modules**

Students can be granted exemption from reading a module if they fulfill the following conditions:

- Teacher’s recommendation for exemption
- Good performance in a diagnostic test (written or viva) based on the module to be exempted
- Department or Programme requirement if any

Students fulfilling these conditions will be granted “Exempted (EXE)” status for that particular module. This means that Modular Credits will be awarded, but no grade is attached, and no computation for CAP is made for that module.

Students who wish to seek module exemption should approach the respective departments/programmes for details on when and what modules are available for module exemption in each semester.

### **Acceleration of Modules**

Students who are granted exemption of a module may proceed to read another module at a higher academic level in lieu as acceleration. For example, MA1108 (a prerequisite for MA2110) is normally read by a Year 1 student. A student granted exemption of MA1108 may accelerate to read MA2110 in his/her Year 1 of study.

### **National University of Singapore Modules**

Acceleration can be extended to reading National University of Singapore (NUS) modules at the undergraduate level. Students who are highly gifted in certain academic areas, and students who are taking Honours modules in a particular subject, may take selected NUS modules after approval has been given by the relevant Department in NUS High.

Students have to pay a tuition fee per module stated by the NUS Registrar’s Office. **Modular Credits earned in completing the NUS modules do not count toward the NUS High School Diploma.** Graduating students who

qualify for admission to the NUS could, however, use these Modular Credits to satisfy in part the academic requirement for their study at the NUS.

It should also be noted here that enrollment for NUS modules depends on available space and the consent of the NUS Registrar.

### ***Withdrawal from Modules***

At the start of a semester, students can choose to read Elective/Enrichment modules. There will be no penalty for withdrawing from the chosen Elective/Enrichment module if a student were to 'drop' it during the *Add-Drop Period* (to be advised at the start of each semester) However, if a student were to withdraw after *the Add-Drop Period*, he/she will be given an 'F' Grade for that module.

### ***Failing and Repeating Modules***

Students are not allowed to repeat modules that they have passed (D Grade or better). If they fail a module ((F Grade), they may have to repeat the module the following academic year.

For some modules, students may be allowed to sit for a Viva after they fail the modules (F Grade). A student who passes a Viva will be given a D grade. For CAP computation, the D grade will be used instead of the original F grade. However, the transcript will indicate that this is an improved grade from the Viva. A student who fails a Viva will have to repeat the module in the following academic year.

Students who fail a module which is a pre-requisite to a higher level module may be allowed to read both modules concurrently as co-requisites.

### **Leave of Absence (LOA)**

LOA period is one year at a time. A student who is admitted at Year 1 is allowed a maximum TWO years of LOA. A student admitted at Year 3 is allowed to apply for LOA only in Year 4.

A student who has been granted LOA is expected to attend a full school during the period of absence from NUS High. He/She has to submit the academic records to NUS High School at the end of each semester. Upon return from LOA, the respective Departments will recommend relevant mode(s) of diagnostic assessment after reviewing the academic records of the student during LOA. Exemption of modules could be given based on the diagnostic assessment *OR* the student may be asked to read and pass specific modules.

*Years 5 and 6 students are not allowed to apply for LOA.*

## **Curriculum Requirements**

### ***CAP for Promotion and Graduation***

Students with an overall CAP of 2.0 in their yearly academic results are deemed to have attained a provisional Pass. Students are required to attain an overall CAP of 2.0 or higher for Promotion from Year 2 to Year 3 and an overall CAP of 2.2 or higher for Promotion from Year 4 to Year 5. For Graduation with the NUS High School Diploma, students have to attain an overall CAP of 2.5 or higher for the required modules in Years 5 and 6.

Students who do not satisfy the minimum overall CAP for promotion will have to repeat the previous Year of Study. This essentially translates into repeating all Core modules. Students are only allowed to retain grades of B+ or better for modules in the Humanities, Fine Art and Music.

## ***Graduation Requirements***

For students to graduate with the NUS High School Diploma, they must fulfill the following minimum requirements in academic subjects:

- Pass in English Programme
- Fulfillment of Mother Tongue requirement
- Mathematics Major
- Two Science Majors
- Completion of Advanced Research Project

Students must have passed ALL required core modules at Levels 1000-6000 (for Year 1 intake) or Levels 3000-6000 (for Year 3 intake) and achieved a minimum CAP of 2.5 from modules (core and elective if applicable) at Levels 5000-6000 used for CAP computation.

At graduation a student will have, in addition to fulfilling English and Mother Tongue requirement, a minimum of three Majors (Mathematics and TWO Sciences).

NUS High students are encouraged to sit for the Preliminary Scholastic Aptitude Test (PSAT), the Scholastic Aptitude Test (SAT) and the Advanced Placement (AP) Examinations. Good SAT and AP results will significantly enhance chances of gaining admission to overseas colleges/universities. In some cases, they may even be admission requirements.

### **Our National Mother Tongue Policy (and MT Requirements for Admission to Local Universities)**

The Mother Tongues (MT) officially refer to Chinese, Malay and Tamil. Like all students in Singapore, it is compulsory for NUS High students to fulfill either *ONE* of the following MT requirements (and for admission to the local universities – NUS / NTU / SMU):

- a minimum 'D7' grade in the GCE O Level Higher Mother Tongue Examination
- a minimum 'S' grade in the GCE A Level H1 Mother Tongue Examination
- a pass in the GCE A Level Mother Tongue Syllabus B Examination

NUS High students taking

- Higher Mother Tongue shall sit for the GCE O Level Higher MT Examination in Year 4
- Mother Tongue shall sit for GCE A Level H1 MT Examination in Year 5.
- Mother Tongue Syllabus B shall sit for GCE A Level MT Syllabus B in Year 6

Students can seek approval from the Ministry of Education (MOE) to take Mother Tongue-in-lieu under the following circumstances:

- Students whose Mother Tongue is a non-Tamil Indian language can apply to take either Bengali, Gujarati, Hindi, Panjabi or Urdu
- Returning Singaporeans who have stayed overseas for an extended period of time can apply to take an Asian Language (Arabic, Burmese and Thai) or a Foreign Language (French, German and Japanese).

Students who, are unable to fulfill the MT or MT-in-lieu requirements for admission to local universities but, satisfy all other requirements will be admitted on a provisional basis. During the course of undergraduate study, they will be required to attend the MT courses conducted by the university or attain the minimum requirement by retaking the MT paper at the GCE A level Exam before they are allowed to graduate.

Exemption from MTL or MTL-in lieu is granted based only on either of the following stringent conditions:

- Students who are suffering from a specific learning disability such as dyslexia or autism
- Students who joined Singapore's education system mid-stream.

Parents may apply to MOE for approval of their child's exemption from taking MT or MT-in-lieu through the school. Students who have been exempted from taking MT or MT-in-lieu at the PSLE will continue to be exempted at NUS High School.

Students who are exempted from MT or MT-in-lieu will be deemed to have met the requirements for admission to local universities.

*No student is allowed to drop MTL or MTL-in-lieu unless written approval has been obtained from MOE.*

### **Subject Major and Major with Honours**

The following academic tracks are offered by the respective subjects:

<p><b>Subject Major</b> (offered by Mathematics, Biology, Chemistry, Physics, Humanities, Fine Art and Music)</p>	<p>Broadly defined as a curriculum leading to academic competency equivalent to 'A' Level or AP Examination. It is also the minimum level of subject requirement for award of the NUS High School Diploma.</p>
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<b>Subject Major with Honours</b> (offered by Mathematics, Biology, Chemistry and Physics)	Directs students to higher level of learning and competency, preparing students for higher AP Examination or university-level courses. To qualify for reading a Subject Major with Honours, students have to maintain a consistently high achievement in core modules.
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### Advanced Research Project

Students must complete a graded Advanced Research Project in the Years 5/6 as a graduation requirement. Completion status of the project is documented in the student's transcript and details described in the student's portfolio. Apart from the student benefits of individual growth and development gained through this experience, college/university admission tutors have indicated that annotation of a successfully completed Research project in the student transcript can have a strong positive effect on the college admissions process. While grades will be awarded towards the completion of the Research project, they will not be used in the computation of the CAP.

# MATHEMATICS AND THE SCIENCES

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## MATHEMATICS

The mathematics curriculum is built upon important conceptual areas of mathematics such as Number and Algebra, Geometry and Measurement, Function and Graph, as well as Probability and Statistics concepts. Students will be able to apply these concepts in multiple ways using numbers, graphs, symbols, diagrams, and words. The Department of Mathematics emphasizes concept attainment through problem solving and reasoning, mathematical skills and tools, mathematical computation and modeling, and putting mathematics to work.

In the foundation years, students are given a broad-based mathematical study of algebra, geometry, statistics and trigonometry. These topics serve as foundation for many modules offered in the later years.

Pre-calculus topics such as functions, trigonometry, sequences and series will be taught in the advancement years. Students must be familiar with the properties of functions, the algebra of functions, the graphs of functions, the language of functions, and the values of trigonometric functions. Vectors and mathematical proofs will also be touched upon.

Students in the specialization years are required to read calculus at an extensive level that is comparable to calculus courses in colleges and universities. They also have a wide range of electives to choose from to deepen their knowledge and widen their exposure.

The Department offers both Major in Mathematics and Major with Honours in Mathematics. A summary of the required modules are given in the Tables below.

For the current Years 5 & 6 students, there are two tracks each available for Major and Major with Honours. Students are advised to follow the most appropriate learning track on the basis of their academic performance. Students in Tracks 1 & 2 normally sit for AP Calculus AB in their Years 6 & 5, respectively. Students in Tracks 3 & 4 normally sit for AP Calculus BC in their Years 6 & 5, respectively. Students normally sit for AP Statistics in their Year 6. Able students may take the respective AP examinations earlier.

Mathematics Major is a compulsory subject major required for graduation with the NUS High School Diploma. To qualify for reading a Major with Honours in Mathematics, students have to achieve consistently good results in their Core modules.

The Department follows the general school policies on curriculum and assessment. For more details, please refer to the school curriculum framework.

The Department follows the general school policies on Exemption and Acceleration of Modules. Interested students shall approach the Head of Department for details on these matters

**Table of CORE Modules offered in 2009**

Year	Module Code	Module Title	Pre-requisites	MC	
1	MA1108	Foundational Mathematics I	None	3	
	MA1109	Foundational Mathematics II	MA1108	3	
2	MA2110	Foundational Mathematics III	MA1109	4	
	MA2111	Foundational Mathematics IV	MA2110	4	
3	MA3112	Equations and Inequalities	MA1104, MA1106	4	
	MA3103	Trigonometry II	MA2104	2	
	MA3113	Functions and Graphs	MA3112	3	
4	MA4105	Sequences, Series and Mathematical Induction	MA3112, MA3113	2	
	MA4107	Vectors in 2 and 3-Dimensional Space	MA3103	2	
	MA4109	Calculus I	MA3103, MA3113, MA4105	4	
	MA4401	Polar Coordinates, Parametric and Vector Functions	Dept Approval needed (Honours module)	2	
5 * Major Modules	Track 1	MA5103	Calculus IIB	MA4108	4
		MA5104	Calculus IIIB	MA5103	2
		MA5105	Statistics IIB	MA2101	2
	Tracks 2, 3 and 4	MA5101	Calculus II	MA4103	4
		MA5102	Statistics II (Explore and Experiment)	MA2101	4
5 * Honours Modules	Track 3	MA5401	Polar Coordinates	Dept Approval needed	1
	Track 4	MA6401	Calculus III	MA4103, MA5101, MA5401	4
6 * Major Modules	All Tracks	MA6102	Complex Numbers	MA2105, MA4102	3
	Track 1	MA6103	Calculus IVB	MA5104	2
		MA6104	Statistics IIIB	MA5105	3
	Tracks 2, 3 and 4	MA6101	Statistics III	MA5102	5
6 * Honours Modules	Track 3	MA6401	Calculus III	MA4106, MA5101, MA5401	4

\* Applicable only to the current Year 5s for 2009/2010 and the current Year 6s for 2009.

## Module Descriptors of CORE modules offered in 2009

Module Code	Module Descriptors
MA1108	<p><b>Foundational Mathematics I</b></p> <p>This module aims to develop some understanding of the essential concepts of mathematics. The basic operations of numbers, fundamental concepts of algebra and geometry will be discussed. Topics include whole numbers, factors and multiples, fractions and decimals, approximation and estimation. This module also covers concepts of algebraic expressions, equations and manipulation, standard form and rules of indices, simultaneous linear equations and graphs of linear equations.</p>
MA1109	<p><b>Foundational Mathematics II</b></p> <p>This module aims to further develop an understanding of the essential concepts of foundational mathematics. Topics included are matrices, direct and inverse proportions, angle properties of triangles, quadrilaterals and polygons. This module also covers perimeter, area, volume and surface area of simple geometrical figures, symmetry, construction and loci. Coordinate geometry will be further developed as well.</p>
MA2110	<p><b>Foundational Mathematics III</b></p> <p>This module builds upon the previous foundation. Topics covered include quadratic functions and inequalities, graphs of simple polynomials, 2D vectors, congruency and similarity. Circle geometry, symmetry, construction and loci will also be taught.</p>
MA2111	<p><b>Foundational Mathematics IV</b></p> <p>This module covers the essential concepts of matrices and surds, as well as introduces students to the concepts of basic trigonometry. Topics like simple trigonometrical ratios, bearings and 3-dimensional problems are covered. Circle geometry is further developed. Students will also learn about basic set language and notation and how they can be applied to probability. Basic data analysis and various problem solving heuristics and techniques are also introduced in this module.</p>
MA3112	<p><b>Equations and Inequalities</b></p> <p>This is an important pre-calculus course that is a prerequisite for many advanced modules. It aims to model and solve problems involving quadratic equations using algebraic approach. Other solutions of equations will also be discussed through the use of remainder and factor theorem and partial fractions. Students will also solve inequalities including inequalities involving modulus functions and algebraic fractions. The uses of exponential and logarithmic functions in real-life such as growth and decay are just some of the highlights in this module.</p>
MA3103	<p><b>Trigonometry II</b></p> <p>This advance course in trigonometry focuses on the concepts of trigonometric functions, identities and equations. Topics include addition theorem, double angle formula, factor formula and R-formula. The unit of circular measure is also discussed here.</p>
MA3113	<p><b>Functions and Graphs</b></p> <p>This is an important pre-calculus course that is a prerequisite for many advanced modules. Students will be familiarized with the properties of functions, the algebra of functions and the graphs of functions. These functions include inverse functions, absolute value functions and piecewise functions. Students will be taught graphs of various functions and the transformation of graphs.</p>
MA4105	<p><b>Sequences, Series and Mathematical Induction</b></p> <p>This module covers topics such as number sequences, summation of series, binomial theorem, arithmetic series and geometric series. The method of difference and proof by mathematical induction will also be taught.</p>
MA4107	<p><b>Vectors in 2 and 3-Dimensional Space</b></p> <p>The aim of this module is to gain an understanding, and thus the application of manipulative</p>

	techniques or operations on vectors, so as to model and solve problems using the vector approach. Scalar and vector product as well as three-dimensional geometry are included in this module.
<b>MA4109</b>	<b>Calculus I</b>  This module is the first of two modules to prepare students for taking the Advanced Placement Calculus AB examination. It is comparable to calculus courses at college and university level. Topics include analysis of graphs, limits of functions, concept of derivative, derivative at a point, derivative as a function, second derivatives, application of derivatives and computation of derivatives, properties of definite integrals and applications of integrals to find area and volume.
<b>MA4401</b>	<b>Polar Coordinates, Parametric and Vector Functions</b>  This is an Honours module and is essential for those who want to take the AP Calculus BC examination in Year 5. Students will appreciate the extension of the rectangular coordinate system and explore the polar coordinate system. Derivatives and integrals of parametric and vector functions will also be taught. Department approval is needed for students to read this module.
<b>MA5101*</b>	<b>Calculus II</b>  This demanding and rigorous course is a continuation of the previous calculus course. Topics include applications of integrals, fundamental theorem of calculus, techniques of antidifferentiation, application of antidifferentiation and numerical approximations to definite integrals, limits of functions, asymptotic and unbounded behavior, and continuity of functions. First order differential equations and their applications to real-life problems will also be touched upon.
<b>MA5102*</b>	<b>Statistics II (Explore and Experiment)</b>  This module is the first of two modules to prepare students for taking the Advanced Placement Statistics examination. Exploratory analysis of data makes use of graphical and numerical techniques to study patterns and departures from patterns. Emphasis is placed on interpreting information from graphical and numerical displays and summaries. Data must be collected according to a well-developed plan if valid information on a conjecture is to be obtained. This plan includes clarifying the questions and deciding upon a method of data collection and analysis. Exploring random phenomena using probability and simulation will also be discussed.
<b>MA5103*</b>	<b>Calculus IIB</b>  This module is a continuation of the previous calculus module for Track 1 students. Topics include properties of definite integrals, applications of integrals, fundamental theorem of calculus, techniques of anti-differentiation and numerical approximations to definite integrals. This module is set at a more comfortable pace.
<b>MA5104*</b>	<b>Calculus IIIB</b>  This course is a continuation of the previous calculus modules for Track 1 students. Topics include first order differential equations and their applications to real-life problems. This module is set at a more comfortable pace.
<b>MA5105*</b>	<b>Statistics IIB</b>  This module introduces students in Track 1 to the basic ideas of probability and statistics. Topics include permutation and combination, discrete random variables, binomial, Poisson and normal distributions.
<b>MA5401*</b>	<b>Polar Coordinates</b>  This is an Honours module and is essential for those who want to take the AP Calculus BC examination in Year 6. Students will appreciate the extension of the rectangular coordinate system and explore the polar coordinate system. Department approval is needed for students to read this module.
<b>MA6101*</b>	<b>Statistics III</b>  This demanding and rigorous course is a continuation of the previous statistics course. Topics include Binomial Distribution, Poisson Distribution, Normal Distribution, Sampling Distribution, t-distribution,

	chi-square distribution, estimation, test of significance, correlation and linear regression. Data must be collected according to a well-developed plan if valid information on a conjecture is to be obtained. Emphasis is placed on interpreting information from graphical and numerical displays and summaries. Exploring random phenomena using probability and simulation will also be discussed.
<b>MA6102*</b>	<b>Complex Numbers</b>  Extending the real numbers system, there will be discussion on the complex numbers system, where numbers can be expressed in Cartesian and Polar forms. Students will learn to represent complex numbers in the Argand diagram and sketch loci of complex equations. The use of de Moivre's theorem to find the $n^{\text{th}}$ roots of a complex number and to prove mathematical results will also be covered.
<b>MA6103*</b>	<b>Calculus IVB</b>  This course is a continuation of the previous calculus course for Track 1 students. Students are prepared to take the AP Calculus AB Exam.
<b>MA6104*</b>	<b>Statistics IIIB</b>  This course is a continuation of the previous statistics module for Track 1 students. Topics include Normal Approximations, Sampling Distribution, $t$ -distribution, estimation, test of significance, correlation and linear regression. Emphasis is placed on interpreting information from graphical and numerical displays and summaries. This module is set at a more comfortable pace.
<b>MA6401*</b>	<b>Calculus III</b>  This demanding and rigorous Honours course exposes students to advanced applications of calculus and include derivatives and integrals involving parametric, polar and vector functions as well as polynomial approximations and convergence of series. Formal definitions of continuity and differentiability are also introduced. Students will also learn about second order differential equations and are more than sufficiently prepared to take the AP Calculus BC examination. Those who are keen may also try for the NUS Advanced Placement Credit Exam for Calculus.

\* Applicable only to the current Year 5s for 2009/2010 and the current Year 6s for 2009.

**Table of ELECTIVE / ENRICHMENT modules offered in 2009**

Year	Module Code	Module Title	Pre-requisites	MC
1	MA1203	Basic Mathematical Olympiad Training I	Selection Test	1
	MA1202V	Advanced Mathematical Olympiad Training I	Department Approval	2
2	MA2203V	Advanced Mathematical Olympiad Training II	MA1202V	2
	CS2201	Visual Basic .NET Programming	None	2
3	MA3206V	Advanced Mathematical Olympiad Training III	Department Approval	2
	MA3208	Numerical Methods	None	1
	MA3211	Problem Solving	None	1
	MA3303	Foundation in Mathematics (Bridging Module)	For new Yr 3 intake	2
	CS3203	Basic Procedural Programming	None	3
	CS3204	Object Oriented Programming I	CS3203	3
4	MA4202V	Advanced Mathematical Olympiad Training IV	MA3206V	2
	MA4203	Mathematical Logic	None	2
	MA4204V	Number Theory	Department Approval	2
5	CS5201	Introduction to MATLAB Programming	None	2
	CS5202	Programming Methodology II	CS4201	3
6	MA6202	Linear Algebra	MA3104	2
	MA6203	Financial Mathematics	MA6101	2
	MA6204	Game Theory	None	2
	MA6205	Graph Theory	None	2

**Module Descriptors of ELECTIVE / ENRICHMENT modules offered in 2009**

Module Code	Module Descriptors
MA1203	<p><b>Basic Mathematical Olympiad Training I</b></p> <p>This module prepares students who are keen to participate in mathematics competition or Olympiad (Junior). Students are selected through an Olympiad diagnostic test at the beginning of Term 1.</p>
MA1202V	<p><b>Advanced Mathematical Olympiad Training I</b></p> <p>This module targets at high ability students who are keen to prepare themselves for mathematics competition or Olympiad (Junior). The course is taught by an external trainer and is conducted on Saturdays.</p>
MA2203V	<p><b>Advanced Mathematical Olympiad Training II</b></p> <p>This module builds upon the previous Olympiad (Junior) training. The course is taught by an external trainer and is conducted on Saturdays.</p>
CS2201	<p><b>Visual Basic .NET Programming</b></p>

	This module aims to provide students the knowledge needed to build simple Visual Basic .NET applications using Visual Studio software. Upon completion of the course, student will have an understanding of basic programming, be able to design user interface using Visual Studio software and program simple windows application using the Visual Basic .NET programming language.
<b>MA3206V</b>	<b>Advanced Mathematical Olympiad Training III</b>  This module targets at high ability students who are keen to prepare themselves for mathematics competition or Olympiad (Senior). The course is taught by an external trainer and is conducted on Saturdays.
<b>MA3208</b>	<b>Numerical Methods</b>  This module teaches techniques to solve problems numerically when an analytical solution is not a viable option.
<b>MA3211</b>	<b>Problem Solving</b>  This module aims to develop the students' ability to solve problems in mathematics and think mathematically. Students will learn a model of mathematics problem solving and the strategies, resources and dispositions that are crucial for successful problem solving. The main mode of learning is a series of 'mathematics practical' lessons. In these lessons, students will work on specially crafted mathematics problems on a special 'practical' worksheet that guides them systematically and meta-cognitively through the problem solving process. The course is taught by a group of external lecturers from NIE.
<b>MA3303</b>	<b>Foundation in Mathematics (Bridging Module)</b>  This bridging module covers concepts of rules of indices, surds, set theory and geometrical properties of circle. Students will perform simple operations with indices and with surds, including rationalizing the denominator. The Cartesian coordinates system will be used to analyze geometrical situations and solve problems. Basic probability and data analysis are taught too. This module is compulsory for second intake students.
<b>CS3203</b>	<b>Basic Procedural Programming</b>  This module aims to equip students with fundamentals in computer and programming knowledge. It is the prerequisite for all other computing electives. Students will be introduced to software development model like the waterfall model. Basic foundation in software development using programming methodologies like pseudo-code and flow chart will be introduced. Students will also learn about concepts of variables, constants and data types, how to write simple assignment statements and expressions, the use of conditional statements in making decisions in a program, and the use of loops for repetition of code. Students who have completed the module would be able to write simple console application in C.
<b>CS3204</b>	<b>Object Oriented Programming I</b>  This module introduces the concepts of Object Oriented Programming (OOP) using Java. Topics include: Introduction to Java and OOP concepts, control flow, use of Java API, concepts and use of classes and objects, use of Arrays & ArrayList, basic searching and sorting algorithms, and simple File IO.
<b>MA4202V</b>	<b>Advanced Mathematical Olympiad Training IV</b>  This module builds upon the previous Olympiad (Senior) training. The course is taught by an external trainer and is conducted on Saturdays.
<b>MA4203</b>	<b>Mathematical Logic</b>  In Aristotelian logic, syllogisms are claimed to be the building blocks of all valid arguments and logical truths. In this module, we will study why Aristotelian logic fails in explaining some logical paradoxes and how it gives rise to various interesting topics in modern logic, including propositional logic, modal logic and fuzzy logic.

<b>MA4204V</b>	<b>Number Theory</b>  This module targets at high ability students who are keen to learn more about Number Theory basics. The course is taught by an external trainer and is conducted on Saturdays.
<b>CS5201</b>	<b>Introduction to MATLAB Programming</b>  This module introduces students to basic Matlab programming. Upon completion of the module, students will have a better understanding of Matlab programming and be able to use Matlab to solve problems.
<b>CS5202</b>	<b>Programming Methodology II</b>  This module is the second part of a two-part series on introductory programming from an object-oriented perspective. It continues the introduction to object-oriented programming begun in CS4201, with an emphasis on more advanced algorithms (e.g. recursion, advanced sort etc) and concepts in OOP (e.g. inheritance, abstraction, polymorphism). Students will also learn how to create a Graphical User Interface in Java (Swing, Graphics & Applets).
<b>MA6202</b>	<b>Linear Algebra</b>  This is an extension of the previous module on matrices. Topics on linear spaces, ranks, eigenvalues and eigenvectors will be explored here.
<b>MA6203</b>	<b>Financial Mathematics</b>  This elective module aims to provide students with a basic understanding of Finance and to explore, from first principles, the mathematical and statistical techniques relevant to modern financial instruments and markets. Students will be exposed to key financial concepts and tools commonly used by managers in making sound financial decisions.
<b>MA6204</b>	<b>Game Theory</b>  Game theory provides a mathematical tool for multi-person decision making. The aim of this module is to provide an introduction to game theory, studying basic concepts, models and solutions of games and their applications in economics. Static games and dynamic games of complete information will be discussed and games of incomplete information and cooperative games will be introduced briefly as well.
<b>MA6205</b>	<b>Graph Theory</b>  Graph Theory is a branch of discrete mathematics which deals with discrete objects and quantities and has wide applications, particularly in computer science and engineering. In this module, students will learn the nature and properties of simple graphs, and different types of graphs such as connected graphs, regular graphs, complete graphs, bipartite graphs and trees. They will also learn the application of graph theory including tournament, matching, and scheduling problems.

# BIOLOGY

The Biology curriculum is designed to cover both breadth and depth of the subject. Some modules adopt a spiral approach, e.g. Cell Biology is covered in Basics of Cell Biology (BL1101), Cell Biology (BL4101) and Biochemistry (BL5105). There are also stand-alone modules such as Functions and Adaptations (BL6401) and Proteins (BL6402).

The first two years provide students with a solid foundation in Biology. Students learn to observe and inquire to pick up good habits of the mind and effective scientific skills.

Students in the third and fourth years read modules that bring them beyond the basics. They investigate biological phenomena and engage in more in-depth studies. These modules will be more demanding in terms of critical thinking and analytical skills.

Modules in the fifth and sixth years adopt a more applicative approach. Students apply what they have learnt from earlier years in broader and more concept-orientated themes. Students are expected to be more independent in their learning approach.

The Department offers both Major in Biology and Major with Honours in Biology. To qualify for reading a Major with Honours in Biology, students have to achieve consistently good results in Core modules.

Students normally sit for AP Biology in their Year 6.

The Department follows the general school policies on curriculum and assessment. For more details, please refer to the school curriculum framework.

The Department does not practice exemption and acceleration of modules. Students who may have advanced knowledge in certain topics in Biology will still be expected to go through the modules to attain hands-on experience which unlike theoretical knowledge cannot be acquired from textbooks.

**Table of CORE Modules offered in 2009**

Year	Module Code	Module Title	Pre-requisites	MC
1	BL1101	Basics of Cell Biology	None	1
	BL1103	Nutrition and the Human Alimentary Canal	None	1
2	BL2101	Human Reproductive System	None	1
	BL2102	Energy and Energetics	None	1
3	BL3101	Animal Physiology	None	2
	BL3104	Cell reproduction and Inheritance	None	1
4	BL4101	Cell Biology	BL1101	2
	BL4102	Biodiversity	BL1102	2
	BL4103	Molecular Genetics	BL3103	2
	BL4104	Evolution	None	1
5 Major Modules	BL5102	Advanced Animal Physiology	BL3101	2
	BL5103	Ecology and the Environment	BL2102	2
	BL5105	Introduction to Biochemistry	BL1101, BL4101, BL4103	2
6 Honours Modules	BL6401	Functions and Adaptations	BL2103, BL3101, BL4102, BL4104	2
	BL6402	Proteins	None	3

**Module Descriptors of CORE modules offered in 2009**

Module Code	Module Descriptors
BL1101	<p><b>Basics of Cell Biology</b></p> <p>This module will teach students how to use microscopes competently to aid in the study of cells. They will understand that cells are the basic units of life and through differentiation, cells are organized into tissues, organs and systems. Students will also be introduced to the great diversity of cells and the concept that cell specialization is determined by genetics and environmental factors. Basic knowledge of the functions of the organelles that are found inside cells will be taught. Lectures will be supplemented by laboratory practicals where students learn to identify cells and prepare slides of cells on their own.</p>
BL1103	<p><b>Nutrition and the Human Alimentary Canal</b></p> <p>Students will learn about what makes up a balanced diet and that nutritional intake varies between different sexes, ages and activity level. They will learn to calculate the ideal nutritional intake for the different groups of people. They will also learn about the human alimentary canal in detail and understand the roles played by the organs of the system. This will be supplemented by hands-on experiments in the laboratory. The process of excretion and the intricacies of waste removal from human bodies will be covered. Kidney failure and how a dialysis machine functions will be touched on as well.</p>
BL2101	<p><b>Human Reproductive System</b></p> <p>In this module, students will learn about sexual reproduction in humans. They will be taught the anatomy of the female and male reproductive systems as well as the roles performed by each component of the systems. Puberty, menstrual cycle and the process of fertilization will also be described. Their understanding will be aided by video and other media resources. They will also learn about STDs and their signs and symptoms. Modes of contraception, both permanent and temporary</p>

	will be covered.
<b>BL2102</b>	<p><b>Energy and Energetics</b></p> <p>Students will learn the laws of thermodynamics in this module and apply them to the various processes of energy transfer between trophic levels in food webs as well as in photosynthesis. They will learn that energy transfer is never 100% efficient. The concepts of populations, communities and ecosystems will be introduced. Nutrient cycles will also be taught. They will learn about the various types of energy sources available today and taught to make informed choices. This module will be supplemented with field trips to Sungei Buloh Nature Reserve to allow better understanding of an ecosystem structure.</p>
<b>BL3101</b>	<p><b>Animal Physiology</b></p> <p>Physiology is a study of how organ systems are regulated and integrated for proper functioning of the organism. The human body will be used as a “model” organism for students to learn about mammalian physiology and homeostasis. Students will also learn to relate differences in physiology of distinct mammals towards various modes of life. Differences in the gas exchange physiology of terrestrial and aquatic mammals, and appreciation of how each system is adapted for different needs is explored. Other aspects include circulation, nerves, muscles and fluid balance. The emphasis is on student-motivated learning including problem-based learning sessions moderated by teachers.</p>
<b>BL3104</b>	<p><b>Cell Reproduction and Inheritance</b></p> <p>In this module, students learn about cell reproduction and chromosomal inheritance. The role of mitosis in asexual reproduction, growth and repair, and the role of meiosis in sexual reproduction will be highlighted. They will be introduced to the concept of chromosomal inheritance. The basic units of inheritance are genes which are arranged on chromosomes. They will also learn about Mendel's Laws and the instances which deviate from these laws. Lastly, some human genetic disorders will also be covered.</p>
<b>BL4101</b>	<p><b>Cell Biology</b></p> <p>Students' knowledge about cells acquired in BL1101 will be reinforced and enhanced. They will learn about the differences between plant and animal cells as well as prokaryotic and eukaryotic cells. They will discover that cell membranes are fluid mosaics and the advantages of such a structure. With such membranes, diffusion, osmosis, active transport, endocytosis and exocytosis are possible for exchange of materials between cells and their environment. Importance of enzymes and their mode of actions will be discussed. Effects of temperature, pH, enzyme concentration etc. will be investigated in the laboratory.</p>
<b>BL4102</b>	<p><b>Biodiversity</b></p> <p>BL4102 is the sequel to BL1102, Diversity of Life. The focus here is on the plant and animal Kingdoms. Morphological characteristics of spore-bearing and seed-bearing plants will be examined in detail. Students will also learn about the characteristics of invertebrates and vertebrates in detail. At the end of the course, students should be able to explain why each organism is classified as such. They should also be able to discuss at length the characteristics that contribute to the success of various plants and animals today. Lab practicals and field trips will allow students to examine specimens in detail.</p>
<b>BL4103</b>	<p><b>Molecular Genetics</b></p> <p>This module will be built on the knowledge acquired in BL3103 Inheritance &amp; Population Genetics. It focuses on DNA, the blueprint of life. Students will be introduced to the discovery of DNA as well as its replication, transcription and translation. They will also get hands-on experience in extraction of DNA, PCR and gel electrophoresis.</p>
<b>BL4104</b>	<p><b>Evolution</b></p> <p>This module will introduce the principles behind Darwin's idea of evolution, possibly the greatest scientific discovery to date. Students will also learn that Darwin's theory of natural selection is</p>

	universal and applicable to all fields in biology. Evidences of evolution will be introduced. Students will be taught about the mechanisms and processes of evolution. In addition, amazing examples of co-evolution will also be shown. Lastly, the module will wrap up with reasons behind localized and mass extinctions. Learning of evolution is made more lively through the use of animations and video screenings in this module.
<b>BL5102</b>	<b>Advanced Animal Physiology</b>  This module focuses on the regulatory aspect of animal physiology. Students will learn the importance of homeostasis in maintaining internal constancy in animals. The chemical control of the body via endocrine system will be covered, emphasizing on the roles of various types of hormones. Immunity of a human body against diseases will also be taught. Students will learn the step-by-step approach taken by the human body to defend against invasion of foreign entities. Common diseases will be used as case studies. Lectures will be supplemented by laboratory practicals.
<b>BL5103</b>	<b>Ecology and Environment</b>  This module will be built on the knowledge from BL2102, Energy and Energetics. Students are introduced to population and community ecology. Advanced ecological concepts such as prey and predator relationships, other symbiotic relationships, competition and succession will be covered. Characteristics of various aquatic and terrestrial biomes will also be explored. Anthropogenic effects and mitigation strategies on the environment will be discussed. Students will learn how to contribute to protecting the environment as well as conservation efforts taken to date around the world. Learning is supplemented by intensive overseas and local field trips to explore and understand more about various aquatic and terrestrial ecosystems.
<b>BL5105</b>	<b>Introduction to Biochemistry</b>  This module will cover the basics of the chemical processes taking place in living organisms. Students will be introduced to the energy flow in a cell, the coupling of exergonic and endergonic reactions that forms the basis of all reactions, and ATP that serves as the energy currency in cellular reactions. Intricacies of photosynthesis such as the light-dependent and light-independent reactions will also be covered. Students will learn how cells harvest energy through glycolysis, cellular respiration and fermentation. Experiments will be conducted to reinforce the knowledge acquired.
<b>BL6401</b>	<b>Functions and Adaptations</b>  This module explores the diverse forms and functions of plants and animals. Based on the knowledge acquired previously on plant and animal anatomy and physiology, students are challenged to question the bioarchitecture these organisms. Why are they built in these ways? How do these forms allow them to adapt to their surroundings? Why are some organisms more successful than others? Students will appreciate the works of nature in shaping the great complexity of forms in plants and animals. The diversity of forms may be the result of evolution over time in the race to adapt to the ever-changing environment.
<b>BL6402</b>	<b>Proteins</b>  This module is the integration between Biology and Chemistry. Students reading this module must be firmly grounded in both disciplines. This module explores the four structural levels of proteins. Protein structure is then related to functions. Students will also learn how to extract and purify protein using various methods. They will learn how to use online databases as a powerful tool to determine protein identity and function.

**Table of ELECTIVE / ENRICHMENT modules offered in 2009**

Years	Module Code	Module Title	Pre-requisites	MC
1	BL1202	Microbiology in Action	None	1

2	BL2201	Food Science	BL1103	1
3	BL3202	Introductory Botany	None	1
	BL3203	Sports Nutrition	BL1103	1
4	BL4203	Ecology Field Course at Christmas Island	BL2102, BL4102	2
	BL4204	Behavior	BL4102, BL4104	1
5	BL5201	Training in Biology Olympiad	Department Approval	2

### Module Descriptors of ELECTIVE / ENRICHMENT modules offered in 2009

Module Code	Module Descriptors
BL1202	<p><b>Microbiology in Action</b></p> <p>This module adopts an experimental approach and introduces students to both the adverse effects and benefits of bacteria and fungi in our daily lives. They will explore the role of microorganisms such as bacteria and fungi in food industries, medicine, agriculture and sewage treatment through interesting practicals in the laboratory. By the end of the module, students will acquire sound microbiological techniques which will be applicable to higher years' modules. To make the lessons more fun, students will also learn how to make yogurt. Visits to Yakult factory or Gardenia factory will be planned.</p>
BL2201	<p><b>Food Science</b></p> <p>This module expands on the foundation knowledge that students have acquired in BL1103, as nutrition and food science are intimately related in various aspects. Through a series of hands-on experiments, students will learn how food is produced, processed, prepared and evaluated with the current scientific technologies. They will also study how food is related to their daily life in terms of health, safety, environmental impacts and potential careers.</p>
BL3202	<p><b>Introductory Botany</b></p> <p><i>This module is compulsory for students who are admitted directly to Year 3 in 2009 and did not obtain exemption from the diagnostic test.</i></p> <p><i>Students who have read BL2103 cannot register for this module.</i></p> <p>Students will learn about the different parts of plants and the roles they play. Their knowledge of photosynthesis will be further enhanced where they will be engaged in experiments to investigate the effects of various factors on the process. The reproductive structures of plants (ferns and angiosperms) will be covered. Self-pollination and cross-pollination as well as the adaptations flowers have for wind and insect pollination will be taught. The roles of biotic factors such as soil, water and nutrients on plant growth will be discussed. The roles of plant hormones in growth, senescence and fruit maturation will also be introduced.</p>
BL3203	<p><b>Sports Nutrition</b></p> <p>In this module, students will investigate the ways which diet influences athletic performance and the mechanisms by which nutrients are used in the body. The biochemical processes in which the nutrients are involved in during low and high intensity level are also explored. The specific dietary requirements of athletes are examined and the values of nutritional ergogenic aids are assessed. Different methods of designing and assessing tailored eating plans for athletes to enhance their sporting performance are included.</p>
BL4203	<p><b>Ecology Field Course at Christmas Island</b></p> <p>This module includes an intensive and exciting one-week overseas field trip to Christmas Island and six hours of prior preparatory theory lessons. This course aims to stimulate interest in ecology, ecological techniques and conservation biology. Concepts pertaining to island ecology such as endemism and invasive species using seabirds and Yellow Crazy Ants are taught. Importance of keystone species will be introduced using endemic Christmas Island Red crabs as examples. Marine</p>

	<p>fishes as important bio-indicators of the health of coral reef ecosystems will be introduced. Conservation efforts to protect the island's wildlife from extinction will also be taught. This course is guided by experienced national park managers and world-renowned researchers. Students will put classroom theory into practical use through daily investigations/activities on the island flora and fauna.</p>
<b>BL4204</b>	<p><b>Behaviour</b></p> <p>Students will learn about animal behavior in this module. Behavior is defined as any type of response to stimuli and all questions in behavior can essentially be classed under two main categories: 'how' and 'why'. The 'how' questions concern how the body of the animal functions to carry out the behavior and the 'why' questions are concerned about the evolutionary significance behind the behavior. Regardless of the question asked, like all sciences, research in behavior is also guided by scientific methods. Various aspects of behavior include movement, foraging, communication, social interactions, courtship, mating systems and selfish versus altruistic behavior.</p>
<b>BL5201</b>	<p><b>Training in Biology Olympiad</b></p> <p>This module is designed for students who are selected due to their excellent performance in Biology modules. These students will be training for the Singapore Biology Olympiad in this module. Students can expect rigorous training in a wide range of Biology topics as well as answering techniques. A final selection of students will be made in the course of this module and they will get to represent the school in the Singapore Biology Olympiad.</p>

# CHEMISTRY

The Chemistry curriculum in NUS High School of Mathematics and Science is a 6-year course which aims to deliver a meaningful learning experience for every student, and seeks to nurture the student as an inquirer. It is designed to ultimately instill depth in the understanding of fundamentals, and high competency in solving chemical problems. Our exciting curriculum takes on the spiraling approach and is divided into three key stages – Foundation, Advancement and Specialisation.

The objectives of the Foundation Years are to build a strong understanding in basic and essential concepts in Chemistry and to develop a sense of appreciation for the subject and how closely it relates to our surroundings. The topics introduced will cover a wide breadth, using a conceptual approach, with an emphasis on understanding the behaviour of our physical world from the perspective of atoms and molecules. In addition, students will be frequently engaged in laboratory activities and during the course of which, learn the process of scientific investigations.

In the Advancement Years, students will be introduced to more advanced concepts like chemical equilibria and thermodynamics. Many of these concepts build on what the students already understand from the Foundation Years and the topics are treated in a more in-depth manner. There is also a continual emphasis on the practical component of Chemistry to enhance the students' theoretical and laboratory skills through relevant and carefully planned practical sessions.

Specialisation years provide students with a platform to delve deeper into certain topics. Modules incorporate more higher order questions to stimulate the analytical minds of the students. At the same time, laboratory work is more intensive as students are now more ready to take on independent research to complement the theory covered in class.

The Department offers Chemistry Major with Honours for students who have aptitude and interest in this subject. To qualify, students have to achieve consistently good results in Core modules.

Students normally sit for AP Chemistry in Year 6.

The Department follows the general school policies on curriculum and assessment. For more details, please refer to the school curriculum framework.

The Department follows the general school policies on Exemption and Acceleration of Modules. Interested students shall approach the Head of Department for details on these matters

**Table of CORE Modules offered in 2009**

Year	Module Code	Module Title	Pre-requisites	MC
1	CM1106	Foundation Chemistry 1	NIL	4
2	CM2104	Foundation Chemistry 2	CM1105	4
3	CM3107	Physical Chemistry 1A (Periodicity and Molecular Models)	CM2103	3
	CM3108	Physical Chemistry 1B (States of Matter)	CM3107	3
4	CM4105	Chemical Energetics & Kinetics	CM3103 & CM3104	3
	CM4106	Equilibrium & Thermodynamics	CM4105	3
5 Major Modules	CM5105	Kinetics & Reaction Mechanisms	CM4104	1
	CM5102	Organic Chemistry	CM3103 & CM4101	2
	CM5104	Inorganic Chemistry	CM3103 & CM3105	2
5 Honours Modules	CM5401	Advanced Organic Chemistry	CM5102	2
6 Major Modules	CM6101	Experiments in Synthetic Chemistry	CM5102 & CM5104	3
6 Honours Modules	CM6401	Principles of Spectroscopy	CM5102	2
	CM6402	Separation Science	CM5102	2

**Module Descriptors of CORE modules offered in 2009**

Module Code	Module Descriptors
CM1106	<p><b>Foundation Chemistry I</b></p> <p>This is a year-long module that is designed to introduce students to basic ideas and principles in Chemistry and places emphasis on understanding and application of scientific concepts. Topics covered include experimental Chemistry, kinetic theory of matter, as well as basic chemical bonding and formulae. As Chemistry is an experimental science, students will have numerous opportunities to handle basic laboratory apparatus during the practical sessions. The knowledge and skills introduced in this module are essential to the understanding of Chemistry in the more advanced modules.</p>
CM2104	<p><b>Foundation Chemistry II</b></p> <p>This year-long module is a continuation from Foundation Chemistry 1, and aims to strengthen the fundamental chemistry concepts required for chemistry students to appreciate and master the chemistry modules taught at higher levels. The emphasis in this module is to enable students to apply their foundational knowledge of the various aspects of chemistry in understanding chemical reactions including precipitation, acid-base and redox reactions. Emphasis will also be given to practical skills required for the volumetric and qualitative analysis of chemicals.</p>
CM3107	<p><b>Physical Chemistry 1A (Periodicity and Molecular Models)</b></p> <p>This module starts by exploring the remarkable organisation of the Periodic Table, as well as its relationship with the electronic structures of elements. The general periodic trends of these properties will also be examined. An overview of chemical bonding (ionic, covalent &amp; metallic bonds) and the structures of ionic, covalent &amp; metallic substances will then be covered. Students will also learn how to draw Lewis structures, predict molecular shapes and molecular polarities. This module also looks into theories of covalent bonding in perspective: Lewis theory and Valence Bond theory.</p>
CM3108	<p><b>Physical Chemistry 1B (States of Matter)</b></p> <p>This module extends on the principles introduced in Year 1 Chemistry. Each phase of matter— gas,</p>

	liquid and solid—will be examined more thoroughly, as well as the transitions from one state to another through phase diagrams. In the second part of the module, we will take a closer look at solutions and their behaviors by exploring their colligative properties as well as further reactions in aqueous solutions.
<b>CM4105</b>	<b>Chemical Energetics &amp; Kinetics</b>  Chemical energetics is the study of heat changes in chemical reactions. The module covers the First Law of Thermodynamics, calorimetry and calculations involving Hess' Law. It also introduces the concepts of different enthalpy changes. Chemical Kinetics is the study of the rates of chemical reactions at both the macroscopic and particulate level. It covers the factors which affect chemical reactions in terms of collisions and the action of catalysts, activation energy and reaction mechanisms. A quantitative description of reaction kinetics will also be covered, where rate equations, rate constants and orders of reaction with respect to reactants are introduced.
<b>CM4106</b>	<b>Equilibrium &amp; Thermodynamics</b>  In this module, we look at two important concepts – Chemical Equilibrium and Thermodynamics, which are fundamental in almost all processes. The understanding of equilibrium enables one to understand how chemical reactions proceed and also how they are controlled while the study of chemical thermodynamics aims to predict whether or not a reaction will occur when reactants are brought together under a specific set of conditions (for example, at a certain temperature, pressure and concentration). Students will explore the key ideas behind these concepts and learn to apply them in the understanding of some common chemical reactions.
<b>CM5105</b>	<b>Kinetics &amp; Reaction Mechanisms</b>  Chemical Kinetics is the study of the rates of chemical reactions at both the macroscopic level and the particulate level. In this module, we will explain how factors like concentration, temperature and pressure affect the rates of reactions and also study the relationship between reaction concentration and time for three types of reactions: zero order, first order and second order. Furthermore, we will examine the mechanism of a reaction in terms of the elementary steps and also study the effect of catalysts on the rates of reactions.
<b>CM5102</b>	<b>Organic Chemistry</b>  Organic chemistry has been the frontier of chemical research. It surrounds us in every part of our life and its knowledge transcends all disciplines of science. The vast majority of chemical compounds known to man are organic; that is, they are compounds built on a carbon framework. Organic compounds vary greatly in size and complexity, from the simplest hydrocarbon, methane, to macromolecules, made up of thousands of atoms. In this module, you will take on the mechanistic approach towards the learning of organic chemistry reactions, so that you will understand the fundamental reasoning behind how organic reactions proceed.
<b>CM5104</b>	<b>Inorganic Chemistry</b>  Inorganic Chemistry covers the main group elements in the s and p blocks and the transition elements in the d block. This module aims to provide a unifying approach to the general physical and chemical characteristics of these elements. In addition, students will also explore a class of compounds known as coordination compounds, which exhibit interesting structures, bonding, and colours. A good foundation in Inorganic Chemistry will allow one to delve into advanced topics such as organometallic chemistry and bioinorganic chemistry.
<b>CM 5401</b>	<b>Advanced Organic Chemistry</b>  This module is taken after the module, CM5102 Organic Chemistry. The module builds upon the foundation of Organic Chemistry and will delve into the mechanisms of organic reactions. Students will deepen their understanding and appreciation of Organic chemistry. The module will cover further applications in synthetic organic chemistry from modern day reactions to the synthesis of biochemical molecules.
<b>CM6101</b>	<b>Experiments in Synthetic Chemistry</b>  This module is taken after modules, CM5102 Organic Chemistry and CM5104 Inorganic Chemistry,

	<p>to provide an introductory experience in laboratory synthesis and analytical techniques. Chemical synthesis is one of the most valuable skills to learn in a Chemistry laboratory and these practical sessions are designed to provide a thorough training in elementary techniques of organic synthesis. Analytical techniques such as complex titrations and chromatography will also be featured in this highly intensive laboratory module. Assessment will be based strongly on proper implementation of these techniques, to build competence in carrying out synthetic and analytical work efficiently and independently.</p>
<b>CM6401</b>	<p><b>Principles of Spectroscopy</b></p> <p>This module covers the various methods of chemical analysis and structure elucidation used in modern day chemistry. Students will gain an understanding and learn to analyse data from various methods such as infrared spectroscopy (IR), mass spectroscopy (MS), ultraviolet spectroscopy (UV), and nuclear magnetic resonance (NMR). These skills in hand will aid them greatly in their pursuit in a career in Science.</p>
<b>CM6402</b>	<p><b>Separation Science</b></p> <p>This module covers the history of chromatography and the various aspects and techniques of modern day chromatography, including gas chromatography (GC), ion-exchange chromatography and high performance liquid chromatography (HPLC). Students will also gain practical experience into this topic.</p>

**Table of ELECTIVE / ENRICHMENT modules offered in 2009**

Year	Module Code	Module Title	Pre-requisites	MC
4	CM4201	Chemistry Olympiad Training I	Department Approval	1
5	CM5202	Chemistry Olympiad Training III	Department Approval	2

**Module Descriptors of ELECTIVE / ENRICHMENT modules offered in 2009**

Module Code	Module Descriptors
CM4201	<b>Chemistry Olympiad Training I</b>  This is a 1MC Chemistry Elective module specially designed for Year 4 students who have done very well in Chemistry and show potential in handling more challenging content and tackling harder physical chemistry problems.
CM5202	<b>Chemistry Olympiad Training II</b>  This is a Chemistry Elective module specially designed for Year 5 students who have done very well in Chemistry and display a strong passion for the subject. During the course, students must show potential in handling more challenging content and tackling higher order Chemistry problems. Students who exhibit high level of understanding and competence may eventually be shortlisted for the Singapore Chemistry Olympiad (SChO) organized by NUS.

# PHYSICS

Physics curriculum in NUS High School spans 6 years and is divided into three key stages – the Foundation, Advancement and Specialisation Years.

Foundation modules (Year 1 & 2) are designed with a broad conceptual approach to ensure that students receive strong foundational grounding in the fundamental concepts and principles such as motion, conservation of energy and electricity. A wider scope is adopted with less emphasis on math-based problems so that it allows greater mastery of these concepts.

In Advancement Years modules (Year 3 & 4), the topics covered in the foundational modules are revisited with greater rigor using a mathematical approach involving the use of tools such as algebra and trigonometry. Greater emphasis is placed in these modules on problem-solving techniques and analytical approaches to physical situations. Students, who intend to pursue Major with Honours in Years 5 & 6, should opt for the Acceleration Track from Year 3 Semester 2 onwards.

The Specialization Years (Year 5 & 6) modules build on those in the earlier years, extending study in mechanics and electromagnetism through the use of calculus. The focus is on deepening students' understanding and extending their learning through greater analytical and mathematical sophistication, as well as raising the standard of their problem-solving abilities through calculus applications.

Besides the core modules, the department offers a wide range of Elective & Enrichment modules which are intended to bring students to the next level of interest and passion in Physics. By going beyond the fundamentals, these modules will allow for students to pursue their passion and interest in areas such Robotics, Computational Physics and Astronomy.

The Department offers both Major in Physics and Major with Honours in Physics. A summary of the required modules are given in the Tables below. To qualify for reading a Major with Honours in Physics, students have to achieve consistently good results in their Core modules.

Students taking Major in Physics normally sit for AP Physics B in their Year 6, while students taking Majors with Honours will sit for AP Physics B in Year 5 and AP Physics C in Year 6.

The Department follows the general school policies on curriculum and assessment. For more details, please refer to the school curriculum framework.

The Department follows the general school policies on Exemption and Acceleration of Modules. Interested students shall approach the Head of Department for details on these matters.

**Table of CORE Modules offered in 2009**

Year	Module Code	Module Title	Pre-requisites	MC	
1	PC1110	Foundational Physics I	None	4	
2	PC2110	Foundational Physics II	PC1110	4	
3	Major Track	PC3110	Mechanics	PC2110	5
	Accelerated Track	PC5110	Advanced Mechanics	PC3110	2
4	Major Track	PC4110	Advanced Physics	PC3110	6
	Accelerated Track	PC5111	Higher Physics	PC4110	2
5 Major Modules	PC5106	Practical Circuitry	PC 4110	2	
	PC5110	Advanced Mechanics	PC3110	2	
	PC5111	Higher Physics	PC4110	2	
5 Honours Modules	PC6101	Atomic & Nuclear Physics	PC5111	3	
	PC5401	Calculus-based Mechanics I	PC3110	2	
	PC5403	Calculus-based E&M I	PC5111	2	
6 Major Modules	PC6101	Atomic & Nuclear Physics	PC5111	3	
	PC6102 *	Modern Physics I	PC 6101	2	
	PC6110 *	Introductory Electronics	PC 5106	2	
6 Honours Modules	PC6402	Calculus-based Mechanics II	PC 5401	2	
	PC6404	Calculus-based E&M II	PC 5403	2	

\* Students are only required to do one of the two modules

**Module Descriptors of CORE modules offered in 2009**

Module Code	Module Descriptors
PC1110	<p><b>Foundational Physics I</b></p> <p>This foundational module provides the basic introduction to the nature and practice of physics. Students will learn about scientific notation, unit conversion, relationships between base physical quantities and its application. The module also aims to develop some understanding of mechanics and to foster an awareness of how these relate to everyday experiences. Students will learn about relationships between speed, distance and time, effects and nature of forces including friction, as well as develop an understanding of Newton's three laws of motion. Finally, students will be introduced to the important concepts of torque, work, energy and power.</p>
PC2110	<p><b>Foundational Physics II</b></p> <p>In this module, we will examine how changes in temperature or states of matter are related to internal energy and heat. The kinetic model of matter is used to explain and predict the physical properties and changes of matter. Students will also need to understand the nature and properties of waves such as light and sound. The course concludes with an introduction to the nature of electric &amp; magnetic forces and simple circuit knowledge.</p>
PC3110	<p><b>Mechanics</b></p> <p>In this advancement year core module, students will focus on developing key concepts in classical mechanics. The module starts with an introduction to physical measurements, kinematics, Newton's</p>

	Laws, momentum, impulse, work, energy and power. The laws of conservation of momentum and energy and their use in elastic/inelastic collisions will also be discussed with emphasis on problem-solving. Finally, students will study the concepts of centre-of-mass systems, circular motion, torque and an introduction to Newton's Law of Universal Gravitation.
<b>PC4110</b>	<b>Advanced Physics</b>  The advancement module covers the essential topics of temperature, thermal physics & thermodynamics, geometrical optics & applications, oscillations & waves and lastly electrostatics & electromagnetism / electromagnetic induction. This course requires use of algebraic mathematics and simple calculus knowledge will be useful in the latter part of the course.
<b>PC5110</b>	<b>Advanced Mechanics</b>  In this advancement year module, students continue with further problems in projectile motion and learn to solve 2-D kinematics problems. This is followed by rotational kinematics introducing the concepts of rotational inertia, angular velocity and acceleration. Students will also be taught further concepts of gravitation such as gravitational potential, gravitational potential energy and applications to satellite motion. Finally, the course will end with an introduction to the concepts of fluid dynamics such as buoyancy, principle of flotation, types of fluid flow, Bernoulli's equation & applications.
<b>PC5111</b>	<b>Higher Physics</b>  In this module, students will learn about beats, phase difference, Doppler Effect, Malus's Law of Polarization and Brewster's Angle and use them to examine and explain phenomenon in oscillation & waves. This is followed by a further study on thermal properties of matter, focusing on ideal gas equation. Finally, students will be introduced to The First and Second Law of Thermodynamics, the Carnot Engine and Entropy.
<b>PC5106</b>	<b>Practical Circuitry</b>  This module equips students with the necessary knowledge and skills for circuit analysis. Students are introduced to basic components, mainly, resistors, capacitors and inductors. They are also taught the concepts of series and parallel circuits as well as theories such as Ohm's Law, Kirchhoff's Voltage Law and Kirchhoff's Current Law. Emphasis is placed on the development of practical skills where students spend time in the laboratory setting up and analysing circuits using equipment such as digital multimeters and oscilloscopes.
<b>PC6101</b>	<b>Atomic &amp; Nuclear Physics</b>  This module aims to provide students with insights into some of the defining experiments such as blackbody radiation, photoelectric effect and Compton scattering that led to the development of quantum mechanics. Students will be taught the wave-particle duality, and the concepts of discrete energy levels in atoms in line spectra. Students will also be taught the basic principles of nuclear structure and radioactivity. These include the developments which led to the elucidation of the size and structure of the nucleus, the discovery and characterization of radiation and radioactive sources and the nuclear transmutations behind such activities. Mass-energy equivalence and the concept of mass defect will be covered with applications for nuclear fusion and fission. An appreciation of environmental issues concerning nuclear energy will also be included.
<b>PC5401</b>	<b>Calculus-based Mechanics I</b>  This module will revisit all the previous topics in Newtonian mechanics using a calculus approach. The emphasis will be on the use of advanced mathematical techniques to analyse and solve classical mechanics problems covering both point and extended objects. Where appropriate, calculus is used to formulate physical principles and in applying these principles to physical problems. This module touches specifically on kinematics, Newton's Laws of Motion, work, energy & power, impulse and momentum, torque & rotational statics.
<b>PC5403</b>	<b>Calculus-based E&amp;M I</b>

	In this module, students will deal with Electric and Magnetism using a rigorous calculus based-approach. This first module will touch on concepts of the electric fields and magnetic fields. Ideas such as Gauss's Law, electric flux, electric potential will be employed to solve problems in electrostatics. These ideas will lead to applications in dielectrics and capacitance (inclusive of networks e.g. RC circuits). Students will also use Biot-Savart's Law and Ampere's Law to deduce the magnetic field at points in space given the various configurations and symmetries.
<b>PC 6102</b>	<b>Modern Physics I</b>  This course aims to provide an introduction to Einsteinian Relativity with an emphasis on conceptual understanding. Galilean Relativity is reviewed for objects traveling near the speed of light and the inconsistencies made apparent. From here, students will learn how Einstein's Theory of Special Relativity rescued the situation and how this theory gave rise to a myriad of consequences such as non-simultaneity of events, time dilation and length contraction. From its interpretation of momentum and energy, students will get to appreciate the origins of the equation $E=mc^2$ . The Theory of Special Relativity will receive quantitative treatment. Towards the end of the course, General Relativity will be qualitatively treated.
<b>PC6110</b>	<b>Introductory Electronics</b>  This module introduces the basics of electronics and focus on diodes, zener diodes and progresses to the design of rectifiers and finally to a simple DC power supply. Students will also get an introduction to the workings of a bipolar junction transistor. Students who are majoring in Physics are encouraged to take this course as the module provides the foundational skills needed for basic engineering laboratory work.
<b>PC6402</b>	<b>Calculus-based Mechanics II</b>  This module will cover mainly rotational kinematics & conservation of angular momentum, oscillations and gravitation. For rotational kinematics, students will apply conservation of energy and angular momentum to systems such as strings and pulleys as well as collisions between a moving particle and a rotating object. Analysis of such problems can be approached from a fixed axis or about its center of mass. For oscillations, students will formulate and solve differential equations for systems such as mass on a spring, simple pendulum and recognize its form for simple harmonic motion. Students will also develop a qualitative understanding of resonance so they can identify situations in which a system will resonate in response to a sinusoidal external force. For gravitation, students will extend from their knowledge of Newton's law of gravitation and cover Kepler's three laws of planetary motion and use them to describe in qualitative terms the motion of an object in an elliptical orbit. Students will also solve problems involving conservation of energy and angular momentum for objects in orbit or projected from a planet's surface.
<b>PC6404</b>	<b>Calculus-based E&amp;M II</b>  In this second module, students will explore magnetic phenomena and its relationships with electricity and the electric field. Topics covered include a review of magnetic field and field lines, Ampere's Law, Biot-Savart's Law, motion of particles in a magnetic field and applications of such concepts e.g. Hall Effect. Electromagnetic effects are analysed, as evidenced by the consequences of Lenz's Law and Faraday's Law. Maxwell's equations are introduced as the framework under which electromagnetic phenomena can be generalized. Students will also learn the concept of alternating current, reactance, as well as resonance, using phasors approach.

**Table of ELECTIVE / ENRICHMENT modules offered in 2009**

Year	Module Code	Module Title	Pre-requisites	No. of MCs
1	PC1302	Robotics	None	1
	PC1303	Robotics (Design and Build)		2
2	PC2301	Aero-Modelling	None	1
	PC2201	Beyond Foundational Physics		1

3	PC3302	Introduction to Astronomy	None	2
	PC3303	Special Topics in Physics		2
	PC3305	Physics Olympiad Training I		2
4	PC4201	Computational Physics	Basic Calculus Programming	2
	PC4305	Solar Energy for Sustainable Development		2
	PC4306	Physics Olympiad Training II		2
	PC4202	Astronomy		1
	PC4304	Aerodynamics	PC3110	2
	PC4307	Physics Olympiad Training III		2
5	PC5301	Physics Olympiad Training IV		2
	PC5302	Physics Olympiad Training V	PC5301	2
6	PC6203	Modern Physics II		2

### Module Descriptors of ELECTIVE / ENRICHMENT modules offered in 2009

Module Code	Module Descriptors
PC1302	<p><b>Robotics</b></p> <p>This module is an introduction to the building and programming of robots using the LEGO Mindstorms Robotics Kit. Students will learn the principles of mechanical design, construction, programming and teamwork skills. In small teams, using LEGO blocks, motors and sensors, students will explore various mechanical components such as gears, levers and pulleys to build and control robots. The course will be structured in a series of missions which the students will attempt to complete.</p>
PC1303	<p><b>Robotics (Design and Build)</b></p> <p>This course will focus on the Lego Mindstorms NXT platform. Students will use the NXT sets to design, build and programme robots. The more advanced features of the NXT technology will be explored. It is preferable but not necessary that students have had some basic hands-on experience with the NXT and the sets will be provided.</p>
PC2301	<p><b>Aero-Modelling</b></p> <p>This module aims to further students' understanding of aerodynamics through an introduction to the world of aero-modelling. This is done through theory and practice. Students will first be taught the fundamentals of plane design. They will then translate theory into actual hands-on construction of a model plane. Students will eventually get the opportunity to fly their constructions.</p>
PC2201	<p><b>Beyond Foundational Physics</b></p> <p>This course is intended to bring students to the next level of awareness in Physics. By introducing more updated topics like Relativity, Quantum Physics and Particle Physics, we hope that students can be motivated to find out about things beyond their current courses.</p>
PC3302	<p><b>Introduction to Astronomy</b></p> <p>This course is an introduction course for avid astronomers and will deal with star charts and field observations. In this module, students get to familiarize themselves with techniques of locating celestial objects by star-hopping, reading star charts, as well as basic terminology used in Astronomy. Basic concepts regarding the phases of the Moon, elements of the celestial sphere, major constellations and planets will be introduced. Students can expect to spend at least three evenings of</p>

	about 3-4 hours each in our very own Observatory doing the practical sessions.
<b>PC3303</b>	<b>Special Topics in Physics</b>  This module aims to introduce and enthruse students to interesting applications of Physics in everyday life and also hope to cover areas such as research and engineering. The format will be seminar series and students will get the opportunity to do some hands-on activities and visit various physics research laboratories in Singapore.
<b>PC3305</b>	<b>Physics Olympiad Training I</b>  This module covers challenging problems in physics and can be taken as preparation for Singapore Junior Physics Olympiad (SJPO).
<b>PC4201</b>	<b>Computational Physics</b>  This course is an elective intended for students who are interested in learning about computational aspects of physics. Students will learn about how to solve initial value problems using differential equation. Examples studied will be radioactive decay, pendulum, projectile motions and the chaotic pendulum. Numerical topics such as root finding, and the solution of simultaneous equations will be covered, as well as the use of random numbers in simulation.
<b>PC4305</b>	<b>Solar Energy for Sustainable Development</b>  This course is an elective intended for students who are interested in learning about Solar Energy technologies. We will give reasons to motivate sustainability, then dive into the measurement of sunlight. Then we will investigate the solar thermal and solar photovoltaic applications. Students will be required to do a term paper essay. There may be a laboratory or field trips to solar-engineering companies.
<b>PC4306</b>	<b>Physics Olympiad Training III</b>  This module covers challenging problems in physics and can be taken as preparation for Singapore Junior Physics Olympiad (SJPO).
<b>PC4202</b>	<b>Astronomy</b>  This module is designed to develop a general understanding of the sun, planets, and moons; origin of the solar system; nature and evolution of stars; exploding stars; stellar remnants, including white dwarfs, neutron stars, and black holes; molecules in space; galaxies and quasars; past and future of the universe. Students will get hands on training in telescope skills (both motorized and manual). Subject to availability of resources, this entire module can take place in the form of a local or overseas field trip where students can enjoy the full view of the Milky Way and where other faint objects are visible through the scope. The students also embark on a simple project on Astronomy e.g. Astrophotography.
<b>PC4304</b>	<b>Aerodynamics</b>  This course is an optional elective intended for Year 4 students who are interested in fluid mechanics and aerodynamics. Beginning with a recap of hydrostatics, the continuity equation and Bernoulli's equation, students will analyse characteristics of fluid flow, drag and lift, animal flight, airfoil designs, propulsion and aircraft design.
<b>PC4307</b>	<b>Physics Olympiad Training III</b>  This module covers challenging problems in physics and can be taken as preparation for Singapore Junior Physics Olympiad (SJPO).
<b>PC5301</b>	<b>Physics Olympiad Training IV</b>  This module covers challenging problems in physics and can be taken as preparation for Singapore Physics Olympiad (SPhO).
<b>PC5302</b>	<b>Physics Olympiad Training V</b>

	<p>This module covers challenging problems in physics and can be taken as preparation for Singapore Physics Olympiad (SPhO).</p>
<b>PC6203</b>	<p><b>Modern Physics II</b></p> <p>This elective module is an extension of the content covered in the core module PC6102. Essentially, more details are covered on the topics of Quantum Physics, Quantum Mechanics, Line spectra, molecules &amp; solids and nuclear structure.</p>

# THE LANGUAGES

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## ENGLISH LANGUAGE & LITERATURE

### ENGLISH LANGUAGE

The English Language programme aims to nurture students who are able to communicate effectively as a result of their development in listening, reading, speaking and writing. Various classroom activities, projects and assessments are aimed at equipping students with critical life-skills of analysis and reflection. In addition, the programme hopes to cultivate students' interest in the language, love for reading and awareness of the world.

At the end of the programme, the student will be a proficient user of English language who demonstrates the qualities of an effective and confident communicator—one who is able express his/her views with confidence and style. More importantly, the student will emerge a critical and creative thinker who is able to analyse and evaluate issues across disciplines.

The curriculum adopts a constructivism approach, which engages the learner in making meaning from authentic texts and using language in real-world contexts. For every module, an integrated and holistic strategy is used, to ensure acquisition of key language skills in listening, reading, speaking and writing. Class time will be devoted to thinking, decision-making, learning-focused interaction and problem-solving in authentic contexts.

The curriculum during the Foundation Years focuses on the appreciation and creation of literary works and functional texts. Through text types such personal recounts, narratives, descriptive works, poetries, plays, the modules aim to develop students' language and literary skills. The study of Literature will be incorporated in some of the modules. In addition, students will be introduced to a wide range of functional texts like factual recounts, information reports and formal letters. They will apply knowledge of textual and linguistic features to communicate effectively for real world purposes.

During the Advancement Years, students will be introduced to expository texts. Through exposure to a broad range of expositions covering various social issues and concepts, students will learn to understand, appreciate and analyse arguments and persuasive elements in these texts. They will acquire techniques in responding to arguments and writing expository essays. In addition, students will apply these skills to complete authentic tasks such as the creation of advertisements and collaterals; writing and presenting formal speeches, reports and proposals.

During the Specialisatoin Years, students acquire knowledge and understanding of diverse topic areas through extensive reading, group discussions and independent research. They will develop skills in analysing and evaluating world issues across disciplines, and understand their significance and implications for the individual, nation and the global community. They will continue to hone their skills in critical reading and formulating cogent arguments.

Students must pass all English Language modules to fulfil the requirements for graduation with the NUS High School Diploma. As English Language is a process skills subject, the department does not allow for exemption or acceleration of modules. Class attendance and participation are imperative for skill-development, hence they are not optional.

**Table of CORE Modules in 2009**

Year	Module Code	Module Title	No. of MCs
1	EL1105	Developing Language and Literary Skills I	4
	EL1106	Developing Language and Literary Skills II	3
2	EL2103	Narration and Description	3
	EL2105	Language for Functional Purpose	3
3	EL3103	Introduction to Exposition	3
	EL3104	Introduction to Exposition II	3
3	EL3106	The Language of Expositions	3
	EL3107	The Language of Expositions II	3
4	EL4103	Critical Reading and Response	3
	EL4104	Language in Society I	3
5	EL5101	Language in Society II	6 (Year-long module)
6	EL6103	Language in Society III	6 (Year-Long module)

**Module Descriptors of CORE modules offered in 2009**

Module Code	Module Descriptors
<b>EL1105</b>	<b>Developing Language and Literary Skills I</b>  This is the first of four modules which will build on students' existing knowledge and language skills and help them further develop the reading, writing, listening and speaking skills needed to become effective users of the language. Through the study of a range of rich texts, students will learn and understand the workings of language and the way linguistic features contribute to the possible interpretations of a text. While students will be exposed to a variety of texts, including narrative and descriptive texts, the key focus of the module will be on personal recounts. Students will also be given opportunities to develop their public speaking skills through delivering presentations in class.
<b>EL1106</b>	<b>Developing Language and Literary Skills II</b>  This is an extension of EL1105, which further hones students' language skills in reading, writing, listening and speaking. The module focuses on the appreciation and creation of literary works such as poetry, personal recounts, narratives and plays. Students will be given opportunities to create personal creative writing portfolios and to present their works in class.
<b>EL2103</b>	<b>Narration and Description</b>  This module develops and hones students' skills in narrative and descriptive writing through regular reading and writing practice. Students will further develop their speaking skills through a group project in which they will critique a canonical narrative text. The module studies the structure and evaluates the qualities of narratives with the aim of making students create their own narrative portfolios in a workshop atmosphere.
<b>EL2105</b>	<b>Language for Functional Purpose</b>  In this module, students will be introduced to a wide range of functional texts like factual recounts, information reports, procedures and formal letters. They will apply knowledge of textual and linguistic features to communicate effectively for real world purposes.
<b>EL3103</b>	<b>Introduction to Exposition</b>

	<p>This module introduces the skills of critical reading and writing. Building on students' knowledge from EL2104, this module will refine their comprehension and summary skills. In addition, they will be exposed to expository writing where they will learn to form claims, substantiate them with ample evidence and elaboration. Students will also learn through varied modes of instructions such as class discussions, journal-writing, peer editing and peer critique.</p>
<b>EL3104</b>	<p><b>Introduction to Exposition II</b></p> <p>This module further hones students' skills in expository writing. It focuses on expository texts in real life settings. Students will be assigned to authentic tasks and projects such as the creation of advertisements and marketing collaterals; writing and presenting formal speeches, reviews, reports and proposals.</p>
<b>EL3106</b>	<p><b>The Language of Expositions</b></p> <p>This module is intended to further equip students with fundamental English language skills so that they will be proficient and confident in their use of the English Language. The areas of focus include teaching students to acquire an extensive lexicon, strengthening their control of the grammar and varied sentence structures as well as employing reading strategies in order to master comprehension skills and craft coherent expository essays. This module will meet the needs of those whose grasp of certain linguistic conventions remains tenuous and, at the same time, leverage on students' existing language skills to construct a better understanding of the English Language.</p>
<b>EL3107</b>	<p><b>The Language of Expositions II</b></p> <p>This module is an extension of EL 3106. It aims to further develop and hone students' English language skills. The areas of focus in this module include expanding students' existing repertoire of vocabulary and gaining a better understanding of sentence making together with grammar in order to comprehend texts as well as to explore the methods of argumentation with reference to authentic materials such as forum and persuasive formal letters.</p>
<b>EL4103</b>	<p><b>Critical Reading and Response</b></p> <p>This module is designed as an introductory course that is focused on the essential skills needed for an English Language learner to be fluent and confident in expressing arguments and opinions in an academic manner - by making cross-disciplinary links that go beyond classroom knowledge. Using authentic texts from varied text types such as newspapers and periodicals as a way of promoting critical thinking and inquiry, it is hoped that this module will prepare students to tackle more challenging and complex academic content in future modules. Emphasis will be placed on critical evaluation of opposing viewpoints of issues, which will be carried out through active independent student research, group discussions and oral presentations. The chief learning outcome thereof is that students will be able to become independent critical readers and writers who are capable of appraising various social local and global issues in an informed manner.</p>
<b>EL4104</b>	<p><b>Language in Society I</b></p> <p>This module's primary aim is to further foster critical reading and writing skills that students need to meet the requirements of the academia and beyond. Themes covered in this module include human rights, the influence of the mass media, as well as science and technology. Activities and projects are aimed to stimulate creative and analytical thinking and writing from the students. Through close reading, classroom discussion, writing exercises and oral presentations, students will be able to read and interpret texts with insight and objectivity. Students will also be given opportunities to practise writing skills in exposition, critiquing, and research in academic settings.</p>
<b>EL5101</b>	<p><b>Language in Society II</b></p> <p>This is the second module in a course in the English Language that seeks to develop the student's understanding, appreciation, and use of the language, thereby unlocking its mystery, beauty and power.</p> <p>It is part of a series of modules that deals with the use of the English Language in Society, dealing with both local and global social concerns, both generally and specifically. The focus would be on the production and comprehension of exposition, persuasion and argumentation in reading, writing, listening and speaking. This would be a year-long module. For this module, the specific topics / themes of focus would be Social Issues, the Politics. Nevertheless, we would also deal with current</p>

	issues, concerns and controversies as they arise.
<b>EL6103</b>	<p><b>Language in Society III</b></p> <p>This module aims to develop students' maturity of thought, critical reading and writing skills, in the context of current, pertinent world issues. Through the study of topics on globalisation, poverty and politics, the module is designed to help students understand better the world they live in and develop a critical awareness of continuity and change in the human experience. Using the nuances of English Language in studying the topics, the module aims to equip students with content knowledge as well as skills in formulating and evaluating arguments. Throughout the module, emphasis will be on the production and comprehension of exposition, persuasion and argumentation in reading, writing, listening and speaking. Teaching and learning will take the form of classroom discussions, debates, comprehension and writing exercises, independent reading, presentations and group research.</p>

## ENGLISH LITERATURE

The Literature curriculum offers students the opportunity to engage critically and meaningfully with a broad selection of literary texts over a span of six years. These include representative works from various genres and periods.

The foundation Literature module is incorporated into the Year 1's English Language modules, EL1105 and EL1106. These foundation modules are pre-requisites for all higher level modules offered in the subject.

The Literature curriculum consists of stand-alone modules with some degree of modular spiralling from Year 1 to 6. The foundation modules provide the basic critical reading skills and competencies necessary for any further study in the course.

There are three key stages in the curriculum, which will allow students to develop, reinforce and attain mastery of skills according to their ability.

1. Foundation – this stage introduces students to the discipline and fundamental skills which will be reinforced in subsequent modules.
2. Advancement – this stage reinforces the foundational skills through application of skills learnt when dealing with more complex material.
3. Specialisation – at this stage, students are accomplished critical readers and will have the skills and competencies required for entry into tertiary level.

### Table of CORE Modules in 2009

Year	Module Code	Module Title	Pre-requisites	MC
1	EL1105	Developing Language and Literary Skills I		4
	EL1106	Developing Language and Literary Skills II	EL1105	3
2	EN2101	Drama	EN1101*	2
3	EN3104	The Novel I	EN1101*	2
4	EN4101	Literature in Context I: Modern Poetry	EN1101*	2
	EN4105	The Novel II	EN1101*	2
	EN4106	Shakespeare	EN2101	2
5	EN5101	Literature in Context II: Post-Colonialism	EN1101*	3
	EN5102	Science Fiction: Taking Stock of Progress	EN1101*	2
6	EN6201C	Literature in Context III: Only Connect	EN1101*	3

## Module Descriptors of CORE modules offered in 2009

Module Code	Module Descriptors
<b>EL1105</b>	<p><b>Developing Language and Literary Skills I</b></p> <p>This is the first of four modules which will build on students' existing knowledge and language skills and help them further develop the reading, writing, listening and speaking skills needed to become effective users of the language. Through the study of a range of rich texts, students will learn and understand the workings of language and the way linguistic features contribute to the possible interpretations of a text. While students will be exposed to a variety of texts, including narrative and descriptive texts, the key focus of the module will be on personal recounts. Students will also be given opportunities to develop their public speaking skills through delivering presentations in class.</p> <p>This is an English Language module that incorporates the fundamental skills of Literature. It is a core module that is compulsory for all Year 1 students.</p>
<b>EL1106</b>	<p><b>Developing Language and Literary Skills II</b></p> <p>This is an extension of EL1105, which further hones students' language skills in reading, writing, listening and speaking. The module focuses on the appreciation and creation of literary works such as poetry, personal recounts, narratives and plays. Students will be given opportunities to create personal creative writing portfolios and to present their works in class. This is an English Language module that incorporates the fundamental skills of Literature. It is a core module that is compulsory for all Year 1 students.</p>
<b>EN2101</b>	<p><b>Drama</b></p> <p>Drama allows students to explore the basics of staging, the use of space, body and voice to present stories or scenarios. This course helps students critically analyse excerpts of dramatic verse, from Shakespeare to Kuu Pao Kun. It also allows them an opportunity to present their own interpretations of simple texts to their peers.</p>
<b>EN3104</b>	<p><b>The Novel I</b></p> <p>Centred on a close textual analysis of Ray Bradbury's <i>Fahrenheit 451</i>, this module will introduce students to the development of the novel, examining its rise as a dominant art form. Students will relate the skills learnt in EN1101 on elements of prose in performing textual analysis on a full-length novel. This module also aims to engage students in a meaningful debate on the dangers of censorship and the loss of independent thought and to evaluate the extent to which the world presented in <i>Fahrenheit 451</i> has become a close approximation of reality half a century later.</p>
<b>EN4101</b>	<p><b>Literature in Context I: Modern Poetry</b></p> <p>A survey of modern poetry that concerns itself with, mankind adjusting to industrialisation, the invention of standard time and ideas of an urban lifestyle. These poems vocalise the alienation, longing for memory and a connection to the rural, yet in the midst of these writings hints of discovery, change and celebration are demanded of the best of humanity that remains to be moved.</p>
<b>EN4105</b>	<p><b>The Novel II</b></p> <p>Chart the development of the English novel, examining its rise as a dominant art form and its changes and developments. This course will also present the various techniques in narratives and style adopted by various authors. Students will be presented with a selection of extracts from novels, ranging from the first novel of incident to the contemporary novel.</p>

<b>EN4204C</b>	<p><b>Shakespeare</b></p> <p>Introduction to the Bard through performance of one of his political tragedies Julius Caesar. Explore questions like "Is Shakespeare still relevant today?", "How is the play staged?", "What is a great man?" and "What does it mean to be honourable today?" Students will view theatre and film interpretations of Shakespeare. Class discussion and participation is important and students will have a chance to stage their own versions of Jullius Caesar. Students will not be assessed on performances but on their ability to defend their staging decisions with evidence from the text.</p>
<b>EN5101</b>	<p><b>Literature in Context II: Post-Colonialism</b></p> <p>Centred round a study of Chinua Achebe's tragic tale of returning home a stranger in <i>No Longer at Ease</i> with other supporting prose along the theme of identity, power and displacement, this course will introduce students to the world of postcolonial literature highlighting the tensions between the 'centre' and the 'other', as well as invite students to consider how postcolonial authors attempt to redress the issue of colonialism. Students will also be given essays on postcolonial thought and criticism and are to relate these theories to the texts they will be covering. The increasing exposure to literary criticism will prepare them for their final year module EN6201 that focuses predominantly on critical theory.</p>
<b>EN5102</b>	<p><b>Science-Fiction: Taking Stock of Progress</b></p> <p>A borderless world? What does science and technology strive to achieve? Science Fiction offers readers a chance to take stock of the relationship between science and the civilisation and progress of man's own soul. The fantastic genre offers new languages, unknown places and characters limited only by the reader's imagination and the author's intention. The second part of the course delves deeper into the idea of systems and dystopias in Science Fiction texts. We begin in the future with William Gibson's collection of Short Stories in <i>Burning Chrome</i>.</p>
<b>EN6201C</b>	<p><b>Literature in Context III: Only Connect</b></p> <p>In this module, students will be introduced to major philosophies and theories in the literary tradition and guided to develop their own connections through personal responses and discussion with the class.</p>

# MOTHER TONGUE AND FOREIGN LANGUAGES

## An Overview

The Mother Tongue & Foreign Languages Department of NUS High School of Math & Science offers core, elective and enrichment language modules to our students. These modules serve to cater to the varying learning needs of our students from different cultural backgrounds. The department aims to provide our students with the language foundation required for tertiary education, and to develop in them the aptitude for language learning.

The core modules offered are Higher Mother Tongue and Mother Tongue for Chinese, Malay and Tamil. Third Languages (French, Japanese, Malay and Chinese), Basic Translation Skills, Topics on Chinese Culture and Topics on Chinese Literature are offered as elective modules. The enrichment modules offered are the Mother Tongue Syllabus B for Chinese and Malay.

Modules are offered to students in accordance to their language abilities and interests, and with strict adherence to the national Mother Tongue Policy.

## MOTHER TONGUE MODULES (CHINESE/ MALAY/ TAMIL)

The Department of Mother Tongue & Foreign Languages offers core, elective and enrichment modules to students taking Chinese, Malay and Tamil as their Mother Tongue.

These modules are offered to students as Core Modules, which progressively equip students with Mother Tongue proficiency in four main aspects, namely listening, speaking, reading and writing. At the end of four years of the Higher Mother Tongue Course and five years of Mother Tongue Course, students would have acquired oral presentation skills, listening skills, reading and comprehension skills, as well as essay and summary writing skills at the intermediate level.

On top of these core modules, Elective Modules are offered to students taking MTL or HMTL. Basic Translation Skills, Topics on Chinese Culture and Topics on Chinese Literature aim to strengthen the language acquisition of students and develop in them the ability to appreciate the language in a cultural context.

For students who cannot cope with MTL modules, they can opt to take MTL Syllabus B which is offered as an enrichment module. They will develop skills in listening, speaking, reading and writing, but at a lower level of proficiency as compared to those taking MTL or HMTL.

## FOREIGN/ THIRD LANGUAGE MODULES (FRENCH/ JAPANESE/ CHINESE/ MALAY)

French and Japanese are Elective Modules. They are offered to students who have the interest to do a Third Language, on top of their Mother Tongue. For students who do not take Chinese, Malay or Tamil as their Mother Tongue, they can opt to take French or Japanese as MTL-in-lieu, upon approval from MOE. There are 4 levels of French or Japanese.

Chinese/ Malay as Third Language are Elective Modules. They are offered to non-Chinese/ Malay students, who have the interest to learn Chinese or Malay at the elementary level. There are 4 levels of Chinese/ Malay as Third Language.

At the 4<sup>th</sup> level, students are expected to achieve communicative competence in simple everyday situations and personal interaction in French, Japanese, Chinese or Malay. Having attained this level of learning would indicate that students have acquired the language foundation necessary for the next level of language learning.

### Table of CORE modules offered in 2009

Year	Module Code / Title (MC)
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	<b>MOTHER TONGUE</b>	<b>HIGHER MOTHER TONGUE</b>
<b>1</b>	CL/ ML/ TL 1101 Chinese/ Malay/ Tamil 1A (3)	CH/ MH/ TH 1101 Higher Chinese/ Malay/ Tamil 1A (3)
	CL/ ML/ TL 1102 Chinese/ Malay/ Tamil 1B (3)	CH/ MH/ TH 1102 Higher Chinese/ Malay/ Tamil 1B (3)
<b>2</b>	CL/ ML/ TL 2101 Chinese/ Malay/ Tamil 2A (3)	CH/ MH/ TH 2101 Higher Chinese/ Malay/ Tamil 2A (3)
	CL/ ML/ TL 2102 Chinese/ Malay/ Tamil 2B (3)	CH/ MH/ TH 2102 Higher Chinese/ Malay/ Tamil 2B (3)
<b>3</b>	CL/ ML/ TL 3101 Chinese/ Malay/ Tamil 3A (3)	CH/ MH/ TH 3101 Higher Chinese/ Malay/ Tamil 3A (3)
	CL/ ML/ TL 3102 Chinese/ Malay/ Tamil 3B (3)	CH/ MH/ TH 3102 Higher Chinese/ Malay/ Tamil 3B (3)
<b>4</b>	CL/ ML/ TL 4101 Chinese/ Malay/ Tamil 4A (3)	CH/ MH/ TH 4101 Higher Chinese/ Malay/ Tamil 4A (3)
	CL/ ML/ TL 4102 Chinese/ Malay/ Tamil 4B (3)	CH/ MH/ TH 4102 Higher Chinese/ Malay/ Tamil 4B (3)
<b>5</b>	CL/ ML/ TL 5101 Chinese/ Malay/ Tamil 5A (3)	NIL
	CL/ ML/ TL 5102 Chinese/ Malay/ Tamil 5B (3)	

### Module Descriptors of CORE modules offered in 2009 (Chinese)

<b>Module Code</b>	<b>Module Descriptors</b>
<b>CL1101</b>	<b>Chinese 1A</b>  This module focuses on contextual learning of words and phrases, which form the basics for language acquisition. Reading and comprehension will go hand in hand with the learning of words and phrases. This course will also equip students with narrative writing skills at the intermediate level. Under the section of functional writing, students will learn how to write personal letters with reference to daily life.
<b>CL1102</b>	<b>Chinese 1B</b>  This module is a continuation of what has been learned in Semester One. In addition to the teaching of writing skills, there will be a greater emphasis on the oratorical component. Reading and comprehension will take precedence over rote learning of words and phrases.
<b>CL2101</b>	<b>Chinese 2A</b>  This module focuses narrative and on equipping descriptive writing skills at the intermediate level. Under the section of functional writing, students will learn how to write personal letters with reference to current affairs. On top of an emphasis on reading and comprehension, more lesson time will be given to oral presentation.
<b>CL2102</b>	<b>Chinese 2B</b>  This module is a continuation of what has been learned in Semester One. In addition to the teaching of writing skills, more lesson time will be allocated to the honing of oral skills through presentations. Interactive learning will continue to be an important feature of the classroom climate. Reading and comprehension will take precedence over rote learning of words and phrases.

<b>CL3101</b>	<b>Chinese 3A</b>  This module focuses on equipping students with more advanced writing skills. More emphasis will be given to argumentative and expository writing. Under the section of functional writing, students will depart from the writing of personal letters to that of business letters.
<b>CL3102</b>	<b>Chinese 3B</b>  This module is a continuation of what has been learned in Semester One. There will be a greater emphasis on the oratorical component on top of the teaching of writing skills. Reading and comprehension will take precedence over rote learning of words and phrases.
<b>CL4101</b>	<b>Chinese 4A</b>  In this module, the training of argumentative and expository writing skills will continue to be the main focus. Students will be introduced to basic summary and speech writing skills.
<b>CL4102</b>	<b>Chinese 4B</b>  This module is a continuation of what has been learned in Semester One. In addition to an increased emphasis on the training of argumentative and expository writing skills, more lesson time will be allocated to oral presentations and debate sessions. Interactive learning will continue to be an important feature of the classroom climate. Reading and comprehension will take precedence over rote learning of words and phrases. More time, however, will be given to preparing students for their second language paper in November.
<b>CL5101</b>	<b>Chinese 5A</b>  This module will equip students with the necessary skills to understand and record key messages and notes from speeches. It also aims to improve the oral presentation skills through recitation and speeches, to widen the scope of reading, to develop the reading skills so as to have a more in depth understanding of the ideas and emphasis of the writers. Students will be taught how to write complex narrative and argumentative essays to further develop their writing competency.
<b>CL5102</b>	<b>Chinese 5B</b>  This module is a continuation of what has been learned in Semester One. In addition to an increased emphasis on the training, this module will further develop students' speech writing skills by focusing on the inference of the meaning behind certain speeches. This will enable students to interact and communicate more effectively. They will also be exposed to more demanding reading materials and learn how to improve on the reading pace. They will also learn how to gather and analyse information and other necessary skills to do report writing.

### Module Descriptors of CORE modules offered in 2009 (Malay)

<b>Module Code</b>	<b>Module Descriptors</b>
<b>ML1101</b>	<b>Malay 1A</b>  This module aims to equip students with effective communication skills, acquire and disseminate information, generate ideas and conceptualise through the use of the Malay language; appreciate and understand various forms of Malay cultures as well as other cultures too. More specifically, this course aims to enable students to have a good grasp of the Malay language which will allow them to understand spoken Malay language, to read and understand written articles from various sources as well as enabling them to write various writing genre on any topics that they are exposed to.
<b>ML1102</b>	<b>Malay 1B</b>  This module will continue to build on the skills developed in Semester One. Pupils' writing skills and oral presentations will continue to be honed. Interactive learning will continue to be an important feature of the classroom climate. Reading and comprehension will take precedence over rote learning

	of words and phrases.
<b>ML2101</b>	<b>Malay 2A</b>  This module is a continuation of ML1102. It will build on the skills of effective communication skills. Reading will not be only restricted to what is contained in the textbook but from short selection from media and literature sources such as short stories, poems, announcements, reports and other short, topic-specific pieces.
<b>ML2102</b>	<b>Malay 2B</b>  This module is a continuation of ML1102. It will build on the skills of effective communication skills. Reading will not be restricted to what is contained in the textbook but from short selection from media and literature sources such as short stories, poems, announcements, reports and other short, topic-specific pieces.
<b>ML3101</b>	<b>Malay 3A</b>  This module will build on the skills developed in ML2102. Students will progress from reading selections from passages to a more sustained and systematic encounter with the nature of the language used in novels, newspapers, Internet and other forms of popular publications as well.
<b>ML3102</b>	<b>Malay 3B</b>  This module will build on the skills developed in Semester One. Students will continue to hone their presentation and writing skills through various learning sources. Communication skills will also be garnered at a higher level through audio-visual exposure, presentations in class and other learning resources and facilities. Communication skills will also be garnered at a higher level through audio-visual exposure, presentations in class, etc.
<b>ML4101</b>	<b>Malay 4A</b>  In this module, students will read, analyze, and discuss texts from literature, non-fiction, and academic sources applying a more critical-thinking approach. Students will also embark on learning journeys to immerse into the language and culture. Experiential learning will also be creatively explored in this module to enhance the effectiveness of communication skills.
<b>ML4102</b>	<b>Malay 4B</b>  This module will build on the skills developed in Semester One. It will continue to foster critical reading and writing skills. Students will also read, analyse, and discuss texts from literature, non-fiction, and academic sources covering a wide range of subjects related to the culture and society of the target language. Students will also embark on learning journeys to foster deep ties with the language and culture. Experiential learning will also be carried out to enhance public-speaking skills.
<b>ML5101</b>	<b>Malay 5A</b>  This module will continue to foster critical reading and writing skills. It also aims to improve the oral presentation skills through recitation and speeches, to widen the scope of reading, to develop the reading skills so as to have a more in depth understanding of the ideas and emphasis of the writers. Students will also be exposed to current issues which are more complex and controversial to enhance their analytical skills.
<b>ML5102</b>	<b>Malay 5B</b>  This module will continue to foster critical reading and writing skills. Students will also be exposed to various forms of relevant texts and articles which are debatable and thought-provoking. This aims to cultivate more analytical thinking.

### Module Descriptors of CORE modules offered in 2009 (Tamil)

Module Code	Module Descriptors
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<b>TL1101</b>	<b>Tamil 1A</b>  In this module, students learn various types of alphabets, words, six types of nouns, nouns of three places. In verbs, they learn verbs, finite verbs, commanding verbs, participles, noun participles, verbal participles and opposites of verbal participles. Later, they learn different classes' words, gender, and number. Lastly in syntax they learn subject, predicate and object, transitive and intransitive verbs.
<b>TL1102</b>	<b>Tamil 1B</b>  In this module, students learn the different kinds of cases, nominative case, cases ending in 'ஐ, ஆல், ஓடு, உடன், கு, இன், இல், இருந்து, அது, உடைய' and vocative case. In tenses they learn past tense, present tense and future tense. In combination, they learn natural combination and abnormal combination. In punctuations they learn full stop, question mark, comma and inverted commas.
<b>TL2101</b>	<b>Tamil 2A</b>  In this module, students learn in verbs the optative verb, verbs of affirmation and negation, symbolic verbs, noun epithet, verb epithet, continuous tenses, harmony between subject and predicate.
<b>TL2102</b>	<b>Tamil 2B</b>  In this module, students learn joining of sentences, places where doubling of hard consonants occur, places where doubling of hard consonants does not occur. In combination, they learn words ending in consonants joining words beginning in vowels and words ending in consonants joining words beginning in consonants, combination of words of direction and combination of numbers with numbers.
<b>TL3101</b>	<b>Tamil 3A</b>  In this module, they learn words ending with shortened 'உ' and full 'உ', nouns formed from verbs. In verbs they learn active verbs and passive verbs, verbs denoting direct action and causative verbs; in nouns they learn open cases of nouns and hidden cases of nouns.
<b>TL3102</b>	<b>Tamil 3B</b>  In this module, they learn perfect tenses, places where doubling of hard consonants occur, transformation of sentences, places where doubling of hard consonants does not occur. The transformation of sentences is done without change in meaning and expansion of sentences is also taught. In combination they learn how the words ending with consonants combine with other words.
<b>TL4101</b>	<b>Tamil 4A</b>  In this module, students learn participles, direct and indirect speech, simple sentence, compound sentence and complex sentence.
<b>TL4102</b>	<b>Tamil 4B</b>  In this module, students learn joining of sentences by changing finite verb to verbal participle or noun participle or changing finite verb to nouns of action, transformation of sentences without any change in meaning. Lastly they learn joining of sentences by changing finite verb to verbal nouns.
<b>TL5101</b>	<b>Tamil 5A</b>  In this module, the students are taught how to answer comprehension questions, to guess the contextual meaning of words, précis writing, cloze passage, filling idioms and combination of words or splitting of words.
<b>TL5102</b>	<b>Tamil 5B</b>  This module is a continuation of TL5101. Please refer to descriptor for TL5101.

### Module Descriptors of CORE modules offered in 2009 (Higher Chinese)

<b>Module Code</b>	<b>Module Descriptors</b>
<b>CH1101</b>	<b>Higher Chinese 1A</b>  This module focuses on equipping narrative and descriptive writing skills at the Intermediate level. Under the section of functional writing, students will learn how to write personal letters with reference to current affairs. On top of an emphasis on reading and comprehension, more lesson time will be given to oral presentations.
<b>CH1102</b>	<b>Higher Chinese 1B</b>  This module is a continuation of what has been learned in Semester One. In addition to the teaching of writing skills, there will be a greater emphasis on the oratorical component. Interactive learning will continue to be an important feature of the classroom climate. Reading and comprehension will take precedence over rote learning of words and phrases.
<b>CH2101</b>	<b>Higher Chinese 2A</b>  In this module, students will learn and practise descriptive and narrative writing, a good means by which to apply their grammar knowledge and skills.
<b>CH2102</b>	<b>Higher Chinese 2B</b>  This module is a continuation of what has been learned in Semester One. In addition to the teaching of writing skills, more lesson time will be allocated to the honing of oral skills through presentations. Interactive learning will continue to be an important feature of the classroom climate. Reading and comprehension will take precedence over rote learning of words and phrases.
<b>CH3101</b>	<b>Higher Chinese 3A</b>  The module focuses on equipping students with more advanced writing skills. More emphasis will be given to argumentative and expository writing. Under the section of functional writing, students will brush up on the writing of business letters. In addition, they will also be taught skills in speech writing.
<b>CH3102</b>	<b>Higher Chinese 3B</b>  This module is a continuation of what has been learned in CH3101. In addition to an increased emphasis on the training of argumentative and expository writing skills, more lesson time will be allocated to oral presentations and debate sessions. Interactive learning will continue to be an important feature of the classroom climate. Reading and comprehension will take precedence over rote learning of words and phrases. More time, however, will be given to preparing students for their 2 <sup>nd</sup> language paper in November.
<b>CH4101</b>	<b>Higher Chinese 4A</b>  In this module, there will be a continued emphasis on the training of advanced writing skills, with more reference to current affairs and controversial topics.
<b>CH4102</b>	<b>Higher Chinese 4B</b>  This module is a continuation of what has been learned in Semester One. In addition to an increased emphasis on the training of argumentative and expository writing skills, more lesson time will be allocated to oral presentations and debate sessions.

### **Module Descriptors of CORE modules offered in 2009 (Higher Malay)**

<b>Module Code</b>	<b>Module Descriptors</b>
<b>MH1101</b>	<b>Higher Malay 1A</b>  This module aims to equip students with strong communication skills, acquire and disseminate information effectively, generate ideas and conceptualise through the use of the Malay language. It also aims to deepen their understanding and appreciation of the Malay language, history and culture. More specifically, this course hopes to stretch their expressive abilities to the fullest, lessons

	conducted are pupil-centred and focus on discovery, critical thinking, problem-solving and simulation.
<b>MH1102</b>	<b>Higher Malay 1B</b>  This module is a continuation of what has been learned in Semester One. In addition to an increased emphasis in building strong communication skills, critical-thinking and problem-solving, more lesson time will be allocated to oral presentations and debate sessions. Pupils will also be exposed to experiential learning.
<b>MH2101</b>	<b>Higher Malay 2A</b>  In this module, pupils will be exposed to writing and oral skills at the intermediate level. They will also be learning poetry and novels, as means to develop their writing skills. More oral presentations and group work will also be introduced.
<b>MH2102</b>	<b>Higher Malay 2B</b>  This module will build on the skills developed in Semester One. Pupils' writing skills and oral presentations will continue to be honed. Interactive learning will continue to be an important feature of the classroom climate. Reading and comprehension will take precedence over rote learning of words and phrases.
<b>MH3101</b>	<b>Higher Malay 3A</b>  In this module, pupils will read, analyze and discuss texts from literature, non-fiction and academic sources covering a wide range of subjects related to the culture and society. Selection will include text and passage from short stories, journals, magazines and newspapers as well as audio-visual materials such as TV programs, feature films, etc. At this stage, students will also embark on learning journeys to immerse themselves in the Malay language and culture.
<b>MH3102</b>	<b>Higher Malay 3B</b>  This module will build on the skills developed in Semester One. Pupils will continue to read and analyze texts from various sources. In addition, there will be an increased emphasis on the training of argumentative and expository writing skills. Pupils will also continue to hone their presentation skills.
<b>MH4101</b>	<b>Higher Malay 4A</b>  This module will build on the skills developed in MH3102. Pupils will continue to be exposed to various texts, which will cover more on current affairs. More critical-thinking will be involved in both writing and presentation skills.
<b>MH4102</b>	<b>Higher Malay 4B</b>  This module will continue to build on the skills developed in Semester One. Pupils will be exposed to various academic and literary sources which require deeper analysis and more critical-thinking. More emphasis will also be given on current issues which will be conducted on individual or group basis.

### Module Descriptors of CORE modules offered in 2009 (Higher Tamil)

<b>Module Code</b>	<b>Module Descriptors</b>
<b>TH1101</b>	<b>Higher Tamil 1A</b>  This module encompasses different aspects of language learning. Students learn various types of alphabets, six types of nouns, nouns of three places. In verbs, verbs that show tenses, commanding verbs, noun participles, verbal participles and opposites of verbal participles are learnt. In nouns, they learn different classes, gender, and number. Lastly in syntax they learn subject, predicate and object.
<b>TH1102</b>	<b>Higher Tamil 1B</b>  In this module, students learn the different kinds of cases, nominative case, cases ending in 'ஐ, ஆல்,

	ஓடு, உடன், கு, இன், இல், இருந்து, அது, உடைய' and vocative case. In tenses, they learn past tense, present tense and future tense. In combination, they learn words ending in vowels joining words beginning in vowels and words ending in vowels joining words beginning in consonants. In punctuations they learn full stop, question mark, comma and inverted commas.
<b>TH2101</b>	<b>Higher Tamil 2A</b>  In this module, students learn types of nouns, especially demonstrative nouns, questioning nouns, common nouns of two classes. In verbs, verbs in command mood, implied verbs, verbs of affirmation and negation are learnt. Lastly in syntax they learn epithets of noun and verb, continuous tenses, harmony between subject and predicate.
<b>TH2102</b>	<b>Higher Tamil 2B</b>  In this module, students learn joining of sentences, and places where doubling of hard consonants occur and those not. In combination, they learn words ending in consonants joining words beginning in vowels and words ending in consonants joining words beginning in consonants, combination of words of direction and combination of numbers with numbers.
<b>TH3101</b>	<b>Higher Tamil 3A</b>  In this module, they learn words ending with shortened 'உ' and full 'உ' demonstrative letters and interrogative letters, nouns formed from verbs, active verbs and passive verbs, verbs denoting direct action and causative verbs, open cases of nouns and hidden cases of nouns, perfect tenses and expansion of sentences.
<b>TH3102</b>	<b>Higher Tamil 3B</b>  In this module, they learn places where doubling of hard consonants occur, transformation of sentences, places where doubling of hard consonants does not occur. In combination of words, they learn words ending with shortened 'உ' and other words and figures of speech.
<b>TH4101</b>	<b>Higher Tamil 4A</b>  In this module, students learn the alphabets that begin words, metonymy of things, metonymy of quality and metonymy of action, simple sentence and compound sentence, complex sentence and joining of sentences (by transforming finite verbs to noun participle and verbal participle).
<b>TH4102</b>	<b>Higher Tamil 4B</b>  In this module, students learn to join sentences by transforming finite verbs to nouns of action and nouns formed from verbs. They also learn the transformation of sentences and figures of speech such as the natural quality of an object is suppressed and another ascribed hyperbole, irony and pun.

**Table of ELECTIVE / ENRICHMENT modules offered in 2009 (French)**

Year	Module Code	Module Title	Pre-requisites	MC
1	FR1201	French Level 1 Part A		3
	FR1202	French Level 1 Part B	FR1201	3
2	FR2201	French Level 2 Part A	FR1202	3
	FR2202	French Level 2 Part B	FR2201	3
3	FR3201	French Level 3 Part A	FR2202	3
	FR3202	French Level 3 Part B	FR3201	3
4	FR4201	French Level 4 Part A	FR3202	3
	FR4202	French Level 4 Part B	FR4201	3

**Table of ELECTIVE / ENRICHMENT modules offered in 2009 (Japanese)**

Year	Module Code	Module Title	Pre-requisites	MC
1	JP1201	Japanese Level 1 Part A		3
	JP1202	Japanese Level 1 Part B	JP1201	3
2	JP2201	Japanese Level 2 Part A	JP1202	3
	JP2202	Japanese Level 2 Part B	JP2201	3
3	JP3201	Japanese Level 3 Part A	JP2202	3
	JP3202	Japanese Level 3 Part B	JP3201	3
4	JP4201	Japanese Level 4 Part A	JP3202	3
	JP4202	Japanese Level 4 Part B	JP4201	3

**Table of ELECTIVE / ENRICHMENT modules offered in 2009 (Chinese)**

Year	Module Code	Module Title	Pre-requisites	MC
1	CL1221	Chinese as 3 <sup>rd</sup> Language 1A		3
	CL1222	Chinese as 3 <sup>rd</sup> Language 1B	CL1221	3
	CL1312	Basic Chinese 1B		3
2	CL2221	Chinese as 3 <sup>rd</sup> Language 2A	CL1222	3
	CL2222	Chinese as 3 <sup>rd</sup> Language 2B	CL2221	3
	CL2311	Basic Chinese 2A		3
	CL2312	Basic Chinese 2B		3
3	CL3201	Topics on Chinese Culture 1		1
	CL3311	Basic Chinese 3A		3
	CL3312	Basic Chinese 3B		3
4	CL4311	Basic Chinese 4A		3
	CL4312	Basic Chinese 4B		3
5	CL5201	Topics on Chinese Literature		1
	CL5202	Basic Translation Skills		1
	CL5311	Basic Chinese 5A		3
	CL5312	Basic Chinese 5B		3
6	CL6311	Basic Chinese 6A		3
	CL6312	Basic Chinese 6B		3

**Table of ELECTIVE / ENRICHMENT modules offered in 2009 (Malay)**

Year	Module Code	Module Title	Pre-requisites	MC
	ML1201	Malay as 3 <sup>rd</sup> Language 1A		3

1	ML1202	Malay as 3 <sup>rd</sup> Language 1B	ML1201	3
2	ML2201	Malay as 3 <sup>rd</sup> Language 2A	ML1202	3
	ML2202	Malay as 3 <sup>rd</sup> Language 2B	ML2201	3
	ML2311	Basic Malay 2A		3
	ML2312	Basic Malay 2B		3
3	ML3201	Malay as 3 <sup>rd</sup> Language 3A	ML2202	3
	ML3202	Malay as 3 <sup>rd</sup> Language 3B	ML3201	3

### Module Descriptors of ELECTIVE / ENRICHMENT modules offered in 2009 (French)

Module Code	Module Descriptors
FR1201	<p><b>French Level 1 Part A</b></p> <p><i>This module is opened to those who have NO prior French language background. The course fee per month is \$100 and charged for the WHOLE Semester (Jan – Jun).</i></p> <p>This module focuses on basic linguistic and communicative structures of the French language. By developing the four skills of listening, speaking, reading and writing as well as teaching basic grammar and vocabulary, it aims at helping students achieve communicative competence in simple everyday situations and personal interaction. The course also attempts to help students optimise their learning by teaching them strategies for language learning and language use. Audio and video materials are used. The course provides an insight into French culture. Sessions are interactive.</p>
FR1202	<p><b>French Level 1 Part B</b></p> <p><i>The course fee per month is \$100 and charged for the WHOLE Semester (Jul - Dec).</i></p> <p>This module is a continuation of FR1201. Please refer to descriptor for FR1201.</p>
FR2201	<p><b>French Level 2 Part A</b></p> <p><i>The course fee per month is \$100 and charged for the WHOLE Semester (Jan - Jun).</i></p> <p>This module focuses on basic linguistic and communicative structures of the French language. By developing the four skills of listening, speaking, reading and writing as well as teaching basic grammar and vocabulary, it aims at helping students achieve communicative competence in simple everyday situations and personal interaction. The course also attempts to help students optimize their learning by teaching strategies for language learning and language use. It provides an insight into French culture. Sessions are interactive.</p>
FR2202	<p><b>French Level 2 Part B</b></p> <p><i>The course fee per month is \$100 and charged for the WHOLE Semester (Jul - Dec).</i></p> <p>This module is a continuation of FR2201. Please refer to descriptor for FR2201.</p>
FR3201	<p><b>French Level 3 Part A</b></p> <p><i>The course fee per month is \$100 and charged for the WHOLE Semester (Jan - Jun).</i></p> <p>This module focuses on basic linguistic and communicative structures of the French language. By developing the four skills of listening, speaking, reading and writing as well as teaching basic grammar and vocabulary, it aims at helping students achieve communicative competence in simple everyday situations and personal interaction. The course also attempts to help students optimize their learning by teaching strategies for language learning and language use. It provides an insight into French culture. Sessions are interactive.</p>
FR3202	<p><b>French Level 3 Part B</b></p> <p><i>The course fee per month is \$100 and charged for the WHOLE Semester (Jul - Dec).</i></p> <p>This module is a continuation of FR3201. Please refer to descriptor for FR3201.</p>

<b>FR4201</b>	<p><b>French Level 4 Part A</b></p> <p><i>The course fee per month is \$100 and charged for the WHOLE Semester (Jan - Jun).</i></p> <p>This module is a continuation of FR3202 and it is meant only for students who have completed and passed FR3202. This module focuses on more advanced linguistic and communicative structures of the French language. By developing the four skills of listening, speaking, reading and writing as well as teaching basic grammar and vocabulary, it aims at helping students achieve communicative competence in simple everyday situations and personal interaction. The course also attempts to help students optimize their learning by teaching strategies for language learning and language use. The course provides an insight into French culture. Sessions are interactive.</p>
<b>FR4202</b>	<p><b>French Level 4 Part B</b></p> <p><i>The course fee per month is \$100 and charged for the WHOLE Semester (Jul – Dec).</i></p> <p>This module is a continuation of FR4201. Please refer to descriptor for FR4201. Completing this module marks the completion of the entire programme (level 1 to level 4).</p>

### Module Descriptors of ELECTIVE / ENRICHMENT modules offered in 2009 (Japanese)

<b>Module Code</b>	<b>Module Descriptors</b>
<b>JP1201</b>	<p><b>Japanese Level 1 Part A</b></p> <p><i>This module is opened to students who have NO prior Japanese language background. The course fee per month is \$100 and charged for the WHOLE Semester (Jan - Jun).</i></p> <p>The goal of this module is to acquire communication skills in the Japanese language in order to interact with native speakers of Japanese in a culturally appropriate manner. Students will also learn how to read and write simple texts in hiragana and katakana. By the end of the semester, students should be able to make simple greetings, introduce people, communicate while shopping, ask for information such as time, prices etc., ask for directions, and invite people.</p>
<b>JP1202</b>	<p><b>Japanese Level 1 Part B</b></p> <p><i>The course fee per month is \$100 and charged for the WHOLE Semester (Jul - Dec).</i></p> <p>This module is a continuation of JP1201. Please refer to descriptor for JP1201.</p>
<b>JP2201</b>	<p><b>Japanese Level 2 Part A</b></p> <p><i>The course fee per month is \$100 and charged for the WHOLE Semester (Jan - Jun).</i></p> <p>This module builds upon the basis of Japanese Level 1 and aims to develop basic linguistic and socio-cultural skills to expand the repertoire of the daily topics and situations with simple structures. Approximately 110 kanji and 180 kanji-words will be introduced. While more emphasis is placed on the development of oral communication skills, students will also learn how to read and write simple and short compositions.</p>
<b>JP2202</b>	<p><b>Japanese Level 2 Part B</b></p> <p><i>The course fee per month is \$100 and charged for the WHOLE Semester (Jul - Dec).</i></p> <p>This module is a continuation of JP2201. Please refer to descriptor for JP2201.</p>
<b>JP3201</b>	<p><b>Japanese Level 3 Part A</b></p> <p><i>The course fee per month is \$100 and charged for the WHOLE Semester (Jan - Jun).</i></p> <p>Building upon the basis of Japanese Level 2 (JP2201 &amp; JP2202), this module develops students' ability to communicate and expands the repertoire of daily topics and situations. Complex structures such as transitive and intransitive, conditionals and passive forms are introduced. Approximately 150 kanji and 200 kanji - words will be introduced. With this knowledge of characters, student s will be</p>

	able to understand and write simple and short essays.
<b>JP3202</b>	<b>Japanese Level 3 Part B</b> <i>The course fee per month is \$100 and charged for the WHOLE Semester (Jul - Dec).</i> This module is a continuation of JP3201. Please refer to descriptor for JP3201.
<b>JP4201</b>	<b>Japanese Level 4 Part A</b> <i>The course fee per month is \$100 and charged for the WHOLE Semester (Jan - Jun).</i>  Building upon the basis of Japanese Level 3 (JP3201 & JP3202), this module aims to further develop students' communication skills in Japanese on daily topics of general interests. The module has a special focus on polite expressions which enables students to communicate appropriately in academic and business situations. Appropriately 150 <i>kanji</i> and 200 <i>kanji</i> -words will be introduced. With this knowledge of characters, students will be able to understand letters with fairly formal written language. This module will complete the four year course of elementary Japanese and will equip students with good foundation to progress to intermediate and advance levels of Japanese studies.
<b>JP4202</b>	<b>Japanese Level 4 Part B</b> <i>The course fee per month is \$100 and charged for the WHOLE Semester (Jul - Dec).</i>  This module is a continuation of JP4201. Please refer to descriptor for JP4201.

### Module Descriptors of ELECTIVE / ENRICHMENT modules offered in 2009 (Chinese)

Module Code	Module Descriptors
<b>CL1221</b>	<b>Chinese as 3<sup>rd</sup> Language 1A</b>  <i>This module is opened to students in Year 1 and 2. It is meant only for <u>non-Chinese</u> students with no prior background in the Chinese language.</i>  This module touches on the basics, such as an overview of the evolution of Chinese characters and an introduction to phonetics (the Hanyu Pinyin system). More emphasis will be given to the oral and listening components.
<b>CL1222</b>	<b>Chinese as 3<sup>rd</sup> Language 1B</b>  This module is a continuation of CL1221. At the end of the course, pupils will acquire basic conversational and writing skills in Mandarin. Please refer to descriptor for CL1221.
<b>CL1312</b>	<b>Basic Chinese 1B</b>  This module aims to develop in students oral communication skills. In addition, students will be taught basic reading skills by introducing them short comprehension passages. They will also be taught how to construct simple sentences.
<b>CL2221</b>	<b>Chinese as 3<sup>rd</sup> Language 2A</b>  <i>This module is a continuation of CL1222 and it is meant <u>only</u> for students who have completed and passed CL1222.</i> The module emphasizes the learning of new vocabularies, simple sentence constructing, and writing of short compositions. The module also aims to equip pupils with comprehension and conversational skills in Chinese. Students looking forward to taking this module should anticipate classes conducted in the afternoon.
<b>CL2222</b>	<b>Chinese as 3<sup>rd</sup> Language 2B</b>  This module is a continuation of CL2221. Please refer to descriptor for CL2221.

<b>CL2311</b>	<b>Basic Chinese 2A</b>  At this level of learning, students will continue to develop their oral communication skills by providing good reasons in responding to a conversational topic. Writing skills will be developed further through using Idioms in sentence construction. Letter writing will also be introduced.
<b>CL2312</b>	<b>Basic Chinese 2B</b>  This module is a continuation of CL2312. Please refer to descriptor for CL2311.
<b>CL3201</b>	<b>Topics on Chinese Culture 1</b>  <i>This module is opened only to Year 3 students, who take Chinese or Higher Chinese as their Mother Tongue.</i>  This module emphasizes on introducing the fundamentals to understand and appreciate the beauty of Chinese culture through Chinese literature, philosophy, customs, arts and technology. It also aims to arouse students' interest in learning Chinese through understanding Chinese culture.
<b>CL3311</b>	<b>Basic Chinese 3A</b>  At this level of learning, students will strengthen their oral communication skills by listening to narrated stories and knowing how to infer and draw conclusion from them. Comprehension skills will also be enhanced by knowing how to process information and organise it. The ability to write complex sentences with Idioms will be developed. The writing of descriptive and narrative essays will be introduced and taught.
<b>CL3312</b>	<b>Basic Chinese 3B</b>  This module is a continuation of CL3311. Please refer to descriptor for CL3311.
<b>CL4311</b>	<b>Basic Chinese 4A</b>  At this level of learning, students will be taught low order critical thinking skills, which will be used in enhancing their oral communication skills. Students will continue to sharpen their writing skills by constructing complex sentences and learning how to write argumentative essays.
<b>CL4312</b>	<b>Basic Chinese 4B</b>  This module is a continuation of CL4311. Please refer to descriptor for CL4311.
<b>CL5201</b>	<b>Topics on Chinese Literature</b>  This module aims to arouse interest and improve capacity in appreciating and appraising literature through the introduction of the highlights and excerpts of ancient and modern China and local literature.
<b>CL5202</b>	<b>Basic Translation Skills</b>  This module aims to progressively equip students with the fundamental translation skills. The contents include fundamental concept of translation, the differentiation between the command and grasp of English and Chinese language, the translation of phrases, sentences, articles or advertisements.
<b>CL5311</b>	<b>Basic Chinese 5A</b>  At this level of learning, students will be taught critical thinking skills at a higher order. This will be used in responses to conversations that require such thinking skills. The writing of argumentative essays will be the focus for developing writing skills.
<b>CL5312</b>	<b>Basic Chinese 5B</b>  This is a continuation of CL5311. Please refer to descriptor for CL5311.

<b>CL6311</b>	<b>Basic Chinese 6A</b>  At this level of learning, students will be taught critical thinking skills at an even higher order. These skills will be tested in responding to conversational topics that require high order critical thinking skills and in demonstrating the ability to organise ideas from different reading sources. Students will acquire the writing competencies in both letter writing and essay writing.
<b>CL6312</b>	<b>Basic Chinese 6B</b>  This module is a continuation of CL6311. Please refer to the descriptor for CL6311. This module marks the completion of the Mother Tongue Syllabus B.

### Module Descriptors of ELECTIVE / ENRICHMENT modules offered in 2009 (Malay)

<b>Module Code</b>	<b>Module Descriptors</b>
ML1201	<b>Malay as 3<sup>rd</sup> Language 1A</b>  <i>This module is opened to students in Year 1 and 2. It is meant only for <u>non-Malay</u> students with no prior background in the Malay language.</i>  This module aims to equip pupils with the skills of understanding standardized spoken Malay language. By the end of the program (i.e. at the 4 <sup>th</sup> level), students should be able to converse fluently in Malay language on common everyday situations that people might talk about as well as being understood by native speakers. In this module, students will acquire language skills through participation in various communicative and written tasks. Through the exposure to the language, students will develop a general understanding of the Malay culture, the sociolinguistic and pragmatic aspects of the language. They will be given exposure to simple poetry and prose. All sessions will be interactive.
ML1202	<b>Malay as 3<sup>rd</sup> Language 1B</b>  This module is a continuation of the skills developed in Semester One. Oral and listening skills will continue to be emphasized in this module. Communicative skills will be garnered through various forms, such as role-plays, skits, short speeches, etc. Reading and writing skills will also be exposed to them as well. Grammar aspects will continue to be taught through interactive approach.
ML2201	<b>Malay as 3<sup>rd</sup> Language 2A</b>  This module will build on the skills of ML1202. Students will be able to understand main contents of essays, poetry and prose. They will also be able to produce various forms of writing skills which evolve around common everyday situations and current affairs through writing structures and styles. This course also aims to provide understanding and awareness of the traditions and cultures of the Malay community which indirectly will help the students find its relevance to their own culture.
ML2202	<b>Malay as 3<sup>rd</sup> Language 2B</b>  This module will build on the skills taught in Semester One. Pupils will continue to be exposed to understand various forms of writing skills. Emphasis will also be given to their reading fluency and pronunciations. Educational trips (such as home stay) may also be embarked upon, to enhance their interest and to provide deeper understanding and awareness of the traditions and cultures of the Malay community.
ML2311	<b>Basic Malay 2A</b>  This module is a follow-up of the Year 1 syllabus. The primary objective is to create opportunity for pupils to enhance the effective use of language in a meaningful and contextual communications. It is also aimed at dissemination of ideas, information and concepts through effective use of the language. Pupils will also be able to instill appreciation and immerse oneself in Malay cultural values and of other ethnic groups too.
ML2312	<b>Basic Malay 2B</b>  This module is a continuity of the module taught in Semester One. The syllabus will give further

	emphasis to the three basic aspects of language ability; oral, listening and writing skills. Pupils will be further exposed to various cultural aspects of the Malays and of other ethnic groups too.
ML3201	<p><b>Malay as 3<sup>rd</sup> Language 3A</b></p> <p>This module will build on the skills of ML2202. Pupils will be more exposed in their four language skills of listening, speaking, reading and writing. It also aims to provide the pupils with more communicative competence in simple everyday situations and personal interaction. As with the other earlier modules, this course also aims to provide understanding and awareness of the traditions and cultures of the Malay community which will help the students appreciate the learning of the language.</p>
ML3202	<p><b>Malay as 3<sup>rd</sup> Language 3B</b></p> <p>This module is a continuation of the skills developed in Semester One. Pupils will continue to be exposed in their four language skills of listening, speaking, reading and writing. It also aims to provide the pupils with more communicative competence in simple everyday situations and personal interaction. In this semester, pupils' understanding and awareness of the traditions and cultures of the Malay community will be enhanced through experiential learning, such as Learning Journeys.</p>

# HUMANITIES, FINE ART and MUSIC

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## HUMANITIES

The Humanities Department aims to nurture our students to have an appreciation and sustained interest in the world around them, who are engaged in multiple perspectives and who have a desire to contribute to the betterment of our society.

The subjects taught by the Department are Geography, History, Social Studies and Economics.

## GEOGRAPHY

The Geography curriculum is designed as a systemic study of patterns and processes that have shaped the physical and human environments. It aims to create in our students, an awareness and understanding of the use and management of these environments. The curriculum will provide students with a broad overview as well as some detailed exemplification. Hence, the topics will be studied at a variety of spatial contexts - from global to local, and in contrasting contexts - from the economically more developed world to the developing world.

The modules covered in the Foundation Years provide a general overview of the discipline, ensuring that students have a strong grounding in, and understanding of, fundamental Geographical concepts and principles.

In the Advancement and Specialisation Years, modules have been planned to equip students with the core competencies and skills required in any Geography study, in preparation for possible further study at tertiary level.

## HISTORY

The History curriculum aims to give students a broad perspective in understanding the current global trends and affairs. At the same time, it will be an introspective journey into the past, an understanding of the present and a glimpse of the future. The curriculum is tailored to meet the needs of Singapore as it moves into the 21<sup>st</sup> century, braving dynamic challenges resulting from globalization and technological advancement. The curriculum also aims to draw a balance between the local, the regional and the international, the social, the economic and the political.

The modules covered in the Foundation Years provide a general overview of the discipline, as well as the basic skills necessary to ensure a good grasp of the discipline. This also ensures that students have a strong grounding in the fundamentals of History as an academic discipline. The foundational modules also aim to build in our students, a national identity and good citizenry, as well as an awareness of one's roots and identity.

In the Advancement and Specialisation Years, the modules will spiral outward from Singapore and Southeast Asia to the 'international' arena. Modules taught will focus on issues and events of an international nature and interest. These modules have been planned to equip students with the core competencies and skills required in any historical study, in preparation for possible future study at tertiary level.

## HUMANITIES AND SOCIAL STUDIES

From 2009, Year One students will not be taking Geography and History as separate subjects. Instead, they have been integrated, together with Social Studies, as *Humanities and Social Studies*. Year One students shall be taking HS1101 in Semester 1 and HS1102 in Semester 2.

## ECONMICS

Economics has been defined as the study of how people use limited resources to produce various goods and services for the unlimited wants of the population. There are two main branches of economics, namely Microeconomics and Macroeconomics.

*Microeconomics* deals with individual units in the economy, usually households or firms. For instance, it is concerned with how a household allocates its income among expenditures for various goods and services, and the determination of a firm's profit-maximising level of production.

*Macroeconomics* deals with the economy as a whole. By concentrating on the economy in aggregate, macroeconomics is concerned with the total output of the economy and the general price level, not the output and price levels of a single firm or industry.

Economics modules are currently offered as Electives at NUS High for students in Years 4, 5 and 6. The nature of the subject is such that there needs to be a spiraling of theoretical and conceptual knowledge. Hence, the Economics curriculum is structured such that students who intend to read higher level Economics modules must have read all other Economics modules offered from Year 4 Semester 1.

**Table of CORE Humanities and Social Studies modules offered in 2009**

Year	Module Code	Module Title	Pre-requisites	MC
1	HS1101	Southeast Asia: Our Beginnings (with Emphasis on Singapore)	Nil	2
	HS1102	Independence and Challenges of Development in Southeast Asia (with Emphasis on Singapore)	HS1102	2

**Table of CORE History modules offered in 2009**

Year	Module Code	Module Title	Pre-requisites	MC
2	HY2103	Southeast Asia – From Colony to Nation (Studies on Selected Countries)	HY1101 (From Settlement to Nation – History of Singapore; last run in 2008)	2
3	HY3101	Russia and Germany Between the Wars (WWI and WWII)		2
	HY3104	Rise of Modern China and Japan		2
4	HY4101	Rise of Modern China and Japan		2
	HY4104	The Cold War and the Collapse of Communism		2
	HY4105	The United Nations Organisation		2
5 Major	HY5102	Contemporary Southeast Asia	All History Core Modules since Y1	2
	HY5101	Conflict and Instability in the Middle East and South Asia		3
6 Major	HY6201C	Development of the Global Economy		3

**Table of CORE Geography modules offered in 2009**

Year	Module Code	Module Title	Pre-requisites	MC
2	GE2101	Dynamic Blue Planet	GE1102 (People, Places and Nation; last run in 2008)	2
3	GE3102	Lithospheric Processes and Resultant Landforms		2
	GE3103	Fluvial and Coastal Geomorphology		2
4	GE4102	Lithospheric Processes and Resultant Landforms		2
	GE4103	Fluvial and Coastal Geomorphology		2
	GE4104	Cities and Urban Development		2
5 Major	GE5102	Climatic Variations and Change	All Geography Core Modules since Y1	2
	GE5103	Global Shift: Economic Geography		3
6 Major	GE6201C	Geographic Information System		3

**Module Descriptors of CORE modules offered in 2009**

Module Code	Module Descriptors
HS1101	<p><b>Southeast Asia: Our Beginnings (with Emphasis on Singapore)</b></p> <p>In this module, students are introduced to Southeast Asia and its interaction with external elements. The module also provides an overview of colonialism and rise of nationalism in the region. The emphasis will be on Singapore. In the process, basic critical thinking and writing skills will also be introduced and developed. Students will learn to explain reasons for, and outcomes of events and changes. Students will also be introduced to source-based analysis, where they learn to critically evaluate the information provided to reach supported conclusions.</p>
HS1102	<p><b>Independence and Challenges of Development in Southeast Asia (with Emphasis on Singapore)</b></p> <p>The first part of this module equips students with an understanding of how selected countries in Southeast Asia attained their independence and the process of nation-building. There will be discussion on the concept of 'nation' and examination of the rise of newly independent nations in Southeast Asia. The second half of the module then focuses on the developmental challenges of nations and nation-states, with an in-depth focus on Singapore's history of development and examines its experience alongside those of other nations. They will continue to develop their skills in source-based analysis, and to evaluate relationships between factors / events / developments.</p>
HY2103	<p><b>Southeast Asia: From Colony to Nation (Studies on Selected Countries)</b></p> <p>This module focuses on the themes of colonialism, nationalism and independence in Southeast Asia between the 19<sup>th</sup> century and the 1960s. It examines how the region's societies and political systems have changed over time in response to these pressures. Students will also learn to compare countries representing the imprint of British, Dutch and French colonial rule in the region during the different stages of their experience. They will also continue to develop their skills in source-based analysis, and to evaluate relationships between factors / events / developments.</p>
HY3101	<p><b>Russia and Germany Between the Wars (WWI and WWII)</b></p> <p>This module provides an overview of the social, political and economic changes that took place in Russia and Germany between the two world wars. Students are challenged to understand these changes in the context of broader issues like revolution, nationalism, imperialism, war and totalitarianism.</p>
HY3104/ HY4101	<p><b>Rise of Modern China and Japan</b></p> <p>The first part of this module examines the development of China from the turn of the 20th century to the establishment of the People's Republic of China in 1949. The themes that the students will be encountering are revolution &amp; reform, nationalism &amp; imperialism, modernization &amp; tradition, and foreign impact &amp; internal dynamics. The second part of the module examines the rise of Japan as a viable Asian power from the turn of the 20th century to 1951. Students will also examine the reasons and impetus for Japan to embark on the road to imperialism, and the outcome of their defeat during the second world war.</p>
HY4104	<p><b>The Cold War and the Collapse of Communism</b></p> <p>This module examines the problems after the Second World War and the events/causes that led to the Cold War between the USA and the USSR. It also traces the development and extent of the Cold War after the 'thaw' of 1953. The module then moves on to examine the issues and events leading to the collapse of communism in Eastern Europe and the Soviet Union, and eventually the breakup of the Soviet Union with the setting up of Commonwealth of Independent States.</p>
HY4105	<p><b>The United Nations Organisation</b></p> <p>This module examines the rationale and principles behind the creation of the United Nations Organisation. It traces the birth of ideas on peace in the post-WW2 context and how these eventually led to the formation of the Security Council within the UN. The module also examines and discusses the roles of the six main organs of the UN. In the process students will get to understand why in spite of the careful framing of the Charter, the UN was unable to solve many of the problems of the international relations. The course will also examine the successes of the UN in non-political work</p>

	(care of refugees, protection of human rights, economic planning, etc).
<b>HY5101</b>	<p><b>Conflict and Instability in the Middle East and South Asia</b></p> <p>This module examines the Arab-Israeli conflict and the Indo-Pakistani war over Kashmir. It analyses the causes, changing nature and consequences of regional conflicts in the latter part of the 20th century. The module also aims to bring out the importance of law and order, social cohesion, racial and religious harmony, and security.</p>
<b>HY5102</b>	<p><b>Contemporary Southeast Asia</b></p> <p>This module examines the challenges faced by Southeast Asian states during the contemporary period. Students will get the opportunity to compare the experiences and historical development of selected countries in the region. Regional conflicts and cooperation will also be analysed.</p>
<b>HY6201C</b>	<p><b>Development of the Global Economy</b></p> <p>This module examines the key developments and reasons for the growth of the global economy. It also analyses the problems that affected this development and growth (e.g. protectionism versus free trade, debt crises, oil crises). Students will also learn about the role of international economic institutions (e.g. World Bank, IMF, GATT and WTO), the reasons for the dominant role of USA in the global economy, Japan's 'economic miracle' and the rise of China as an economic power in the post-Mao era.</p>
<b>GE2101</b>	<p><b>Dynamic Blue Planet</b></p> <p>This module aims to develop an understanding of the characteristics and distribution of physical phenomena on our Planet Earth. It deals with the Earth as a dynamic system – the internal and external processes that have shaped its surface. The concepts of longitudes, latitudes, tropics and poles, as well as the spatial location of the continents and the oceans will be studied to provide an appreciation of the relationship that exists between the spatial location of a place and its physical landscape.</p>
<b>GE3102/ GE4102</b>	<p><b>Lithospheric Processes and Resultant Landforms</b></p> <p>This module examines the forces that have helped shaped our planet. It explains the various forms of tectonic activity and the resultant rocks and landforms. It also looks at volcanicity, earthquakes and other geographical phenomenon resulting from tectonic activity. The module also focuses on the geomorphic processes of weathering, erosion and mass movement, and the role they play in landform and slope development. It examines these earth surface processes in a range of environments from hill slopes to rivers and coasts, studying the potential hazards resulting from these geomorphic processes. It also looks at landform evolution on selected rock types under different climatic conditions.</p>
<b>GE3103/ GE4103</b>	<p><b>Fluvial and Coastal Geomorphology</b></p> <p>This module studies the hydrology and geomorphology of the river system to compare the processes occurring in a drainage basin at different scales and in a variety of environments. Students are introduced to the principles of river hydrology and geomorphology as they govern the patterns of flows, the movement of river load, the behaviour of the channel and the resulting features. This module also deals with the evolution of coastal landforms. It examines the processes at work, the range of terrestrial, atmospheric, marine and biological factors that affect them, and the resultant changes that occur. Environmental changes as a result of human action and changing land use are also examined.</p>
<b>GE5102</b>	<p><b>Climatic Variations and Change</b></p> <p>This module explores the Earth's various climatic zones or biomes, and examines the climatic factors which cause these variations. The roles of the atmosphere, ocean, biosphere and cryosphere are explained and linked to develop an understanding of how the Earth's climate operates as an integrated system. Local climatic patterns (microclimates) and their modification by human activity are also examined. Particular attention is paid to the effects urban areas and vegetation have on microclimates. The module also discusses the changes in global climate and the implications as a</p>

	result of natural episodic events like the El Niño-Southern Oscillation, and volcanic eruptions, as well as human induced phenomena like the greenhouse effect and global warming.
<b>GE5103</b>	<b>Global Shift: Economic Geography</b>  This module examines the interrelationships between transnational corporations (TNCs) and regional development in an era of global economic restructuring. It seeks to give an insight of how trends in production and trade give rise to a changing global map of economic activities. The module provides students with not only a description and explanation of TNC operations, but also practical knowledge in analysing the impact of TNCs on home countries and their contributions to regional development.
<b>GE6201C</b>	<b>Geographic Information System</b>  This module explores the use of geographical information system (GIS) technology that can be applied to real-world issues. Students will be trained in basic introductory skills on how to utilise GIS technology to explore and solve different social, economic, physical-based problems. They will also be introduced to basic cartographic skills and essential elements in completing a spatial map. Students will be required to research on real-world issues, construct their own data, analyse the data and to display their results spatially in geographic representations. Students are required to work individually on lab assignments, which will allow them to acquire the skills needed towards completing their final project. This is an applied module. Students will be expected to work on and submit a module project as fulfilment of the module.

**Table of ELECTIVE / ENRICHMENT modules offered in 2009**

Year	Module Code	Module Title	Pre-requisites	MC
4	EC4208	Microeconomics I	Nil	2
	EC4209	Microeconomics II	EC4208	2
5	EC5209	Microeconomics II	EC4209	2
	EC5201	Macroeconomics I	EC5209	2
6	EC6201	Macroeconomics I	EC5201	2
	EC6202	Macroeconomics II	EC6202	2

**Module Descriptors of ELECTIVE / ENRICHMENT modules offered in 2009**

Module Code	Module Descriptors
<b>EC4208</b>	<b>Microeconomics I</b>  Microeconomics I studies the economic way of thinking, understanding the nature and function of markets, as well as the role of scarcity and competition. Students will also learn how markets may fail to achieve the pareto optimal outcome for society and how government intervention can correct some economic inefficiencies. This module aims to introduce students to economic reasoning, apply key economic concepts and conduct analysis of economic topics and familiarise students with the numerical aspects of basic economics.
<b>EC4209/ EC5209</b>	<b>Microeconomics II</b>  The aim of the module is to develop the basic tools of microeconomic analysis learned in Microeconomics II. Students will learn the principles underpinning the theory of the firm; the concept of market structures, especially competitive and monopolistic markets; how the markets fail and; the effects of government policies on household and firm decision-making. Upon the completion of Microeconomics I & II, students would have a solid grasp of the fundamental ideas and terminology in microeconomics. They should have the confidence to begin applying these ideas to 'real world' economic problems, meaning they would be able to identify the relevant economic concept that needs to be used in the analysis of a particular economic problem, drawing on and combining the concepts taught in the two modules.

<b>EC5201/ EC6201</b>	<b>Macroeconomics I</b>  This module introduces students to Macroeconomics, which deals with the economy as a whole. By concentrating on the economy in the aggregate, macroeconomics is concerned with the total output of the economy and the general price level, and not the output and price levels of a single firm or industry. In this module, they will be exposed to key economics indicators and fundamental macroeconomics issues.
<b>EC6202</b>	<b>Macroeconomics II</b>  This module builds on the concepts attained in Macroeconomics I. Students will learn about macroeconomic policies (fiscal, monetary and supply-side policies). They will also be introduced to international economics – benefits from trade, general pattern of trade between Singapore and the rest of the world, free trade and barriers to trade, globalization and capital flows, and Free Trade Agreements.

## FINE ART

The Fine Arts curriculum in NUS High School aims to help students excel in all fields of study. A student can put into practice what they have learnt in the classroom through art making; geometry in perspective drawing, chemistry in ceramics, physics in sculpture, biology in figure drawing and environmental sculptures, psychology in interactive art and computer technology in new media arts. Art can also be used as a neutral ground when talking about social or controversial subjects. It serves as a non-intimidating place to explore issues such as social and personal issues, gender issues, racial and ethnic differences and current events. Students will be able to develop self-expression and self-confidence in their abilities.

Five strategies will be employed to enhance the student's learning:

- 1) **Aesthetic perception** – Students will learn to perceive the aesthetic value in nature and in their immediate surroundings, they will be able to articulate with a language specific to the visual arts.
- 2) **Artistic expression** – Through the process of art making, students will learn to express themselves and learn the art of visual communication through various forms.
- 3) **Historical and Cultural context** – Students will understand historic contributions and cultural context in the visual arts. They will analyze the role of visual art in the development of human cultures all around the world.
- 4) **Critical Analysis** – Students will learn to analyze aesthetic principles and verbalize their understanding of the issues through constructive criticism of other students' work.
- 5) **Practical Applications** – Students will apply creative skills in problem solving, communication and organization of resources and time. They will also learn aesthetic appreciation, expression through visual language and will experience first hand the process of cross-disciplinary interaction. These abilities will help students understand how the arts are applied in everyday life and what careers are related to the visual arts.

The Fine Arts curriculum in NUS HIGH SCHOOL encompasses 4 main aspects in visual arts education.

- 1) **2 Dimensional (2D) studies:** which include Drawing, Painting, Printmaking, Photography, Textiles, Collage and Illustration.
- 2) **3 Dimensional (3D) studies:** which include Sculpture, Ceramics, Metalwork, Woodwork, Multi-media work and Installation Art.
- 3) **Design Modules:** will delve into Fashion Design, Jewellery Design, Product Design, Interior and Furniture Design.
- 4) **Aspects of Art History:** will be infused into the 2D, 3D and Design modules. It aims to cultivate the understanding and knowledge of architecture, sculpture, painting, and other art forms within diverse historical and cultural contexts.

Separate Art History modules are also offered as electives for students who are interested in taking the AP Art History examination. These modules are an in depth study of Art History and Theory, pitched at the same level as an introductory college course in Art History.

During the foundation years, students are given a broad-based introduction to art making in 2 Dimensional Arts such as Painting & Drawing, 3 Dimensional Arts such as Ceramics & Sculpture and specific aspects of Art History related to the respective 2D and 3D modules. These topics serve as foundation for many modules offered in the later years.

In depth research into advanced techniques in drawing, painting, printmaking, collage and hand-building large forms in clay, plaster casting, wood and metal forming will be taught in the advancement years. Students will gain the ability and confidence in building a 2D and/or a 3D portfolio for AP Studio Art.

Students may graduate with a NUS High School Diploma with a Major in Fine Arts by reading the prescribed Studio Art modules stated below. Studio Art is designed for students who are seriously interested in the practical experience of art. There will not be a written exam; instead, students submit portfolios for evaluation at the end of each semester in preparation for AP Studio Art. Students will work on building a portfolio in one of three portfolio areas: 2-D Design, 3-D Design or Drawing. Students will have to consult the Head of Art to decide on a suitable area to focus on. The portfolio should reflect three areas of concern: (1) a sense of quality in a student's work; (2) the student's concentration on a particular visual interest or problem; (3) the student's need for breadth of experience in the formal, technical, and expressive means of the artist. Students majoring in Fine Arts will be equipped with the skills and knowledge to submit an AP Studio Art Portfolio in Year 6 of their studies.

Art Major students normally submit their portfolio for AP Studio Art in Year 6.

### Table of CORE Modules offered in 2009

Year	Module Code	Module Title	Pre-requisites	MC
2	FA2102	3D Basic	None	2
3	FA3101	2D Intermediate	FA1101*	2
	FA3102	3D Intermediate	FA2102	2
4	FA4105	Introduction to Design	FA3101 or FA3102	2
	FA4101	2D Advance		2
	FA4102	3D Advance		2
5 Major	FA5101	Studio Art 1	All Fine Art Core Modules since Y1	3
	FA5111	Studio Art 2		2
6 Major	FA6110	Studio Art 3		

\*FA1101 2D Basic - Last run in 2008

### Module Descriptors of CORE modules offered in 2009

Module Code	Module Descriptors
FA2102	<p><b>3D Basic</b></p> <p>Sculpture is about shape and tactility and the way materials are controlled and used to portray real things and express ideas. Sculpting trains the student to replicate and create a world in 3 dimensions. The course will teach students modelling skills to replicate what they see around them and then to learn to make their own objects using their imagination. With the confidence in ability to handle and mould in clay, the students will be encouraged to learn through play and to explore the visual and tactile world. They will also be exposed to related ceramics history from China, Japan, Africa, Middle-East, Egypt and works from the Greco-Roman period.</p>
FA3101	<p><b>2D Intermediate</b></p> <p>Students will practice drawing and painting skills in this module. Techniques such as life drawing,</p>

	perspective drawing, oil & acrylic painting will be taught. Students will attain skills in problem solving as well as practical hands-on art making techniques. They will also be exposed to art historical periods such as Baroque, Impressionism, Post-Impressionism and Dutch portrait painters.
<b>FA3102</b>	<b>3D Intermediate</b>  In this module, students will practice their throwing and hand-building skills in ceramics, and casting skills in plaster and cement. They will attain skills in problem solving as well as practical hands-on art making techniques. They will also be exposed to specific periods in art history such as Egyptian, Greco-Roman, Ancient Chinese, Neo-Classical, Renaissance and Baroque, that are related to sculpture.
<b>FA4105</b>	<b>Introduction to Design</b>  This module will teach the basics in design. Students will delve into fashion design, jewellery design, product design, interior design and furniture design to create their very own signature work. Students will see a project through from the drawing board to its final product. Skills in creative thinking as well as practical applications of a design will be put to use.
<b>FA4101</b>	<b>2D Advance</b>  This module will teach students advanced skills, such as, proportion and foreshortening in drawing, painting, printmaking and collage. In depth research into techniques in pencil, ink and charcoal drawing and painting will be conducted with the figure and landscape as subject matter. Specific art history topics such as British Landscape painters Turner & Constable, and Renaissance master painters such as Michelangelo will be introduced. Students will gain confidence in building a 2D portfolio for AP Studio Art from this course.
<b>FA4102</b>	<b>3D Advance</b>  In this module, students will be trained to sculpt and construct in mixed media. It will teach students advanced skills such as wood-working and handling of woodshop tools. They will become confident in building large scale sculpture as well as learning detailing and finishing skills. Specific art history topics such as Installation Art, Minimalism, Land Art and Post-modernism will be introduced. Students will gain confidence in building a 3D portfolio for AP Studio Art from this course.
<b>FA5101 FA5111 FA6110</b>	<b>Studio Art I/II/III</b>  FA5101, FA5211 and FA6210 are compulsory Studio Art modules for students who wish to major in art. They are designed for students who are seriously interested in the practical experience of art. There will not be a written exam; instead, students submit portfolios for evaluation at the end of the school year in preparation for AP Studio Art. Students will work on building a portfolio in one of three portfolio areas: 2-D Design, 3-D Design and Drawing. Students will have to consult the head of art program to decide on a suitable area to focus on. The portfolio should reflect three areas of concern: (1) a sense of quality in a student's work; (2) the student's concentration on a particular visual interest or problem; (3) the student's need for breadth of experience in the formal, technical, and expressive means of the artist.

**Table of ELECTIVE / ENRICHMENT modules offered in 2009**

Year	Module Code	Module Title	Pre-requisites	MC
1	FA1310	Art Enrichment 1	None	2
3	FA3301	Pottery field trip in Jindezhen, China	None	2
5	FA5340	Art History 2	FA4240	2
	FA5341	Art History 3	FA5340	2
6	FA6340	Art History 4	FA5341	2

	FA6350	Art Internship	FA6340	2
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### Module Descriptors of ELECTIVE / ENRICHMENT modules offered in 2009

Module Code	Module Descriptors
FA1310	<p><b>Art Enrichment 1</b></p> <p>This module is for the beginner artist. Students who are interested in or are curious about art are encouraged to take this module to get a taste of art making. Art appreciation and cultivating a passion for the arts is the core focus of this course. Students will get to have hands on experience playing with materials such as clay, paper mache, paints &amp; charcoal, and go on field trips. The key objective of this module is to explore art and have fun!</p>
FA3301	<p><b>Pottery Field Trip to Jindezhn, China</b></p> <p>This is a field trip course where the module is carried out overseas. This year we will be going to China to experience the ceramics in its country of origin. A combination of art making and art history, this course is for students who enjoy hands-on projects as well as understanding the history behind the practice. Learn how teapots are made from the master ceramists in Jingdezhen, China.</p>
FA5340	<p><b>Art History 2</b></p> <p>This course will introduce students to the history of western art from the 18<sup>th</sup> &amp; 19th Century. Art has not gone through a more dramatic transformation in its entire history than it did during this period. Beginning from Realism and Impressionism, to Cubism and Futurism, the evolution of the visual image and its ideas has been phenomenal. Students will begin to understand the transition of the role of art as recorder of history to freedom of expression.</p>
FA5341	<p><b>Art History 3</b></p> <p>This course is an in depth study of Art History and Theory in preparation for the AP Art History exam. It will cultivate the understanding and knowledge of architecture, sculpture, painting, and other art forms within diverse historical and cultural contexts. Emphasis will be placed on understanding works in context, considering such issues as patronage, gender, and the functions and effects of works of art</p>
FA6340	<p><b>Art History 4</b></p> <p>This course is a continuation of Art History 3. It is an in depth study of Art History and Theory in preparation for the AP Art History exam. It will cultivate the understanding and knowledge of architecture, sculpture, painting, and other art forms within diverse historical and cultural contexts. Emphasis will be placed on understanding works in context, considering such issues as patronage, gender, and the functions and effects of works of art.</p>
FA6350	<p><b>Art Internship</b></p> <p>This module will prepare the student with practical skills in the art world by attaching them to art institutions such as art museums, galleries, conservatories and colleges. The student's art management skills will be developed and their ability to describe, analyze and evaluate a work of art from diverse historic and cultural backgrounds enhanced. This course aims to groom the student for a profession in the Arts.</p>

# MUSIC

Music education in the NUS High School aims to refine the aesthetic sensitivities of all humanities. Although music is not a mandatory subject whereby all students of NUS High School have to study, it is still our mission to provide a quality music program that is an integral part of the entire education as well as a reflection of a well-balanced education experience. Students majoring in music—upon recommendation—will also enjoy the collaboration opportunities with the NUS Yong Siew Toh Conservatory of Music. As such, the music program hopes to inform, challenge, direct, enhance, develop music leadership skills, musical understandings, and positive attitudes that will enable students to enjoy a richer life through listening to or participating in meaningful musical experiences, not only for the present but also in later life.

NUS High School music program provides for the musical growth of all students through the acquisition of musical knowledge and the development of basic skills of music reading, music listening and analysis, performing and creating of music. Further, in support of the NUS High School mission: to nurture well-rounded and world ready scientific minds to make distinguished contributions as Pioneers, Achievers, Thinkers & Humanitarians, the music program will aim

## **Cultural**

To foster the continued development of music appreciation and understanding through the study and performance of music and give our students a lifelong source of enjoyment.

## **Recreational**

To provide all students with the opportunity for worthy use of leisure time, an emotional outlet, recognize the talent and diversity of musical behaviors, and good social experience.

## **Educational**

To develop interested and discriminating listeners, provide a well-rounded music education and prepare students for musical activities beyond high school. To align with NUS High School's strategic objectives:

- to establish a rigorous music curriculum that caters to varied interests and talents and that allow every student to develop their individual peaks.
- to provide performing opportunities where possible that will lead to a positive school experience for every student.

## **Service**

To lend color and atmosphere to school and community affairs while promoting and enhancing the dignity and reputation of NUS High School at all appearances. Students interested to lead should join the NUSHS Music Ambassadors.

## **Citizenship**

To develop the ability to function as a responsible member of the group, to enhance the student's ability to interact with others in a positive manner, and to develop the ability to function as a responsible member of the community.

As in any endeavor, the accomplishment of NUSHS Music Program depends also upon the ability, interest, degree and quality of effort given by each student, teacher ability and interest, and constraints of facilities, equipment and time-tabling.

<Crescendo (*cresc*) is an Italian term to mean (a) a gradual increase; *specifically*, a gradual increase in volume of a musical passage (b) the peak of a gradual increase>

## **DESIGN OF CURRICULUM**

The High School Music Program is designed as a developmental and sequential approach to music instruction within a six-year program (Foundation - Years 1 & 2; Advancement - Years 3 & 4; Specialization - Years 5 & 6). Each module represents a minimum of 12-15 weeks of classroom instruction per semester. Each modular credit is equivalent to 50 minutes of the class time. The curriculum is purposely flexible in order to meet the needs of students within a variety of facilities and school timetable structures. Some of the modules are self-contained and may be used independently with other modules. Some modules are taught concurrently with other modules, while others are taught in spiral sequence.

The music curriculum at NUS High School is designed with the knowledge that

1. the individual students will not necessarily be practitioners of the arts, few may choose it as a career,
2. still more may pursue it as an avocation, and
3. most of the students will be the mass audience for the culture of their times.

Students aiming to choose Music as a 4<sup>th</sup> major may do so by completing a total of **22 CORE** modular credits. These **CORE Modules** offer students a broad-touch based exposure and a general overview of the subject so as to increase the students' general musical knowledge, the depth of understanding and appreciation of the subject matter. These modules lay a strong foundation and the fundamental concepts and principles of the subject. Module grades are counted toward the CAP.

(NOTE: Certain modules may be accelerated if student background indicates a prior grasp of content and thus strongly advice to sit for the diagnostic test so as to be exempted and at the same time credits earned toward fulfilling of the requirement.)

**ENRICHMENT Modules** offer students across the 6 years (ageless) who are interested to learn a new instrument in the performing area of the music study. Students will learn first in a group setting and by end of the module, choose to continue to study on a one-to-one private lesson with an external teacher (no modular credit for private lessons) if they are interested to sit for the practical examinations such as ABRSM or TRINITY. These modules are not graded. (**Students with advanced instrumental skills may approach the Head of Music for advice.**)

## **EXPECTED REQUIREMENTS**

### Applied Instrument:

Students majoring in Music must try to attain a standard of the Associated Board of Royal School of Music (ABRSM) Grade 8 or beyond for the first musical instrument and a standard ABRSM Grade 5 for the second instrument by Year 6. Majoring students will study or continue to learn the applied instruments with their external music teachers who will prepare them for one of the examination boards such as the *Associated Board Royal School of Music* (ABRSM) and Trinity College London (TCL). Each level grows from those experiences previously presented.

### Performing Opportunities: Chamber Music, Senior Recital and CCA Performing Arts:

Aside from fulfilling the 2 musical instruments requirement, majoring students must also fulfill 2 semesters of chamber music in Year 4 or 5; and is required to present a student recital on the final year before graduation. Majoring student is also required to participate in one of the CCA Performing Arts group: School Orchestra or Chinese Orchestra or Choir. Every student is entitled to the opportunity to explore in and out of school music activities and the study of orchestra instrument during his or her high school education.

## **ASSESSMENT**

The modes of assessment for music modules have been planned to range from individual practical examinations to submitted projects and presentations—with emphasis on authentic assessments. Each module carries its own specific Continual Assessment (70%) requirement such as Quizzes/Tests, File Check, Assignment (in theory or in practical aspects), Projects, Concert Reports; and a Final Examination or Project (30%) or entirely 100% Continual Assessment.

Students experience both the reflective preparations and drafting and revision of work. At the other extreme, aside from learning to improvise, sight-read/sing, and generally 'think on their feet,' students are strongly encouraged to be assessed by external examination boards such as the Associated Board Royal School of Music, Trinity College of Music, the College Board AP-Music Theory, or have auditions with the university or conservatory locally and/or overseas.

## **LEARNING OUTCOMES**

The NUS High School Music Program promotes awareness of music through the development of musical skills, knowledge and perception that contributes to the total development of the individual. School and community resources are used to facilitate the exploration of music in a manner both meaningful and relevant to students. By Year 6, having completed all Cores modules, majoring students would have attained the skills and knowledge that will prepare them for tertiary level music education. Nonetheless, it is the hope that by the end of their school year, the maturing students will experience the following outcomes and rewards as a result of the music experiences here at NUS High:

1. a changed attitude in which they value music for all people, not just a select few;
2. a feeling of pride in their ability to make music: as appreciative listeners, to understand as performers and to create as composers
3. a feeling of increased confidence in their musical judgments
4. a feeling of emotional satisfaction, and
5. as advocators and supporters of the schools' music education and to the local arts scene.

The Music Program in NUS High School helps students develop and achieve basic competencies and to strive for excellence within the limits of their individual capabilities and peaks in three important and specific areas of emphasis: Skill Development, Musical Understanding, and Attitude Development.

### Exemption Policy

Unless they have already attained external certificate such as ABRSM Music Theory Grade 5, students are allowed to sit for the Diagnostic Tests for MU3102 *Elements of Music Theory*. Upon A+, they can accelerate to the next level of music theory module (subject to availability of the student time-table)

### Table of CORE Modules offered in 2009

Year	Module Code	Module Title	Pre-requisites	MC
2	MU2101	Einstein in Basic Musicianship	Open to all students with good learning attitude	2
3	MU3112	Music: Art of Listening	Open to all students with good learning attitude	2
	MU3117*	Opera: The Extravagant Art	For students who have read MU2111 "The Enjoyment of Music Listening"	
	MU3102**	Elements of Music Theory	Completed MU2101 or have at least attained ABRSM Grade 3 / 4 Theory. (Students who have already obtained ABRSM Music Theory Grade 5 and above need not register for this module but instead to sit for the Diagnostic Test and score an A+ to be exempted. Student will earn the 2 MC for fulfillment but no grades will be added to the overall CAP.	2
4	MU4121	Technology in Music Education	Open to all students with good learning attitude and a plus to have basic keyboard and music theory skills.	2
	MU4122	Contemporary Music Education	Open to all students with good learning attitude.	2
5	MU5106	Music Arrangement & Composition	Completed MU3102 "Elements of Music Theory" and attained at least a certificate of ABRSM Grade 5 Music Theory.	3
	MU5105	Melody & Harmony		3
6	MU6118	Music in Cultural Perspectives	Open to all students with good learning attitude.	3
	MU6107	Advanced Ear-Training & Sight Singing	Completed MU5105 and at least attained a certificate of ABRSM Grade 6 Theory.	3

\* **NOTE:** Student will select one of the modules

\*\* **NOTE:** Students with a strong grasp of up to ABRSM Grade 5 content and has at least obtained ABRSM Music Theory Grade 5 is strongly advice to sit for MU3102 diagnostic test.

### Module Descriptors of CORE modules offered in 2009

Module Code	Module Descriptors
MU2101	<p><b>Einstein in Basic Musicianship</b></p> <p>This module is for all students with or without music background to understand and grasp the essential elements of music. It will develop students' sense of musical values as well as the necessary skills for effective musical expression—from basic ear-training and sight-singing to conducting, music theory (ABRSM Grades 1 to 3) and music appreciation. Students will also experience through a heightened appreciation of the musical heritage of Europe and its offshoots to today's music—the varied musics of popular music, blues and jazz, and on the musics of other cultures.</p>
MU3112	<p><b>Music: Art of Listening</b></p> <p>This module will look into a tighter and more logical aspect of listening and appreciation—focusing on the symphony, opera, chamber, concertos of the early music to today—relating them to the arts, society and nationalities. This course will also introduce you to the contents of various works and their aesthetic qualities: what goes on in the music, and how it affects us. Listening to music is itself an art and good listening constitutes an active, creative experience. The highly sensuous pleasure</p>

	we experience while listening to great music is our emotional reward for an intellectual effort well made.
<b>MU3117</b>	<p><b>Opera: The Extravagant Art</b></p> <p>Opera incorporates many different art forms: drama, singing, costuming, lighting, dancing and music. Witnessing all those arts coming together into a unified whole, one find it a special satisfaction. This module looks into the connections between music and intellectual history, the workings of symbolism in opera and the importance of staging an opera in keeping with the composer's intentions; also looking into how operas give musical and dramatic expression to ideas about the self, society, and history, how attitudes toward society, culture and politics shape great operatic works. Analysis includes from operas by prominent composers of the various eras.</p>
<b>MU3102</b>	<p><b>Elements of Music Theory</b></p> <p>This module spirals to the next level of music theory for students who have already attained ABRSM Grade 3 / 4 Music Theory or have completed Einstein in Basic Musicianship. It covers the basic form and analysis of music, various clefs, irregular time signatures, usage of triads and chords in harmonization, basic compositional devices, ornaments, instruments of the orchestra, transposition and arrangement, etc. All students must sit for the external examination: ABRSM Music Theory Grade 5 paper.</p>
<b>MU4121</b>	<p><b>Technology in Music Education</b></p> <p>This module aims to provide students with the knowledge and hands-on skills through weekly in-class practical exercise, lectures, demonstrations and examples to music technology skills where they learn music notation software (Finale), basic knowledge of MIDI set up, use computer workstations to create and compose music, basic music sequencing (garage band), as well computer-assisted program for ear-training, theory, and history. All students will attain skills of music notation and basic midi sequencer by the end of the module.</p>
<b>MU4122</b>	<p><b>Contemporary Music Education</b></p> <p>This module focuses on issues that affect the teaching and learning of music in the coming years. From a comprehensive survey of the history, philosophy, and functions of music education to its social, psychological, and pedagogical aspects—we look into topics such as attitude formation, creativity, cognitive processing, and behavioral techniques—how social class, race, and other characteristics influence the responses of students to different types of music; and many other issues. This course is organized into four parts: historical, social, intellectual and political context of contemporary music education; along with a look at what lies ahead for the profession.</p>
<b>MU5106</b>	<p><b>Music Arrangement and Composition</b></p> <p>This module looks into the principles of composition and aim to develop student's inventive ability with guided writings in various forms of musical composition. Three parts: Instrumentation, Choral Arranging and Orchestration. Instrumentation deals with the ranges, techniques, and timbres of each of the orchestra instruments. Orchestration deals with major scoring problems as well as techniques of transcribing piano, chamber, and band music for orchestra. Choral Arranging explores the ranges and transpositions of voices. Students will work on these characteristics and basic techniques in arranging, transcribing and scoring for chorus, orchestra, band and ensembles from pre-existing scores to original compositions.</p>
<b>MU5105</b>	<p><b>Melody and Harmony</b></p> <p>This module deals with tonal organization in the music of the 18th and 19th centuries, offers a thorough and comprehensive course of study in harmony, figured bass, forms and analysis, melodic decorations, suspension, writing for orchestral instruments, modulation, suspension, diatonic secondary 7th chords, Neapolitan 6th chord, Diminished 7th, Augmented 6th, advanced studies in four-parts, modulation, instrumental styles writing, harmonizing a melody, rewriting chorale passage and sonata, continuation of melodic writing for 2 treble instruments and a basso continuo, identification of compositions, its different genres and styles etc. Majoring students must sit for the external examination: ABRSM Grade 8 Music Theory.</p>

<b>MU6118</b>	<b>Music in Cultural Perspectives</b>  Students who take this module will understand and appreciate music of all types and vernacular—from past to present, from East to West. Music symbolizes a people's way of life; it represents a distillation of cultural style. This module looks into the tradition & philosophy, musical concepts & styles, musical instruments, performances, integrated learning—which values respect and represents our culturally diverse population and make a comparative study of what, at any given point in time, was happening in the other arts as well—via representative recordings of music literature and multimedia.
<b>MU6107</b>	<b>Advanced Ear-Training and Sight-Singing</b>  This module challenges students to the task of ear-training and sight-singing exercises designed to build up an increased aural/oral awareness of musical sounds and pitching. Consist of melodic (2—3 parts), harmonic (2—4 parts) and rhythmic (simple to irregular) drills and dictations, identifying intervals (simple to compound), types of scales (e.g. modes, chromatics blues scales), triads and chords, keyboard harmony, score reading in various clefs (treble, alto, tenor, bass), conducting skills—ALL within a tonal/atonal context, error detection, prepared/unprepared singing and dictation, students will learn to audiate (“hearing” eye) without having to sing or play it out loud.

**Table of ELECTIVE/ENRICHMENT modules offered in 2009**

Year	Module Code	Module Title	Pre-requisites	MC
1 - 3	MU1331	Group Violin For Beginners	Open to all students with absolutely no background in violin playing and good learning attitude.	1
	MU1334	Group Keyboard for Beginners		1
6	MU6361	Senior Recital	Additional requirement for majoring students. Majoring Year 6 students must try to attain a minimum standard of ABRSM Grade 8 for the first musical instrument and a minimum standard of ABRSM Grade 5 for the second instrument. Student must also pass the jury a month before the recital.	1

**Module Descriptors of ELECTIVE/ENRICHMENT modules offered in 2009**

Module Code	Module Descriptors
<b>MU1331</b>	<b>Group Violin for Beginners</b>  Group violin instruction is one of the most challenging and most promising music programs. Designed for students with little or no music background—across levels, this highly intensive structured course (10-12-weeks) will cover what you need to learn in basic violin playing. Emphasis will be placed on playing position, basic tone production, rhythmic precision, interpretation of music symbols, bowing techniques, care of the instrument, solo and ensemble playing. Open to all beginning-level violin students. Students are required to purchase their own violin, music stand, and music book (Violin orders and accessories will be taken during 1st lesson).
<b>MU1334</b>	<b>Group Keyboard for Beginners</b>  Group keyboard module provides an experience that is exploratory and participatory but is not aimed at producing capable pianist at this point. Designed for students with little or no music background, the 10-12 weeks structured course will cover what you need to learn in basic piano playing. It is especially useful for those who are interested to learn the fundamentals of music theory, basic technique and performance skills, solo and ensemble playing. Open to all beginning-level keyboard students. Students are required to purchase their own keyboard instrument and music book. (Keyboard orders and accessories will be taken during 1st lesson)
<b>MU6361</b>	<b>Senior Recital</b>  Music performance is an integral part of every student's music education. As such, students

	<p>specializing in music are required to perform a full recital in the final year of NUS High education: primary instrument (35 minutes) and secondary instrument (10 minutes) as well as to follow the recital guidelines. A full recital should consist of 45-50 minutes of music. Students should begin thinking about the recital date one year before the actual day. Majoring students will check with the Program Head the procedures and bookings, concert repertoires with their external music teacher, and after concert reception with their parents.</p>
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## **EXPERIMENT. EXPLORE. EXCEL.**

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