PROGRAMME OF STUDIES FOR THE CLASS OF 2020

correct as of 24 May 2020

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ABOUT NUS HIGH SCHOOL

The NUS High School of Mathematics and Science is an independent, specialised co-educational school that offers its own six-year diploma programme. Established in 2005 by the Ministry of Education, Singapore (MOE) and the National University of Singapore (NUS), the school offers a rich and broad-based curriculum in mathematics, the sciences, humanities, the languages and the arts. The specialised math and science curriculum is underpinned by creative teaching to inspire and challenge talented young minds who are passionate in these disciplines. The school's keystone programme for research, innovation and enterprise, the Da Vinci Programme, complements these specialisms. Apart from promoting interdisciplinary learning, the Programme provides the opportunity for students to undertake authentic research under the guidance of researchers from tertiary institutions and research institutes. The school's affective and character education programme is responsible for developing socially responsible leaders who are committed to contribute towards the betterment of society. The school's curriculum is accredited by MOE and NUS. Upon successful completion of the six-year programme, students graduate with the NUS High School Diploma. The Diploma is recognised by local and renowned overseas universities.

Our Mission

To inspire and shape the future of education in mathematics and science.

Our Vision

Future-ready Pioneers, Humanitarians and Innovators for the world.

ACADEMIC PROGRAMME OF STUDIES

The Academic Programme of Studies is the prescribed syllabus at every stage of the NUS High School curriculum. It outlines the curriculum structure, modular system, grading system as well as promotion and graduation requirements. It will be updated regularly to reflect all academic modules that are offered to the Class of 2020.

1. Curriculum Structure

NUS High School designs and implements a unique curriculum that is relevant, deep, rigorous and inspiring to students who have the aptitude in and passion for Math and Science. The NUS High School curriculum allows students to have more flexibility for deeper exploration in their learning as they move up from the Foundation Years to the Specialisation Years.

Foundation Years	Year 1 - 2	Students will acquire the fundamentals and build their base knowledge.
Advancement Years	Year 3 - 4	Students will enhance their knowledge and have the opportunity to apply their knowledge
Specialisation Years	Year 5 - 6	Students will be engaged in doing advanced courses in their areas of specialisation.

1.1 Modular System

The NUS High School curriculum is based on a modular system. The school offers our students a diverse spectrum of courses and enriches them through our multidisciplinary approach. It also provides the rigour and depth of curriculum while allowing flexibility and breadth to the learning so that students can develop to their full potential. Students can progress at their own pace and choose from a wide range of modules.

1.1.1 Types of Modules

CORE	Essential modules with the core knowledge and skills expected of a student majoring in the discipline at the high school level.
ELECTIVE	Modules that build on the Core modules to give greater depth and deeper understanding to students for the subject. It provides flexibility of choice with further different focus within the discipline. It is not compulsory to take elective modules.
ENRICHMENT	Modules that are offered to students who wish to broaden their interest It is not compulsory to take enrichment modules.
HONOURS	Honours modules are advanced modules designed at university undergraduate level for students specifically reading Mathematics or Science subject at Major with Honours level. Honours modules are offered in Years 4 to 6. It is not compulsory to take Honours modules.

1.1.2 Module Codes

Each module of study has a unique module code consisting of a two-letter prefix and four digits:
- First two letters: Subject code that denotes the discipline (see List of Subject Codes)
- The first digit indicates the academic level of module offered.
- The second digit is used to indicate the type of module: 1 for Core, 2 for Elective, 3 for Enrichment and 4 for Honours
- The last two digits indicate the module number.

For some modules, there is a suffix letter.
- A letter 'A' indicates that the module is a preclusion and taken in lieu of the core module, with different assessment weighting.
- A letter 'C' indicates that an elective module may be considered a core pre-requisite for specific groups of students. For example, some Computing Studies elective modules are core pre-requisites and automatically included for a Computing Studies Major student for computation of CAP.
- A letter 'E' indicates that selected Computing Studies elective modules may be included into the Computing Studies Subject CAP (see 2.3.1)
- A letter 'M' indicates that a Mother Tongue Language in-lieu module is offered by an external MOE-approved language centre.
- A letter 'V' indicates that the module is offered by external agencies or Institutes of Higher Learning, but is considered a school module.

List of Subject Codes

AR Art	**AE** Affective & Character Education	**CL** Chinese	**EL** English Language	**GM** German	**MA** Mathematics	**PE** Physical Education
BG Bengali	**AR** Art	**CM** Chemistry	**EN** English Literature	**HD** Hindi	**MH** Higher Malay	**TH** Higher Tamil
BL Biology	**BG** Bengali	**CS** Computing Studies	**FR** French	**HY** History	**ML** Malay	**TL** Tamil
CE Character & Citizenship Education	**BL** Biology	**DV** Da Vinci	**GE** Geography	**IH** Integrated Humanities	**MU** Music	**UD** Urdu
CH Higher Chinese	**CH** Higher Chinese	**EC** Economics	**GJ** Gujarati	**JP** Japanese	**PC** Physics	

Examples:
- **EL2106** is an English module (EL) taught at academic level two (2). It is a core module (1).
- **CM1302** is a Chemistry module (CM) taught at academic level one (1). It is an enrichment module (3).
- **MA3206V** is a Mathematics module (MA) taught at academic level three (3). It is an elective module (2) that is conducted at an external agency (V).

1.1.3 Pre-requisite(s)/Co-requisites/Preclusions

Pre-requisite(s)	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

1.1.4 Modular Credits

Under the modular system, workloads are expressed in terms of Modular Credits (MCs). A modular credit (MC) is a unit of the effort, stated in terms of time, expected of a typical student in managing his/her workload. The MC-value of a module is derived by dividing the estimated total number of workload hours per week for that module by the credit factor of 2. For example, a 4-MC semester-long module would require 8 hours of work a week, including lessons in class, laboratory sessions, assignments, and independent or group work in a semester. A 6-MC year-long (2 semesters) module would require 6 hours of academic work per week for an academic year.

1.2 Foundation Years

Students are to read all Core modules of the following academic subjects during their Foundation Years – English Language, Mother Tongue, Mathematics, Biology, Chemistry, Physics as well as Humanities, Art and Music. Please refer to the respective academic Departments for details. Students are also expected to read modules under the *Da Vinci* Programme. Please refer to the *Da Vinci* Programme for details.

Compulsory Academic modules and Modular Credits in the Foundation Years

Year 1		Year 2	
English Language & EN	7	English Language & EN	7
Mother Tongue[1]	6	Mother Tongue[1]	6
Mathematics	6	Mathematics	8
Biology	4	Biology	4
Chemistry	4	Chemistry	4
Physics	4	Physics	4
		2 from GE, AR & MU	4
Integrated Humanities	4	Integrated Humanities	2
Da Vinci	5	*Da Vinci*	5
Total[2]	**35**	**Total**[2]	**39**

[1] It is compulsory for students to take up Mother Tongue Language modules, with the exception of students who have been exempted by the Ministry of Education. The figures shown assume students read Higher Mother Tongue modules.

[2] The total number of modular credits in the Academic Year of Studies excludes modules in the *Da Vinci* Programme as these modules do not have a Grade Point (refer to section 2.2 for details). The *Da Vinci* Programme is reflected in this table so as to provide a complete representation of compulsory academic load.

1.3 Advancement Years

Students are to read all Core modules of the following academic subjects during their Advancement Years – English Language, Mother Tongue, Mathematics, Biology, Chemistry, Physics as well as Humanities. Please refer to the respective academic Departments for details. Students are also expected to read modules under the *Da Vinci* Programme. Please refer to the *Da Vinci* Programme for details.

Compulsory Academic modules and Modular Credits in the Advancement Years

Year 3		Year 4	
English Language	6	English Language	6
Mother Tongue[1]	6	Mother Tongue[1]	6
Mathematics	8	Mathematics	10
Biology	6	Biology	6
Chemistry	6	Chemistry	6
Physics	6	Physics	6
Humanities, Art & Music	4	Humanities, Art & Music	4
Da Vinci	3		
Total[2]	**42**	**Total**[2]	**44**

[1] This assumes students read Higher Mother Tongue modules and clear the MOE MT requirement. If not, students will continue to read Mother Tongue module in Year 5 or even Year 6.
[2] Total number of modular credits in the Academic Year of Study excludes modules in *Da Vinci* Programme. *Da Vinci* Programme is reflected in this table so as to provide a complete representation of compulsory academic load.

1.4 Specialisation Years

Students are to complete the following during their Specialisation Years:

English Language	Students have to read all English Language Core modules from Years 5 - 6.
Mother Tongue	Students have to continue taking Mother Tongue modules, if they have not already fulfilled the requirements by Year 4. Please refer to the Mother Tongue Modules Offered, for details.
Three Compulsory Major Subjects	Students have to read **Mathematics** and **TWO Sciences**[1] as Major subjects. • Mathematics • Science Subject 1 • Science Subject 2
Advanced Research Project	Students have to complete an Advanced Research Project (ARP) in any Mathematics, Science or Engineering domain. It is part of the *Da Vinci* Programme.
Optional **Major Subject**	Students **may** read **ONE** of these subjects as the fourth Major, provided they have met the pre-requisite requirements of the selected subject. i.e. students are allowed to read a **maximum** of **FOUR** Major subjects, which can be from the following subjects: • Science Subject 3 • Art • Economics • English Literature • Geography • History • Music
Optional **Major with Honours**	Students **may** read any of the following subjects at Major with Honours level (refer to section 1.4.1), which is built on the Major curriculum. • Mathematics • Biology • Chemistry • Physics • Computing studies

[1]Science subjects include Biology, Chemistry, Physics and Computing Studies.

Compulsory Academic modules and Modular Credits in the Specialisation Years

Year 5		Year 6	
English Language Mother Tongue[1]	6	English Language	6
Mathematics	9	Mathematics	3
Science subject 1	5-8	Science subject 1	3-6
Science subject 2	5-8	Science subject 2	3-6
Da Vinci	*3*		
Total[2]	**26 - 29**	**Total**[2]	**16 - 19**

[1] This assumes students read Higher Mother Tongue modules and clear the MOE MT requirement. If not, students will continue to read Mother Tongue module in Year 5 or even Year 6.

[2] Total number of modular credits in the Academic Year of Study excludes modules in *Da Vinci* Programme. Da Vinci Programme is reflected in this table so as to provide a complete representation of compulsory academic load.

1.4.1 Major with Honours

For Mathematics, Biology, Chemistry, Physics and Computing Studies, the school offers specialization at Major and **Major with Honours** level. For Major with Honours, students will cover topics that are beyond the typical high school curriculum. Students who have maintained a consistently high achievement in the modules that they have read before the Specialisation Years may qualify, and be approved by the academic Departments, to read their choice(s) of Major subject(s) as Major(s) with Honours.

2. Grading System

2.1 Assessment

Students are assessed through a combination of Continual Assessments (CA) and End-of-Semester Examinations. Continual Assessment can be based on quizzes, assignments, tests, practicals, projects, reports, presentations, etc. 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.

2.2 Grade Point System

Academic performance for **CORE**, **ELECTIVE** and **HONOURS** modules is measured by Grade Points on a 5-point scale (including Mother Tongue Language modules):

Grade	A+	A	A-	B+	B	B-	C+	C	D+	D	F
Grade Point	5.0		4.5	4.0	3.5	3.0	2.5	2.0	1.5	1.0	0

A D grade and above are considered as passing grades.

Academic performance for **ENRICHMENT** and **DA VINCI** Programme modules is measured as shown in the following grade table.

Enrichment Modules	Distinction	Merit	Pass	Fail
Da Vinci Programme Modules	Excellent	Merit	Satisfactory	Unsatisfactory

No Grade Points are awarded for Enrichment modules and Da Vinci Programme modules. The performance of these types of modules is not used in the computation of GPA/CAP.

Additional Indicators for Modules	Exempted (EXE)	Students exempted from taking a Core module by the relevant academic Department will be awarded the Modular Credit(s), but will not receive a Grade Point. Refer to section 2.4.
	In Progress (IP)	For modules that extend more than one semester, the Grade Point will be given at the conclusion of the module. The status "IP" is assigned during the intervening semesters.

Additional Remarks for Modules	Accelerated	Students completed a higher level module. Refer to section 2.5.
	Completed	Students completed the module.
	Repeated	Students repeated the module.

2.3 Cumulative Average Point (CAP)

Academic progress is tracked by the Cumulative Average Point (CAP), which is the weighted average grade point of all modules taken by a student. Therefore, a student's CAP is the sum of the module grade points multiplied by the number of MCs for the corresponding module, divided by the total number of MCs. This is represented as follows:

$$CAP = \frac{\text{sum (module grade point x MCs assigned to module)}}{\text{sum (MCs assigned to all modules used in calculating the numerator)}}$$

All CAP scores will be computed to 1 decimal place.

Modules with no grade point such as exempted and Enrichment modules do not contribute to CAP.

There are three different CAPs with different time frames and purposes – Promotion CAP, Biennial CAP and Graduation CAP.

Promotion CAP	Biennial CAP	Graduation CAP
To determine promotion to next Academic Year	To compute the Graduation CAP	To determine the Classification of Diploma (refer to section 3.3)
• Year 1 to 5	• Year 3 - 4 CAP • Year 5 - 6 CAP	• Year 3 to 6
Shows the academic performance in the Academic Year of Study	• **Year 3-4 CAP** - Shows the academic performance of ALL THE SEMESTERS FROM YEAR 3 SEMESTER 1 UP TO THE CURRENT SEMESTER • **Year 5-6 CAP** - Shows the academic performance of ALL THE SEMESTERS FROM YEAR 5 SEMESTER 1 UP TO THE CURRENT SEMESTER	Shows the academic performance of ALL THE SEMESTERS FROM YEAR 3 SEMESTER 1 UP TO THE CURRENT SEMESTER
Grade points of ALL Core modules including Mother Tongue Core modules, Elective and Honours modules read in the Academic Year are used for the computation of CAP		Graduation CAP = ½ x (Yr 3-4 CAP + Yr 5-6 CAP)[2] The higher value of either computation • Grade points of ALL Core, Honours modules and Elective[1] modules but excluding core Mother Tongue (MT) Language modules • Grade points of ALL Core, Honours modules and the core MT Language modules as

Promotion CAP	Biennial CAP	Graduation CAP
		well as Elective[1] modules

[1] Electives are selected by the system, which will maximize the CAP for students. Exception is at Year 6 Semester 2, where students will select electives of their choice for inclusion into their Graduation CAP.
[2] Yr 3-4 CAP and Yr 5-6 CAP will be in 1 decimal place. Graduation CAP will be in one decimal place.

2.3.1 Subject CAP

Subject CAP is computed from grades of all Year 3-6 Core, Elective[1] and Honours (if applicable) modules in that subject. Subject CAP at Years 1 & 2 will be shown for records. The following Subject CAP will be displayed in the Academic Transcript:
- English Language
- Mother Tongue Language
- Mathematics
- Biology
- Chemistry
- Physics
- Humanities, Art and Music

The Mathematics Subject CAP may include Year 3-4 Computer Studies (CS) electives modules for students who are not doing CS as a Major or Major with Honours. A student who does a Major or Major with Honours in CS will have all the CS modules reflected in a separate Computer Studies Subject CAP.

For a student who does a 4th Major in Art, Economics, English Literature, Geography, History or Music, the Humanities, Art and Music Subject CAP will include the area of Major in brackets. For example, a History Major student will have a Humanities, Art and Music (History) Subject CAP.

Major CAP is computed from grades of all Core modules at Level 5000-6000, in that subject.

Honours CAP is computed from grades of all Honours modules in that subject.

2.4 Exemption from Modules

Teachers will recommend suitable students for diagnostic tests. Students can be granted exemption from reading a module if they fulfill the following conditions:
- Excellent performance in diagnostic tests and;
- Other Department requirements, subject to approval

Students fulfilling these conditions will be granted "EXE" status for that particular module and no grade point is awarded. Modular credits are fulfilled. Interested students who wish to seek module exemption should approach the respective academic Departments for more information.

2.5 Acceleration of Modules
Students who are granted exemption of a module may proceed to read another module at a higher academic level in lieu. For example, a Year 1 student granted exemption from MA1110 (pre-requisite to MA2112) may accelerate to read MA2112 in his/her Year 1 of study. MA2112's grade will be computed into the student's GPA of the semester it is read, and upon the student's entry into his/her official Year 2 of study, into his/her CAP. The accelerated module will be printed out in the semester progress report.

2.6 Failing and Repeating Modules

Students who fail a **Core** module (F Grade) shall sit for a Viva. A student who passes the Viva will be given a D grade and the student will be deemed to have completed the core module. For CAP computation, the D grade will be used instead of the original F grade. A student who fails the Viva will have to repeat the module when it is offered again. Upon passing the repeated module, the student will be awarded a new grade.

Students who fail a module which is a pre-requisite to a higher level module would not be allowed to read the higher level module. However, a student may read both modules concurrently, on a case-by-case basis, subject to department and school approval - however, this is not applicable to students who do not meet minimum Promotion CAP of 2.5 to promote to the next academic Year of Study.

Students who fail an Honours module (F Grade), shall not be offered a Viva. The student is deemed to be unsuitable to handle the rigour of the Honours curriculum, and will no longer be allowed to continue with the Department's Honours programme.

2.7 Optional Examinations

Years 5 and 6 students are encouraged to sit for the Advanced Placement (AP) Examinations, which are optional examinations offered by the United States College Board. AP results may enhance chances of gaining admission to overseas colleges/universities.   For some universities, AP results are required for admission.

3. Promotion and Graduation

3.1 CAP for Promotion

A student must obtain a minimum Promotion CAP of 2.5 to promote to the next academic Year of Study. A student who is unable to meet the minimum Promotion CAP will repeat the Year of Study. This essentially means repeating all Core modules that a student has to read for that Year of Study.

3.2 Graduation Requirements

For students to graduate with the NUS High School Diploma, they must fulfill ALL the following requirements:
- Obtain a minimum Graduation CAP of 2.5
- Pass all Year 3-6 Core modules for English Language
- Complete respective Mother Tongue Language modules, as required (refer to Mother Tongue Policy)
- Pass all Year 3 & 4 Core modules for Mathematics, Biology, Chemistry and Physics
- Pass all Year 5 & 6 Core modules for Mathematics Major, two Science Majors and 4th Major (if applicable)
- Pass respective Year 3 & 4 Core modules for Humanities, Art and Music, as required
- Obtain at least a Satisfactory grade for the Advanced Research Project

*Students must have completed at least **four** years of residency studies (including Years 4, 5 and 6) at NUS High School to graduate with the NUS High School Diploma.*

3.3 Classification of Diploma

Students who graduate are awarded the NUS High School Diploma with High Distinction, Distinction, Merit or Pass, based on the Graduation CAP computed to the first decimal place.

Class of Diploma	Pass	Merit	Distinction	High Distinction
Graduation CAP	2.5 – 2.9	3.0 – 3.9	4.0 – 4.4	4.5 – 5.0

--------------------------------**END** ----------------------------------

Mathematics and Statistics

The mathematics curriculum at NUS High School is built upon important mathematical concepts such as number and algebra, geometry and measurement, function and graph, as well as probability and statistics.

Students will be able to apply these concepts in multiple ways using numbers, graphs, symbols, diagrams, and words. The learning process emphasises concept attainment through problem solving and reasoning, mathematical skills and tools, mathematical computation and modelling, and putting mathematics to work.

In the Foundation Years (Years 1 to 2), students are given a broad-based mathematical study of algebra, geometry, statistics and trigonometry. These topics serve as a 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 (Years 3 to 4). 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, numerical methods and mathematical proofs will also be touched upon. Simple concepts of calculus are introduced too.

Students in the Specialization Years (Years 5 to 6) are required to read calculus at an extensive level that is comparable to calculus courses in colleges and universities. They will also further their knowledge in pure mathematics and statistics. In addition, they have a 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.

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 excellent results in their Core modules.

Students are advised to follow the more appropriate choice on the basis of their academic performance. Students offering Major normally sit for AP Calculus AB in their Year 5 whereas students offering Major with Honours normally sit for AP Calculus BC in their Year 5. Students may also have the option of sitting for AP Statistics in their Year 6. The respective AP examinations are optional.

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.

Level	Sem	Module Code	Module Type	Module Title	Description	Modular Credits (MC)	Pre-requisites	Preclusions	Co-requisites	Hrs/ wk	Remarks
1	1	MA1110	Core	Foundation Mathematics I	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.	3	None			3	
1	1	MA1203	Elective	Basic Mathematical Olympiad Training I	This module provides students with a taste of Olympiad-type mathematics. Students are expected to participate in the Singapore Mathematical Olympiad (Junior).	2	None			2	
1	1	MA1306	Enrichment	Fun with Fractals	This enrichment module explores the topic of fractals through a series of hands-on activities and experimentation. Students are expected to work in groups to produce a product demonstrating fractal properties by the end of the module.	2	None			2	
1	2	MA1111	Core	Foundation Mathematics II	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.	3	MA1110			3	
1	2	MA1202V	Elective	Advanced Mathematical Olympiad Training I	This module targets high ability students who are keen to prepare themselves rigorously for the Singapore Mathematical Olympiad (Junior). The course is taught by an external trainer and is conducted on Saturdays.	2	Department Approval			2	
1	2	MA1204	Elective	Advanced Mathematical Olympiad Training IA	This module targets high ability students who are keen to prepare themselves rigorously for the Singapore Mathematical Olympiad (Junior).	2	MA1203			2	
2	1	MA2112	Core	Foundation Mathematics III	This module builds upon the previous foundation. Topics covered include quadratic functions and inequalities, graphs of simple polynomials, congruency and similarity. Circle geometry, basic set language and notation will also be introduced. Topics like simple trigonometrical ratios, bearings and 3-dimensional problems are covered too.	4	MA1111			4	
2	1	MA2203V	Elective	Advanced Mathematical Olympiad Training II	This module builds upon the previous Junior Olympiad training. The course is taught by an external trainer and is conducted on Saturdays.	2	MA1202V			2	
2	1	MA2206	Elective	Advanced Mathematical Olympiad Training IIA	This module targets high ability students who are keen to prepare themselves rigorously for the Singapore Mathematical Olympiad (Junior).	2	MA1204			2	

2	2	MA2113	Core	Foundation Mathematics IV	This module covers the essential concepts of basic data analysis, permutations and combinations, probability and surds. Circle geometry is further developed. Students will also learn about 2D vectors and various problem solving heuristics and techniques.	4	MA2112			4	
2	2	MA2207	Elective	Advanced Mathematical Olympiad Training IIIA	This module targets high ability students who are keen to prepare themselves rigorously for the Singapore Mathematical Olympiad (Senior).	2	MA2206			2	
3	1	MA3114	Core	Advanced Mathematics I	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 involving absolute-valued functions. Exponential, logarithmic and trigonometric functions will also be explored in further details.	4	MA2113			4	
3	1	MA3206	Elective	Advanced Mathematical Olympiad Training IVA	This module targets high ability students who are keen to prepare themselves rigorously for the Singapore Mathematical Olympiad (Senior).	2	Department Approval		MA3206V	1.5	
3	1	MA3304	Enrichment	Foundation Mathematics (Bridging Module)	This bridging module is compulsory for second intake students. It covers concepts like rules of indices, surds, set theory and geometric properties of circle. Students will perform simple operations with indices and surds, including rationalizing the denominator. The Cartesian coordinates system will be used to analyze geometrical situations and solve related problems. Basic counting techniques, probability and data analysis are taught too.	3	None			1.5	Bridging module (For new Yr 3 intake only)
3	2	MA3115	Core	Advanced Mathematics II	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 solving of inequalities involving rational functions. Further trigonometrical identities and calculus are introduced, as well as Binomial Theorem.	4	MA3114			4	
3	2	MA3206V	Elective	Advanced Mathematical Olympiad Training III	This module targets at high ability students who are keen to prepare themselves rigorously for the Singapore Mathematical Olympiad (Senior). The course is taught by an external trainer and is conducted on Saturdays.	2	Department Approval			1.5	
4	1	MA4112	Core	Advanced Mathematics III	This module covers topics such as number sequences, summation of series, arithmetic and geometric series. Students will learn to extend the vector approach to 3D. There will also be discussion on the complex numbers system, where numbers can be expressed in Cartesian or polar forms. Students will learn to represent complex numbers in the Argand diagram. Further work will also be done on calculus and transformation of graphs.	5	MA3115			5	
4	1	MA4202V	Elective	Advanced Mathematical Olympiad Training IV	This module builds upon the previous Senior Olympiad training. The course is taught by an external trainer and is conducted on Saturdays.	2	MA3206V			1.5	

4	2	MA4113	Core	Advanced Mathematics IV	Various methods of proofs are introduced in this module. The method of difference and proof by mathematical induction will also be taught. Further topics in calculus that will be covered include analysis of graphs, Maclaurin series (including binomial), integration techniques and applications of integrals to find area and volume. Numerical methods, further counting techniques and conditional probability will also be introduced.	5	MA4112			5	
4	2	MA4401*	Honours	Polar Coordinates, Parametric Equations and Vector Functions	This module is essential for students who want to read Mathematics Major with Honours. Students will explore the polar coordinate system. Parametric equations are introduced. Derivatives and integrals of polar, parametric and vector functions will also be taught.	2	MA4112			2	* This module is compulsory for students who intend to read Math Honours in the Specialisation Years.
5	1	MA5109	Core (Major)	Advanced Calculus	This demanding and rigorous course introduces calculus typically covered in a university course. Continuity and differentiability of functions are introduced. Topics include fundamental theorem of calculus, Intermediate Value Theorem, Mean Value Theorem, limits of functions, asymptotic and unbounded behavior. First order differential equations and their applications to real-life problems will also be taught.	4	MA4113			4	
5	1	MA5404	Honours	Honours Calculus	This demanding and rigorous Honours course exposes students to advanced applications of calculus 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 in Calculus.	3	MA4113, MA4401			3	
5	2	MA5107	Core (Major)	Statistics	This module is a comprehensive study of various probability distributions and statistical concepts. Topics include Binomial Distribution, Poisson Distribution, Normal Distribution, Sampling Distribution, t-distribution, test of significance, correlation and linear regression. Exploring random phenomena using probability and simulation will also be discussed.	5	MA2113			5	
5	2	MA5403	Honours	Linear Algebra	This Honours module introduces students to the operations on matrices and its applications to solving system of linear equations. Topics on vector spaces, linear transformations, rank and nullity, eigenvalues and eigenvectors will also be explored.	2	MA4113, MA4401			2	
6	1	MA6200	Elective	Modern Geometric Topology	In the beginning of 20th century, mathematicians noticed that topological idea is essential to understand continuity, differentiation and integration of functions. Euclidean spaces such as the real line, the plane and the 3-dimensional space can be generalized to manifolds. Though manifolds of dimension less than 3 is well-known, we still do not see enough for three dimensional manifolds. To study these manifolds, we can use differentiation, combinatorics and topology. In particular, geometric topology including knot theory gives a good road to explore low dimensional manifolds. In this module, students will study knots and related topics such as braids and polynomials.	2	MA4132 or MA5109			1.5	

6	1	MA6207	Elective	Advanced Statistics	This demanding and rigorous course is a continuation of the previous statistics course. Topics include t-distribution and chi-square distribution. Estimation, test of significance, correlation and linear regression will be revisited at a deeper level. Design of experiments and survey methodology will also be covered.	5	MA5107			1.5	
6	1	MA6406+	Honours	Introduction to Abstract Algebra	This module is a first course in abstract algebra. Topics include sets and relations, binary operations and equivalence. The concept of groups is introduced and studied in detail. Lagrange Theorem, homomorphism and isomorphism are covered too.	2	MA5403			2	+ Students majoring with Honours in Mathematics must read at least 2 options.
6	1	MA6407+	Honours	Introduction to Number Theory	This module is a first course in elementary number theory. Topics include Euclid's algorithm, prime numbers and their related functions, systems of linear congruences and cryptography. Various theorems and proving techniques will be discussed too.	2	MA5403			2	+ Students majoring with Honours in Mathematics must read at least 2 options.
6	2	MA6105	Core (Major)	Advanced Mathematics V	This module revisits concepts covered in earlier Advanced Mathematics modules and extends it further. Students will learn to solve 3D vectors problem involving lines and planes. The use of De Moivre's theorem to find the nth roots of a complex number and to prove mathematical results will also be covered. Theory of equations (up to degree 4) will be taught too.	3	MA4112, MA4113			3	
6	2	MA6403+	Honours	Introduction to Operational Research	Linear Programming is introduced as a basic approach in operational research. Topics include the Simplex Method, Big-M method and duality. Applications to real-life problems are done to explore the algorithms further.	2	MA5403			2	+ Students majoring with Honours in Mathematics must read at least 2 options.
6	2	MA6405+	Honours	Introduction to Graph Theory	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.	2	MA5403			2	+ Students majoring with Honours in Mathematics must read at least 2 options.

Computing Studies

Infocomm Technology is becoming an integral part of our life in the new global economy. Computing education at NUS High aims to equip students the ability to use computational thinking and creativity to understand and change the world. Computing has deep links with mathematics, science and design and technology, and provides insights into both natural and artificial systems. Computing also ensures that students become digitally literate (i.e. be able to use, express themselves and develop their ideas through information and communication technology, at a level suitable for the future workplace and as active participants in a digital world).

The Computing Studies curriculum in NUS High School is divided into three key stages – Foundation, Advancement and Specialisation Years.

In the Foundation Years (Year 1 & 2), students are exposed to a breadth of topics in Computing so that they can appreciate what the study of Computer Science is about. These topics aim to ignite their interest and passion in Computer Science, and also serve as a foundation for many modules offered in the later years.

In the Advancement modules (Year 3 & 4), the topics covered in Year 1 & 2 are revisited in greater depth, with a greater emphasis on developing problem-solving techniques and analytical approaches. Students will discover how programming can be applied to solve many real life problems.

Finally, students in the Specialization Years (Year 5 & 6) will be exposed to more advanced Computer Science concepts, and relate these ideas to the diverse computing systems and applications in real life.

The Department offers both Major in Computing Studies and Major with Honours in Computing Studies. To qualify for reading a Major with Honours in Computing Studies, students have to achieve consistently excellent 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.

Level	Sem	Module Code	Module Type	Module Title	Description	Modular Credits (MC)	Pre-requisites	Preclusions	Co-requisites	Hrs/wk	Remarks
1	2	CS1201	Elective	Computational Thinking	Computational thinking is taking an approach to solving problems, designing systems and understanding human behaviour that draws on fundamental concepts in computer science. This module consists of three main units: 1) Problem Solving, 2) Programming Principles & Concepts and 3) Data Skills. Students will be able to 1) Learn and apply a variety of problem-solving techniques to discover a solution to problems that are situated in a variety of contexts. 2) Understand basic programming principles and concepts such as iterations, conditionals and variables using turtle graphics. 3) Perform simple data cleaning, analysis and visualization using various functions in Excel and learn about the importance of data security.	3	None			2	
2	1	CS2204	Elective	Problem Solving in Computing	The aim of this module is to introduce students to the discipline of computing and to the problem solving process. Students will learn about important programming concepts such as variables, data types, assignment statements and expressions, conditional statements, loops etc. Students who have completed the module would be able to write useful C programs to solve problems.	3	None			2	
2	2	CS2203	Elective	Computer Fundamentals	Computer Fundamentals aim to introduce and examine the core components of computer systems. This elective covers a foundational understanding of computer hardware, operating systems, software, peripherals and basic programming. Students will be using the Raspberry Pi for the module to explore the computer system.	3	None			2	
3	1	CS3204#	Elective	Object Oriented Programming I	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, the use and design of classes and objects, use of Arrays & ArrayList, simple File IO & Exception handling, and creating Java GUI applications.	3	CS2204			3	# Students majoring in Computer Science (CS) in the Specialisation Years will have CS3204, CS3206 and CS4203 reflected as CS3204C, CS3206C and CS4203C respectively as these electives are core pre-requisites for the CS Major and will be included in their CAP.
3	1	CS3205	Elective	Informatics Olympiad Training	The Informatics Olympiad emphasizes creativity in problem solving on one hand, and programming skill and expertise on the other. This module targets high ability computing students who are keen to prepare themselves rigorously for various Informatics Olympiad competitions and at the same time hopes to create more awareness among computing students on the finer points of programming, which is not merely writing a piece of code, but involves useful algorithmic techniques and problem-solving skills.	2	CS2204			1.5	
3	2	CS3206#	Elective	Object Oriented Programming II	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 CS3204, with an emphasis on more advanced concepts in OOP (e.g. inheritance,	3	CS3204			3	# Students majoring in Computer Science (CS) in the Specialisation Years will have CS3204, CS3206 and CS4203 reflected as

					abstraction, polymorphism). Students will also learn how to create a Graphical User Interface in Java (JavaFX, Graphics, Animation etc).						CS3204C, CS3206C and CS4203C respectively as these electives are core pre-requisites for the CS Major and will be included in their CAP.
3	2	CS3207	Elective	Informatics Olympiad Training II	This module targets high ability computing students who are keen to prepare themselves rigorously for the National Informatics Olympiad competition. Advanced algorithmic topics such as dynamic programming, graph algorithms, greedy algorithms, trees etc are covered in this module.	2	CS3205			1.5	
4	1	CS4203#	Elective	Mobile Application Development	This course introduces students to the design and implementation of Android applications for mobile devices. Students will develop an App from scratch, assuming a good knowledge of Java, and learn how to set up Android Studio, work with various Android building blocks (Activities, Services, Broadcast, etc) to create simple user interfaces to make Apps run smoothly. At the end of the course, students will learn skills for creating and deploying Android applications.	3	CS3206			3	# Students majoring in Computer Science (CS) in the Specialisation Years will have CS3204, CS3206 and CS4203 reflected as CS3204C, CS3206C and CS4203C respectively as these electives are core pre-requisites for the CS Major and will be included in their CAP.
4	1	CS4204	Elective	Informatics Olympiad Training III	This module targets high ability computing students who are keen to prepare themselves rigorously for the National Olympiad in Informatics. Advanced data structures such as fenwick tree, segment tree and advanced algorithms such as dynamic programming will be discussed in the module.	2	CS3207			1.5	
5	1	CS5101	Core (Major)	Database Design	This module aims to equip students with the fundamental concepts of database design. The module covers data definition and modeling, database access and command languages, and design and implementation in the context of the relational database model.	3	CS4203			3	
5	2	CS5102	Core (Major)	Data Structures and Algorithms	This module aims to introduce students to advanced data structures and algorithms in programming. Topics covered include: uses and implementations of abstraction and encapsulation through classic data structures (lists, stacks, queues, trees), basic algorithmic analysis, graph representation and various graph-search algorithms.	3	CS5101			3	
5	1 or 2	CS5401V#	Honours Track 1 (SoC)	Discrete Structures	This module is offered by NUS School of Computing as CS1231. This module introduces mathematical tools required in the study of computer science. Topics include: (1) Logic and proof techniques: propositions, conditionals, quantifications. (2) Relations and Functions: Equivalence relations and partitions. Partially ordered sets. Well-Ordering Principle. Function equality. Boolean/identity/inverse functions. Bijection. (3) Mathematical formulation of data models (linear model, trees, graphs). (4) Counting and Combinatoric: Pigeonhole Principle. Inclusion-Exclusion Principle. Number of relations on a set, number of injections from one finite set to another, Diagonalisation proof: An infinite countable set has an uncountable power set; Algorithmic proof: An infinite set has a countably infinite subset. Subsets of countable sets are countable.	4	SoC CS1010S*			4	# Students majoring with Honours in Computer Science and chosen to read Honours Track from NUS School of Computing (SoC) must read at least 2 options. * SoC CS1010S Programming Methodology is a module offered by NUS School of Computing.
5	1 or 2	CS5402V^	Honours Track 2 (Digipen)	Computer Environment	This module is offered by DigiPen Institute of Technology Singapore as CS100. This course provides students with a detailed examination of the fundamental elements on which computers are based. Topics covered	4	DigiPen CS170~			4	^ Students majoring with Honours in Computer Science and chosen to

					include number systems, representation of numbers in computation, basic electricity, electric circuits, digital systems, logic circuits, data representations, digital memory, computer architecture, and operating systems. Operational code and assembly languages are discussed, examined, and used in either a microprocessor or microcontroller environment, such as a personal computer or an autonomous car.						read Honours Track from DigiPen Institute of Technology Singapore must read at least 2 options. ~ DigiPen CS170 High-level Programming II: The C++ Programming Language is a module offered by DigiPen Institute of Technology Singapore.
6	1	CS6103	Core (Major)	Introduction to Artificial Intelligence	This course aims to introduce techniques to build computers that are capable of exhibiting intelligent behavior. It will cover a wide range of modern Artificial Intelligence topics including search, logic, knowledge representation etc. The module will provide students with an overview of the applications of Artificial Intelligence.	3	CS5102			3	
6	2	CS6102	Core (Major)	Computer Networking	This module aims to equip students with the fundamental concepts of computer networking. Students will acquire the basic knowledge of data transmission, TCP/IP protocol architecture, local area network technologies, wireless network and concept of network routing and forwarding. It also teaches the basic concepts and principles of information security, and the fundamental approaches to secure computers and networks.	3	CS6103			3	
6	1 or 2	CS6401V #	Honours Track 1 (SoC)	Computer Organization	This module is offered by NUS School of Computing as CS2100. The objective of this module is to familiarise students with the fundamentals of computing devices. Through this module students will understand the basics of data representation, and how the various parts of a computer work, separately and with each other. This allows students to understand the issues in computing devices, and how these issues affect the implementation of solutions. Topics covered include data representation systems, combinational and sequential circuit design techniques, assembly language, processor execution cycles, pipelining, memory hierarchy and input/output systems.	4	SoC CS1010S*			4	# Students majoring with Honours in Computer Science and chosen to read Honours Track from NUS School of Computing (SoC) must read at least 2 options. * SoC CS1010S Programming Methodology is a module offered by NUS School of Computing.
6	1 or 2	CS6402V #	Honours Track 1 (SoC)	Introduction to Operating Systems	This module is offered by NUS School of Computing as CS2106. This module introduces the basic concepts in operating systems and links it with contemporary operating systems (eg. Unix/Linux and Windows). It focuses on OS structuring and architecture, processes, memory management, concurrency and file systems. Topics include kernel architecture, system calls, interrupts, models of processes, process abstraction and services, scheduling, review of physical memory and memory management hardware, kernel memory management, virtual memory and paging, caches, working set, deadlock, mutual exclusion, synchronization mechanisms, data and metadata in file systems, directories and structure, file system abstraction and operations. Examples will be discussed from contemporary operating systems such as Unix/Linux and/or Windows.	4	CS6401V			4	# Students majoring with Honours in Computer Science and chosen to read Honours Track from NUS School of Computing (SoC) must read at least 2 options.

| 6 | 1 or 2 | CS6403V^ | Honours Track 2 (Digipen) | Operating Systems I: Man-Machine Interface | This module is offered by DigiPen Institute of Technology Singapore as CS180. This course presents an overview of modern operating systems as implemented on personal computers. It presents an overview of what an operating system is and does, with emphasis on the following topics: organization and design, process management, threading, interprocess communication, process synchronization, and memory management. | 4 | CS5402V^ | | | 4 | ^ Students majoring with Honours in Computer Science and chosen to read Honours Track from DigiPen Institute of Technology Singapore must read at least 2 options. |
| 6 | 1 or 2 | CS6404V^ | Honours Track 2 (Digipen) | Game Implementation Techniques | This module is offered by DigiPen Institute of Technology Singapore as CS230. This presents game implementation techniques and engine architecture. Students investigate foundational concepts of game architecture, such as game-system component separation and game flow, while learning about essential elements such as the game state manager, input/ output handler, and frame rate controller. CS 230 introduces Windows programming, state machines, and collision detection algorithms, which students will integrate into their own remakes of classic games. As part of their implementation, students create and expand their own collision, vector, and matrix libraries, enabling them to incorporate basic physics engines. Students survey concepts in space partitioning, particle systems, map editors, and other elements as a bridge to more advanced concepts in implementation techniques and engine architecture. | 4 | DigiPen CS170~ | | | 4 | ^ Students majoring with Honours in Computer Science and chosen to read Honours Track from DigiPen Institute of Technology Singapore must read at least 2 options. ~ DigiPen CS170 High-level Programming II: The C++ Programming Language is a module offered by DigiPen Institute of Technology Singapore. |

Biology

The Biology Curriculum is uniquely designed to cover both breadth and depth of the subject. Modules adopt a spiral and thematic approach. Such approach contributes to the learning of various fields of biology in a seamless fashion. This ensures that students have acquired the proper foundational knowledge before learning topics at a more advanced level or in greater depth. It is hoped that students will see the connections of various topics with greater clarity and understanding.

The first and second years are Foundation Years which aim to provide students with a solid foundation in biology. They develop observation and inquiry skills. They will also pick up good habits of the mind, and effective scientific skills through experiential and hands-on learning.

The third and fourth years are Advancement Years which allow students to read modules that take them beyond the basics. They investigate biological phenomena and engage in more in-depth investigations. There is more exposure to critical thinking and analytical skills in the more demanding modules.

The fifth and sixth years are Specialization Years whereby students who are deeply interested in pursuing biology-related disciplines in universities, will continue to read offered modules that adopt a more applicative and in-depth approach. These modules allow more knowledge application in broader and concept-orientated perspectives. Students will also become more independent in their learning approaches.

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 will have the option of sitting for the AP Biology examination 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 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 in the laboratory and in the field, which unlike theoretical knowledge, cannot be acquired from textbooks.

Level	Sem	Module Code	Module Type	Module Title	Description	Modular Credits (MC)	Pre-requisites	Preclusions	Co-requisites	Hrs/wk	Remarks
1	1 and 2	BL1108	Core	Foundational Biology I	BL1108 is a year-long module that aims to develop students' theoretical and practical competencies in biology, so that they will build a strong foundation, encompassing both breadth and depth, on which to further their studies in biology through the course of the NUS High curriculum. The module begins with the study of the building blocks of life – cells. In order to support life, movement of biological molecules into and out of cells must occur; therefore, the mechanisms through which this can be facilitated are also subsequently studied. The biological molecules that move in and out of cells are studied in detail and students will also carry out investigations regarding how these substances can be identified. Students will explore the fate of biological molecules in both animal and plant systems, with regards to transport and nutrition. Lastly, zooming out to take a macro perspective, students will explore how biotic and abiotic factors may influence the diversity of organisms and discuss ethical issues related to the environment. Three biological themes are addressed at various points during the module: the correlation between structure and function, the relation between a system and its parts, as well as the flow of energy through biological units. The discussion of bioethical issues is also infused at appropriate points. At the end of the module, it is hoped that students will be inspired to develop a passion for biology through acquiring a deep understanding of the concepts taught and awareness of their applications to daily life, through frequent hands-on activities designed to develop practical skills in a scaffolded manner, as well as through excursions and discussions.	4	None			4	Year long module
2	1	BL2203	Elective	Biology Olympiad Training I	This module is designed for Year 2 students who are selected due to their excellent performance in biology modules. These students will explore some challenging concepts not taught in the core modules. Students can expect rigorous training in a wide range of biology topics as well as answering techniques. Students will be encouraged to take part in various biology competitions where appropriate. This module is by invitation only.	2	Department Approval			2	
2	2	BL2204	Elective	Biology Olympiad Training III	This module is for students who have done well for BL2203. It is also opened to Year 2 students whose Semester 1 performance in BL2107 is consistently excellent. These students will continue to explore some challenging concepts not taught in the core modules. Students can expect rigorous training in a wide range of biology topics as well as answering techniques. Students will be encouraged to take part in various biology challenges when appropriate. This module is by invitation only.	2	Department Approval			2	
2	1 and 2	BL2107	Core	Foundations in Biology II	This year-long module will continue to equip students with the basic foundational knowledge required to learn biology at a more advanced level subsequently. Students will learn about the reproductive structures of flowering plants, self-pollination and cross-pollination as well as the adaptations flowers have for wind and insect pollination. After learning plant reproduction, students will learn the equivalent but more complicated scenarios in human reproduction. In addition, they will also learn about transport, respiration and excretion in humans. Mechanisms of homeostasis will be introduced and illustrated using the regulation of body temperature. Laboratory practical sessions will be carried out when covering the various	4	BL1108			4	Year long module

					physiological systems in order to enhance students' learning and understanding.						
3	1	BL3206	Elective	Biology Olympiad Training III	This module is designed for students who like to challenge themselves with the difficult concepts in biology. They will learn additional topics and explore the concepts beyond what they have covered in their Year 3 core biology modules in greater depth. It also prepares them for the UK Biology Challenge that is opened to all students who are 13 to 15 years old, as well as the Singapore Junior Biology Olympia (SJBO) that is opened to Year 2 to 4 students. This module is by invitation only.	2	Department Approval			1.5	
3	1	BL3305	Enrichment	Foundations In General Biology	This is a bridging module offered to the yearly intake of new Year 3 students. Students will be equipped with foundational knowledge from core content such as ecology, basic cell biology, and basic physiology through mass lectures. In addition, a key emphasis in the second half of the module will be the development and familiarization of hands-on biological skills that will equip students in studying biology in their senior high years. Laboratory skills involving microscopy, microbiology and physiology techniques will be taught.	2	None			1.5	Bridging module (For new Yr 3 intake only)
3	2	BL3207	Elective	Biology Olympiad Training IV	This module is for students who have done well in BL3206. It is also opened to Year 3 students whose Semester 1 performance in BL3108 is consistently excellent. These students will explore some challenging concepts not taught in the core modules. Students can expect rigorous training in biology topics that will prepare them for the following year's biology competitions. This module is by invitation only.	2	Department Approval			1.5	
3	1 and 2	BL3109	Core	Foundations in Biology III	After acquiring the basic foundational knowledge in biology in Year 1 and 2, students will move on to learn about the human nervous and endocrine systems, and how signals are generated and regulated to co-ordinate the various body functions. In addition, how cell divides by mitosis and meiosis will also be covered before students learn about the concepts of inheritance and genetic variation. For the section on molecular genetics, the structure of DNA and its role in protein synthesis, genes, genetic engineering and medical biotechnology will be covered. The last part of the module focuses on in-depth study of the cell and molecules of life. It includes the cell theory, the functions of membrane systems and organelles in cells, the structure of a typical bacterial cell, the structures of biomolecules and their functions, the structural components of viruses, as well as the fluid mosaic model of membrane structure. Where appropriate, various bioethical issues and laboratory experimentation will be covered at suitable junctures throughout the module.	6	BL2107			3	Year long module
4	1	BL4206	Elective	Biology Olympiad Training V	This module is designed for Year 4 students who are selected due to their consistently excellent performance in their previous years' biology modules. They will be trained for the Singapore Junior Biology Olympiad (SJBO) in this module. Students can expect rigorous training in topics that are not taught in the core modules. This module is by invitation only.	2	Department Approval			1.5	
4	2	BL4207	Elective	Biology Olympiad Training VI	This module is for students who have done well for BL4206 or those whose Semester 1 performance in BL4109 is consistently excellent. Students will be rigorously trained in topics of biology that are not covered in the core modules. The training is an important preparation for the Singapore Biology Olympiad (SBO) in the following year. This module is by invitation only.	2	Department Approval			1.5	
4	2	BL4401#	Honours	Functional Adaptations of Invertebrates and Vertebrates	This module provides an exciting platform for the study of animal diversity. The module provides a brief introduction to the science behind classification by learning about taxonomy and phylogeny. Students will learn about the different invertebrate and vertebrate taxa, with an emphasis on diagnostic	2	BL3109			2	#Students must take the Honours Elective in

					characteristics, evolutionary relationships, functional adaptations and environmental interactions. The interdisciplinary nature of this module aims to develop in students a deeper understanding and appreciation of the evolutionary innovations in the animal kingdom. Laboratory practicals will allow students to examine specimens in detail. Field trips will also be organised for students to learn about taxonomical work and the natural heritage of Singapore.						order to qualify for subsequent Honours modules.
4	1 and 2	BL4110	Core	Advanced Biology I	Based on the foundation that students have built in the lower years, this module will explore various biological topics at a greater depth. The topics covered include genetics of viruses and bacteria, organization and control of prokaryotic and eukaryotic genomes, cellular physiology and biochemistry, as well as the unifying themes of evolution and diversity in biology. Where appropriate, various bioethical issues and laboratory experimentation will be covered at suitable junctures throughout the module.	6	BL3109			3	Year long module
5	1	BL5202	Elective	Biology Olympiad Training VII	This module is designed for students who are selected due to their consistently excellent performance in their previous years' biology modules. They will be trained for the Singapore Biology Olympiad (SBO) in this module. Students can expect rigorous training in a wide range of biology topics as well as answering techniques. This module is by invitation only.	2	Department Approval			1.5	
5	2	BL5203	Elective	Biology Olympiad Training VIII	This module is for students who have done well for BL5202 or those who are invited to read it due to their consistently excellent performance in their Year 5 biology modules. They will go through rigorous preparation for the Singapore Biology Olympiad (SBO), which will be held at the end of the module in November and December. A final selection of students will be made in the course of this module and they will get to represent the school in the SBO.	2	Department Approval			1.5	
5	1 and 2	BL5108	Core (Major)	Advanced Biology II	This module is a continuation of the previous Advanced Biology I module. Students will explore and learn various advanced level biological topics in greater depth. These include isolating, cloning and sequencing of DNA, applications of molecular and cellular biology, immunology, basic developmental biology, as well as infectious diseases. In addition, the ecology curriculum unique to NUS High School will be the highlight of this module. The 1-day ecology field work at St. John's Island or other equivalent habitats will enhance and complement the classroom learning of ecology from a practical perspective. The impact of climate change on animal and plants will also be covered. Where appropriate, various bioethical issues and laboratory experimentation will also be covered at suitable junctures throughout the module.	8	BL4110			4	Year long module
6	1	BL6403	Honours	Advanced Molecular Genetics	This module covers forward and reverse genetics, as well as their importance in studying gene functions. Students' basic knowledge in molecular genetics will be reinforced and enhanced. Various molecular techniques used to determine gene functions, such as random mutagenesis, gene knock-out in mice and reverse transcription polymerase chain reaction, will be covered in details. Yeast two-hybrid system, phage display and other techniques used to decipher gene-to-gene interactions will also be discussed. In addition, the purpose of studying gene interaction as a means to determine a particular gene function shall be highlighted. Hands-on practical lessons on extracting RNA for studying gene expression in Salmon, TA cloning and blue-white selection to screen for recombinant bacteria will supplement students' learning and enable them to acquire molecular biology skills. Different bioinformatics tools to study gene sequences and functions will also be introduced and explored.	2	BL4110, BL4401 and BL5108			2	

6	2	BL6404	Honours	Advanced Biochemistry	This module will enhance and expand students' knowledge in biochemistry. Students will learn how the structures of proteins are related to their functions and how the chemical properties of proteins will determine the subsequent techniques used to extract, detect, purify and quantify them. The principles of these laboratory techniques and their applications in the study of proteins will be covered. Research article critique will also contribute to the authentic learning of students in analyzing experimental data critically.	3	BL4110, BL4401 and BL5108			3	
6	1 and 2	BL6103	Core (Major)	Applied Biology	After acquiring advanced-level knowledge in biology, this module enables students to appreciate the application aspects of biology. However, in the first half of the module, the focus is on the consolidation of key concepts through the years. This will be useful for students who would like to take the relevant external examinations. In the second half of the module, current trends in biology and other relevant contemporary topics will be introduced and emphasized. The issues in these areas can be explored via field trip, industrial visit and other relevant learning journeys, peer-teaching presentations, journal research, research writing and invited guest lecturers who are experts in these fields.	3	BL3108, BL4110 and BL5108			3	Year long module

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 instil depth in the understanding of fundamentals, and high competency in solving chemical problems. Our exciting curriculum takes on the spiralling 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 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 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 an aptitude and interest in this subject. To qualify, students have to achieve consistently excellent results in the Core modules.

Students will have the option of sitting for the AP Chemistry examination 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.

Level	Sem	Module Code	Module Type	Module Title	Description	Modular Credits (MC)	Pre-requisites	Preclusions	Co-requisites	Hrs/ wk	Remarks
1	1 and 2	CM1106	Core	Foundation Chemistry I	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, acid-base reactions, as well as chemical bonding, formulae and equations. 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.	4	None			2	Year long module
1	1 and 2	CM1302	Enrichment	Chemical Potpourri	This lab-based module covers a series of chemical investigations ranging over several areas of Chemistry. Students can look forward to activities which complement the formal study of Chemistry in the classroom and provide opportunities for developing analytical skills in dealing with chemical problems.	2	None			2	
2	1 and 2	CM2104	Core	Foundation Chemistry II	This year-long module is a continuation from Foundation Chemistry I, 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.	4	CM1106			2	Year long module
2	1 and 2	CM2302	Enrichment	Chemical Potpourri II	Chemistry plays an integral role in the daily running of our lives. This module aims to continue to give students insight and appreciation of the chemistry that affects our daily activities through chemical investigations that range over several areas of Chemistry, such as the food we eat and the soaps we use.	2	CM1106			2	
3	1	CM3107	Core	Advanced Chemistry I	This module covers the concepts needed to relate structures of simple molecules to their properties. The structure, nomenclature, general physical properties and reactions of some organic compounds will be covered. The basic ideas of quantum mechanics are discussed, as these are essential in describing the modern view of atomic structure, the nature of the electron density and its interaction with the nucleus. This module then explores 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. The module then proceeds to an overview of chemical bonding (ionic, covalent and metallic bonds) and the structures of ionic, covalent and metallic substances. Lewis structures, molecular shapes and molecular polarities are emphasized.	3	CM2104			3	
3	1	CM3205	Elective	Challenging Concepts in Chemistry I	This module serves to engage talented students in chemistry with a more in-depth study of topics learnt in Years 1-3 core modules. New concepts will be included and many are built on the key understanding of the concepts acquired previously. This module also aims to train the	3	Department Approval			1.5	

					students' problem solving ability and nurture their scientific skills to get them better prepared for the Olympiad competitions.						
3	1	CM3305	Enrichment	Foundation in Chemistry (Bridging)	This is a bridging module for students joining our school at Year 3. This module aims to allow students to master fundamental chemistry knowledge which will be required for the understanding of higher chemistry modules. Emphasis will be placed on the structure of an atom, how atoms interact to form the numerous chemical compounds, the calculations involved in chemical formula and equations as well as the various types of chemical reactions. There will also be hands-on experience in volumetric analysis and basic chemical analysis. The skills learnt in this module will train students to perform both quantitative and qualitative analyses of unknown samples.	3	Department Approval			1.5	Bridging module (For new Yr 3 intake only)
3	2	CM3108	Core	Advanced Chemistry II	This module starts with a continuation of Chemical bonding. Valence bond theory and the concept of hybridisation will be discussed to explain for the formation of covalent bonds. This module then introduces the properties of gases, liquids and solids in terms of the behavior of their components: atoms, ions, and molecules. The physical properties of gases, liquids and solutions will be examined in greater detail. Students will also learn how the nature and strength of intermolecular forces relate to the composition and structure of molecules, and thus their physical properties. To facilitate the understanding of intermolecular forces, physical experiments related to these topics will also be carried out by the students.	3	CM3107			3	
3	2	CM3206	Elective	Challenging Concepts in Chemistry II	This module serves to engage talented students in chemistry with a more in-depth study of topics learnt in Years 1-3 core modules. New concepts will be included and many are built on the key understanding of the concepts acquired previously. This module also aims to train the students' problem solving ability and nurture their scientific skills to get them better prepared for the Olympiad competitions.	3	Department Approval			1.5	
4	1	CM4105	Core	Chemical Energetics & Kinetics	Chemical Kinetics is the study of rates of chemical reactions. The module introduces the Collision theory to explain how various factors (concentration, pressure, temperature & catalyst) affect rates of reactions. It also covers in depth the quantitative description of reaction kinetics (rate laws & integrated rate laws) followed by proposing reaction mechanisms that are consistent with experimental rate laws. Chemical Thermodynamics is the study of the interrelation of heat and work with chemical reactions. The module makes use of the First Law of Thermodynamics to establish an understanding of enthalpy change of reaction (heat change at constant pressure) and focuses on the measurements of enthalpy changes by calorimetry and the calculations of enthalpy changes by the Hess' Law. The module further makes use of the Second Law of Thermodynamics, focusing on the use of Gibbs free energy change, to predict and explain the spontaneity of a reaction under a specific set of conditions (temperature, pressure and concentration). The Third Law of Thermodynamics is also discussed in order to have a complete understanding of entropy changes of reactions.	3	CM3107 and CM3108			3	
4	1	CM4201	Elective	Chemistry Olympiad Training I	These are chemistry elective modules specially designed for Year 4 students who have done very well in chemistry and show potential in	3	Department Approval			1.5	

					handling more challenging content and tackling harder physical chemistry problems.						
4	2	CM4106	Core	Chemical Equilibria & Thermodynamics	The concept of Equilibrium is fundamental in almost all chemical reactions, as well as many physical processes. It is a description of a chemical system when opposing reactions are proceeding at equal rates. This module explores the idea of reversible reactions, dynamic equilibrium in a closed chemical system, and how various factors (concentration, pressure & temperature) can influence an equilibrium system. With this understanding, we will be able to describe chemical equilibrium quantitatively using equilibrium constants. The module deals with various homogeneous and heterogeneous equilibria in depth, ranging from gaseous equilibria to aqueous equilibria of weak acids and bases, buffer solutions and sparingly soluble salts. The module concludes with the thermodynamics aspects of chemical equilibria, particularly how the thermodynamic function, standard Gibbs free energy change determines the extent of reaction (equilibrium constant).	3	CM4105			3	
4	2	CM4202	Elective	Chemistry Olympiad Training II	These are chemistry elective modules 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.	3	Department Approval			1.5	
5	1	CM5107	Core (Major)	Organic Chemistry	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.	3	CM3107 and CM4105			3	
5	1	CM5202	Elective	Chemistry Olympiad Training III	These are chemistry elective modules 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).	3	Department Approval			1.5	
5	2	CM5106	Core (Major)	Electrochemistry & Inorganic Chemistry	Building upon the redox as well as reactivity concepts covered in the lower years, this module will delve deeper into electrochemistry, covering the principles underlying the function of galvanic cells and the selective discharge of ions in electrolytic cells. The inorganic chemistry component 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 and their compounds. 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.	3	CM3108 and CM4106			3	
5	2	CM5203	Elective	Chemistry Olympiad Training IV	These are chemistry elective modules 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	3	Department Approval			1.5	

					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).						
5	2	CM5402	Honours	Advanced Organic Chemistry	This module is taken after the module, CM5107 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.	3	CM5107			3	
6	1	CM6101	Core (Major)	Experiments in Synthetic Chemistry	This module is taken after the organic and inorganic chemistry modules, 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 commonly employed in synthetic chemistry. Analytical techniques such as 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.	3	CM5107 and CM5106			3	
6	1	CM6201	Elective	Principles of Chemistry I	This module aims to help students reconsolidate the concepts and build the command of foundation in Chemistry. Areas covered include Physical and Inorganic Chemistry followed by Organic and Analytical Chemistry.	3	Department Approval			3	
6	2	CM6403	Honours	Analytical Chemistry	This module covers the various aspects of separation techniques, chemical analysis and structure elucidation used in modern day chemistry. Students will gain an understanding and practical experience of distillation, extraction, and various chromatographic methods, including thin layer chromatography (TLC), gas chromatography (GC) and high performance liquid chromatography (HPLC). Students will also learn to analyse spectra of infrared spectroscopy (IR), mass spectrometry (MS), ultraviolet spectroscopy (UV), and nuclear magnetic resonance (NMR). These analytical skills will aid them greatly in their pursuit, particularly in Science and Engineering.	3	CM5107			3	
6	2	CM6404	Honours	Current Trends in Chemistry	This module aims to equip students with an understanding of the current and major issues that affect us and how chemistry is linked to these issues. These include air / water quality control and monitoring, nanochemistry, catalysis and green chemistry. Guest speakers may also be invited to discuss their current research, and the latest technology and developments in the more advanced areas in chemistry.	1	CM5107			1	
6	1 or 2	CM6205	Elective	Medicinal Chemistry	As the pharmaceutical industry develops and grows here in Singapore, it is important to be attuned to the role that chemistry plays in concert with other science disciplines in the process of drug discovery. This theory-intensive module will give a taste of the realm of medicinal chemistry, from discovery to synthesis and development to biological activity. Students will require an interest in organic chemistry, biochemistry and biomolecular sciences.	2	CM5107			1.5	

| 6 | 1 or 2 | CM6206 | Elective | Forensic Science | Forensic science is the application of science in the resolution of legal disputes. Science is valuable in this context because of its potential in providing reliable, pertinent and often definitive information about a given case. In this module, students will learn about the basic principles behind forensic science, such as recording and preservation of crime scenes, analysis of trace and contact evidence, examination of body fluids and forensic pathology. The role of forensic science in influencing detective fiction and vice versa will also be covered. Students will also study how detective fiction has evolved in its narrative nature from works by authors such as Edgar Allan Poe, Sir Arthur Conan Doyle and Agatha Christie to film directors such as Alfred Hitchcock, as well as famous TV series, such as CSI. In addition to fiction, students will also briefly study how forensic science has influenced board games, as well as the authenticity of the forensic science used in these board games. | 2 | CM5106 and CM5107 | | | 1.5 | |

<u>Physics</u>

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

Foundation modules (Year 1 & 2) are designed to ensure that students receive a strong grounding in fundamental physics concepts such as motion, conservation of energy and electricity. There is a greater emphasis on hands-on activities to enable students to develop a conceptual understanding of these concepts.

In the Advancement modules (Year 3 & 4), the topics covered in Year 1 & 2 are revisited with greater depth while integrating basic mathematical skills such as algebra and trigonometry. There is a greater emphasis on developing problem-solving techniques and analytical approaches to physical situations.

The Specialisation modules (Year 5 & 6) build on what has been introduced in the earlier years, covering a wide range of topics from Modern Physics to Practical Circuitry. Honours students will extend their study in mechanics and electromagnetism through the use of calculus. The emphasis is on deepening students' understanding and extending their learning through a higher level of analytical and mathematical sophistication. These modules provide the necessary foundation for students to take university modules in physics and engineering.

Besides the core modules, the department offers an excellent variety of elective & enrichment modules, which are intended to cater to students' varied interests and passions in physics. Examples of these areas include robotics and astronomy.

The Department offers both major in physics and major with honours in physics. A summary of the required modules is given in the table below. All students are strongly encouraged to keep physics as a major regardless of their field of specialisation in university. All physics students will have the option of sitting for the AP Physics 1 examination in Year 5. Students offering major in physics will have the option of sitting for the AP Physics 2 examination in Year 6, while students offering major with honours in physics will have the option of sitting for the AP Physics C examinations in Year 6.

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

Level	Sem	Module Code	Module Type	Module Title	Description	Modular Credits (MC)	Pre-requisites	Preclusions	Co-requisites	Hrs/ wk	Remarks
1	1 and 2	PC1110	Core	Foundational Physics I	This foundational module provides a basic introduction to the nature and practice of physics. Students will learn about scientific notation, unit conversion, relationships between base physical quantities and its applications. The module also aims to develop a basic understanding of mechanics and to foster an awareness of how these relate to our everyday experiences. Students will learn about relationships between speed, distance and time, the effects and nature of forces including friction, as well as develop an understanding of Newton's laws of motion. Finally, students will be introduced to the important concepts of work, energy and power.	4	None			2	Year long module
1	2	PC1301	Enrichment	Water Rockets	This module aims to interest students in the physics of flight through an introduction to the world of water rockets. This is done through theory and practice. Students will first be taught the fundamentals of flight and rocket design. They will then translate theory into actual hands-on construction and eventually get the opportunity to fly their own constructions.	2	None			1.5	This module is offered subject to teaching manpower availability
1	1	PC1302	Enrichment	Robotics	This module is an introduction to the building and programming of robots using the LEGO Mindstorms EV3 Robotics Kit. Students will learn the principles of mechanical design, construction, programming and teamwork. 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 as a series of missions that the students will be required to complete.	2	None			1.5	This module is offered subject to teaching manpower availability
1	2	PC1303	Enrichment	Robotics (Design and Build)	This course will focus on the Lego Mindstorms EV3 platform. Students will use the EV3 sets to design, build and programme robots. Students will get to explore the various sensors that are available in the EV3 Kit and relate to real-life examples of how these sensors are applied. It is preferable but not necessary that students have had some basic hands-on experience with the NXT/ EV3 platform.	2	None			1.5	This module is offered subject to teaching manpower availability
1	1	PC1304	Enrichment	Discover Physics	In this module, students will engage in experiential activities which will enhance their knowledge and awareness of Physics in a creative manner. Through self-directed research and learning guided by teachers, they will design and conduct investigations on interesting physics phenomena.	2	None			1.5	This module is offered subject to teaching manpower availability
2	1 and 2	PC2110	Core	Foundational Physics II	In this module, students 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 changes in the physical properties of matter. Students will also need to understand the nature and properties of waves such as light and sound. The module concludes with an introduction to the nature of electric & magnetic forces and knowledge of simple circuits.	4	PC1110			4	Year long module
2	1	PC2302	Enrichment	Robotics II	In this module, students will code in VB.NET and will learn, amongst other things, about structured programming, VS object-oriented programming, loops, arrays and conditional statements through the introduction of microcontrollers and electronics. They will work with	2	None			1.5	This module is offered subject to teaching manpower availability

					various types of sensors, learn to programme them to obtain data, and use the data to control servo motors, lights, sound and a rich touchscreen display screen.						
2	2	PC2304	Enrichment	Robotics III	This module will see students learning more advanced applications. Robotic platforms, Game Programming, and Vision Systems may be introduced at this stage, using the same programming language and microcontroller platform. This module is a follow up to PC2302. However students who have not attended PC2302 will still be able to take this module.	2	None			1.5	This module is offered subject to teaching manpower availability
2	1	PC2305	Enrichment	Introduction to Astronomy	This course is an introductory course for avid student astronomers and will deal with star charts and field observations. Students can expect to spend at least three evenings of about 3-4 hours each in our very own Observatory as part of the practical sessions.	2	None			1.5	This module is offered subject to teaching manpower availability
3	1 and 2	PC3110	Core	Mechanics	In this advancement module, students will focus on developing their understanding of key concepts in classical mechanics and thermodynamics. The module begins with an introduction to physical measurements, kinematics, Newton's laws of motion, momentum, impulse, work, energy and power. The principles of conservation of momentum and energy and their application in elastic and inelastic collisions will also be discussed. Finally, students will be introduced to the concepts of centre-of-mass systems, circular motion, torque and Newton's Law of Universal Gravitation.	6	PC2110			3	Year long module
3	1	PC3200	Elective	Introductory Physics Olympiad	This module can be taken by students who wish to challenge themselves with more advanced topics and problems in physics.	2	None			1.5	
3	2	PC3201	Elective	Physics Olympiad Training I	This module covers challenging problems in physics and can be taken as preparation for the Singapore Junior Physics Olympiad (SJPO).	2	None			1.5	
3	2	PC3302	Enrichment	Astronomy	This module provides an introduction to basic astrophysics through celestial mechanics and satellite/ planetary motion. Topics covered include: (1) An introduction to stellar coordinate systems; (2) An introduction to planetary orbits via circular approximation and the observation of retrograde orbital motion; (3) Two-body interactions: Giant impact hypothesis, qualitative discussion of the Nice model of solar system formation and study of orbital slingshots (this topic will build on students' understanding of conservation of momentum from PC3110); (4) Orbital Dynamics 1: Two-body orbits of non-negligible masses (this topic will build on students' understanding of gravity from PC3110); (5) Orbital Dynamics 2: Kepler's laws in non-circular orbits, including the concepts of gravitational potential energy, as well as elliptical, parabolic and hyperbolic orbits. This module will be mostly theoretical in nature, with two special sessions for planetary observations and an observational project for students to perform.	2	None			1.5	This module is offered subject to teaching manpower availability
3	1	PC3305	Enrichment	Bridging Module	This module revisits the topics taught in Year 1 and Year 2 and is targeted at students who join the school in Year 3.	2	None			1.5	Bridging module (For new Yr 3 intake only)
4	1	PC4110	Core	Advanced Physics I	In this advancement module, students will learn about geometrical optics with applications to reflection, refraction, converging and diverging lenses, as well as converging and diverging mirrors. Students will also be introduced to simple harmonic motion as well as the concepts of forced oscillations and resonance. The topic of waves, including both transverse and longitudinal waves, will be covered	3	PC3110			3	

					together with an introduction to the principle of superposition and stationary waves.						
4	2	PC4111	Core	Advanced Physics II	This advancement module provides a more in-depth treatment of some of the concepts that students were introduced to in Year 1 & 2. Students will be introduced to the concepts of electric fields and forces, including Coulomb's law, electric flux and electric potential in the context of electrostatics. Students will also be introduced to the concepts of magnetic fields, motion of particles in a magnetic field and some real-world applications. Students will also learn about the relationship between electric and magnetic fields as evidenced by Lenz's Law and Faraday's Law.	3	PC3110			3	
4	2	PC4203	Elective	Physics Olympiad Training III	This module covers challenging problems in physics and can be taken as preparation for the Singapore Junior Physics Olympiad (SJPO).	2	PC4206			1.5	
4	1	PC4206	Elective	Physics Olympiad Training II	This module covers challenging problems in physics and can be taken as preparation for the Singapore Junior Physics Olympiad (SJPO).	2	PC3201			1.5	
5	2	PC5101	Core (Major)	Atomic & Nuclear Physics	This module will introduce students to some of the defining experiments in physics that led to the development of quantum mechanics, e.g. blackbody radiation, photoelectric effect, Compton scattering, wave-particle duality and line spectra. Students will also be introduced to the discovery and fundamental principles of nuclear structure and radioactivity. Mass-energy equivalence and the concept of mass defect will also be covered together with nuclear fusion and fission as examples of real-world applications of these concepts. Students will also be equipped to engage in a discussion on the environmental issues concerning the use of nuclear energy.	3	PC 4110 and PC4111			3	
6	1	PC5106	Core (Major)	Practical Circuitry	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 analyzing circuits using equipment such as digital multimeters and oscilloscopes.	2	PC 4110 and PC4111			2	
5	1	PC5107	Core (Major)	Advanced Physics III	In this advancement module, students continue with their study of superposition and the concepts of interference & diffraction. They will also study rotational motion, and this will cover torque, rotational kinematics and dynamics as well as conservation laws. A further topic introduced is the linear polarization of light.	2	PC 4110 and PC4111			2	
5	1	PC5200	Elective	Physics Olympiad Training IV	This module covers challenging problems in physics and can be taken as preparation for the Singapore Physics Olympiad (SPhO).	2	PC4203			1.5	
5	2	PC5201	Elective	Physics Olympiad Training V	This module covers challenging problems in physics and can be taken as preparation for the Singapore Physics Olympiad (SPhO).	2	PC5200			1.5	
5	1	PC5202	Elective	Physics in Review I	This is a consolidation module for students who wish to revise the previous topics taught from Year 1 to 5.	2	None			1.5	
5	1	PC5401	Honours	Calculus-based Mechanics I	This module will revisit all the previous topics in Newtonian mechanics using a calculus-based 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 will be used to formulate physical principles and apply these principles to solve physical problems. This module touches	2	PC3110			2	

					specifically on kinematics, Newton's laws of motion, work, energy & power, impulse and momentum.					
5	2	PC5403	Honours	Calculus-based E&M I	In this module, students will revisit the previous topics in Electricity & Magnetism using a calculus based-approach. This module will introduce the concepts of electric and magnetic fields. Ideas such as Gauss's Law, electric flux and electric potential will be employed to solve problems in electrostatics. These will lead to applications in dielectrics and capacitance (including 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 various configurations and symmetries.	2	PC 4110 and PC4111		2	
6	2	PC6110	Core (Major)	Introductory Electronics	This module introduces students to the basics of electronics with a focus on diodes and progresses to the design of rectifiers and finally to a simple DC power supply. Students will also be introduced to the workings of a bipolar junction transistor.	2	PC5106		2	This module is offered to Physics Major Student only (not Physics Honors)
6	2	PC6203	Elective	Special Relativity	This module aims to provide an introduction to Special 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 $E=mc^2$.	2	None		1.5	
6	2	PC6208	Elective	Computational Physics	This module provides a basic introduction on the application of numerical methods and computational modelling to Physics problems. Through these, students pick up computational modelling skills and implement these in Python programming to analyze physical systems.	2	PC5401, PC5403, P6402		1.5	
6	1	PC6402	Honours	Calculus-based Mechanics II	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 a mass on a spring and the simple pendulum. 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.	2	PC5401		2	
6	1	PC6404	Honours	Calculus-based E&M II	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 these concepts e.g. Hall Effect. Electromagnetic effects are analysed, as	2	PC5403		2	

				evidenced by the consequences of Lenz's Law and Faraday's Law. Maxwell's equations are introduced as the framework by which electromagnetic phenomena can be generalized. Students will also learn the concept of alternating current, reactance, as well as resonance, using a phasor approach.					

English Language and Literature

1   Introduction

The English Language curriculum is a six-year programme with seven core modules that students will undergo and must pass to fulfil the requirements for graduation with the NUS High School Diploma.

Foundational Literature is incorporated into the Year 1 and 2's English Language modules, EL1108 and EL2108. These foundational modules are pre-requisites for optional higher-level modules offered in the subject. Students can opt for Literature as their choice of Humanities in Year 3 and 4, and as their 4th major in Year 5 and 6.

In addition, English Language and linguistics elective modules are offered to further develop the talent and passion of selected students.

2   Overview of the modules

English Language

The English Language and Literature Curriculum aims to nurture students who are world-ready thinkers and communicators. Students will communicate effectively in varied contexts as a result of their development in listening, reading, speaking and writing. More importantly, it seeks to develop in students a broad and mature understanding of a range of subject matter pertaining to the local and world affairs as well as the ability to analyse and evaluate them critically and creatively. In addition, the programme hopes to cultivate students' literary consciousness, lifelong interest in the language, love for and appreciation of texts of varied genres, which will enable their journey in self-directed learning.

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 critical and creative thinking, decision-making, learning-focused interaction and problem-solving in authentic contexts.

The curriculum in Years 1 and 2 focuses on the appreciation and creation of literary works and functional texts. Through text types such personal recounts, narratives, descriptive works, poetry, and plays, the modules aim to develop students' language and literary skills. The study of Literature and skills of literary analysis will be incorporated in the English Language modules. In addition, students will be introduced to a wide range of functional texts like factual recounts and information reports. They will apply knowledge of textual and linguistic features to communicate effectively for real world purposes.

In Years 3 and 4, students will be introduced to expository texts. Through exposure to a broad range of expositions and other text types 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 advocacy speeches, campaigns, reports and proposals. Themes related to society such as family, education, youth, the aged, media, the arts and culture, crime and discrimination will be studied.

In Years 5 and Year 6 Semester 1, students acquire knowledge and understanding of diverse topic areas through extensive reading, group discussions and independent research. These topic areas include the study of social institutions; nation and policies; politics; science and ethics as well as global forces/events shaping the world. They will develop skills in analysing and evaluating varied 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.

In Year 6 Semester 2, students will opt for one academic reading/writing or linguistic module based on their interest and ability.

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 where class attendance and participation are imperative for skills development, the department does not allow for exemption or acceleration of modules.

Level	Sem	Module Code	Module Type	Module Title	Description	Modular Credits (MC)	Pre-requisites	Preclusions	Co-requisites	Hrs/ wk	Remarks
1	1 and 2	EL1108	Core	Foundational Language and Literary Skills	This module will build on students' existing knowledge and language skills to help them further develop the reading, writing, listening and speaking skills needed to become effective users of the language. Through the study of the module's key novel –A Wrinkle in Time, along with a range of other rich texts, students will learn distinctive literary features and put these skills to practice in the form of narrative writing. They will also learn summary skills and critical thinking skills in the form of the Opinion-Based Question The key focus of the module will be on the narrative form through an in depth exploration of figurative language, character development and plot structure. As a complementary form of writing, students will explore the Factual Recount through an independent project. Students will also hone their reading skills by mastering the short answer, summary and OBQ questions. Additionally, students will develop their oratorical skills through storytelling.	7	None			3.5	Year long module
2	1 and 2	EL2108	Core	Intermediate Language and Literary Skills	This year-long module spans across two semesters and aims to build on the narrative writing skills acquired in EL1131: Language and Literary Studies I. Students will also be exposed to the information report in the form of a brochure project. Conventional reading skills such as the comprehension and summary skills will be further developed with a new dimension of evaluative skills included in the form of the Opinion-Based Question. Students will also be exposed to Socratic Seminars to hone their critical thinking as well as speaking and listening skills. The culminating module project will be a Book Trailer project based on the module core text that will facilitate students' to express their literary analysis through an interactive mode of storyboarding, acting and video-recording/editing. The chosen texts for this module will include short prose as well as a full length novel and a play. These literary pieces have been carefully curated to meet the language and literature needs of the module as well as to develop students' affective education through the main theme of Self and Conflict by exploring sub-themes such as Man vs Self, Man vs Society, Man vs Man and Man Vs Nature.	7	EL1108			3.5	Year long module
3	1 and 2	EL3103	Core	Introduction to Expositions	This year-long module introduces the skills of critical reading and persuasive writing. Building on students' knowledge from Years 1 and 2, this module will further refine their comprehension, summary skills and opinion based questions. In addition, they will be introduced to the genre of expository writing where they will learn to form claims, substantiate them with ample evidence and elaboration. They will be exposed to themes like family, education, youth and the aged through reading material, writing activities and class discussions. This module also focuses on functional texts in real life settings where they get to apply their knowledge of textual and linguistic features to communicate effectively for real world purposes.	6	EL2108			3	Year long module
3	1	EL3201	Elective	Creative Writing	This is an elective module that aims to introduce students to basic structural and textual elements of short fiction and poetry that they are expected to weave into their creative work. This will be done through two strategies. First, the student will do a close reading of both notable works of short fiction and poetry as well as the original manuscripts of peers in workshops. Second, he or she will undergo extensive practice, with the aim of honing divergent and innovative thinking, in the form of regular writing exercises, either take-home	2	None			1.5	

No.	Sem	Code	Type	Module	Description		Prereq				Remarks
					or in class. The workshop framework is at the heart of the writing, reading and discussion of creative writing in this module. Selected readings will cover both canonical as well as contemporary creative writing. The student will be given prompts based on the works that have been discussed in class. The best works will be published in the school publication and other journals, as well as entered in competitions.						
4	1 and 2	EL4104	Core	Language in Society I	This module is designed as an introductory course on the essential skills needed for an English Language learner to be fluent and confident in expressing arguments and opinions in an academic manner. Through the analysis of emerging issues/trends in the mass media, crime and punishment, prejudice and discrimination, students will gain a broad and mature understanding of the topics and apply them in specific reading, writing and oral communication tasks. In addition, key controversies arising from social institutions like the family and education will be examined. Other than argumentative essay and reading comprehension components, students will also be assessed through oral presentations and research. Varied sources of texts will be used to broaden content knowledge and promote critical reading and inquiry. This is a year-long module that spans two semesters. In the course of the module, students are encouraged to take a proactive and independent approach in broadening current affairs knowledge.	6	EL3103			3	Year long module
5	1 and 2	EL5101	Core	Language in Society II	This module is designed as an intermediate course on the essential skills needed for an English Language learner to be fluent and confident in expressing arguments and opinions in an academic manner. At the end of it, students would have gained the mastery of analysing argumentative texts. The exploration of certain key concepts will be done over the course of four main topics, namely, that of Globalisation (Economic/ Social/ Cultural), Environment, Science & Ethics and Poverty. Through the discussion of these issues students will be able examine local and global issues critically and develop a sense of civic mindedness. A good understanding of these topics will also equip students to handle more complex topics like Politics in year 6. Aside from essay and comprehension components, students will also be assessed through active independent group projects and oral presentations. Varied text types such as newspapers, magazines and periodicals will be used to promote critical thinking and inquiry. This is a year-long module that spans two semesters. In the course of the module, students must take a proactive and independent approach in broadening current affairs knowledge. This is essential if students wish to do well in this intermediate course.	6	EL4101			3	Year long module
6	1	EL6103	Core	Language in Society III	This is the final of three modules in the senior years which develop students' understanding and use of language in society. It will build on the skills of exposition, persuasion and argumentation to focus on global and political concerns. Through the study of political ideologies, international relations and emerging issues on conflicts and security, students will become critically aware of the global concerns that affect them. Aside from Essay and Application Question components, students will also be assessed through independent group projects and oral presentations. Varied text types such as newspapers, magazines and periodicals will be used to promote critical thinking and inquiry. This is a semester-long module. In the course of the module, students are encouraged to take a proactive and independent approach in broadening current affairs knowledge.	3	EL5101			3	

6	2	EL6105*	Core	Understanding Discourse	This module will explore discourse and expose students to frameworks and approaches to analysing it. Different types of discourse can be seen as linguistic representations of particular worldviews. A critical perspective on the analysis of specific discourses, whether oral or written, aims to promote the general awareness that language is used to construct and perpetuate particular viewpoints, and through such linguistic constructions, specific (power) relationships are maintained. By virtue of the fact that discourse involves the situated use of language in relevant sociocultural contexts, it is an orientation that promotes the crossing of disciplinary borders.	3	EL6103			3	*Students have a choice of one module, subject to department's approval
6	2	EL6106*	Core	Academic Research & Writing	As a critical writing module, the course will focus on the development of basic competencies in academic reading, writing and research. Students will develop skills in reading for academic purposes as well as engage in basic academic research data collection, analysis and literature review, and produce an original research paper through process writing. The module will expect students to work on multiple drafts of a research essay based on a single research question, focusing on the importance of editing and revising arguments as new information and insights develop. Students will be guided through the critical reading of academic journal articles and learn how to distil and apply relevant information into the creation of new academic knowledge.	3	EL6103			3	*Students have a choice of one module, subject to department's approval
6	2	EL6203	Elective	Advanced Creative Writing	This elective module is intended for Year 5 or 6 students who wish to polish their fiction or poetry writing. It will include significant close reading and discussion of notable literary texts, completion of writing assignments and prompts, and peer review workshops. Students are expected to work on their own portfolios of poems, stories or novella. The workshop framework is at the heart of the writing, reading and discussion of creative writing in this module. Selected readings will cover both canonical as well as contemporary creative writing. The best works will be published in the school publication Epiphanies and other journals, as well as entered in competitions.	2	None			1.5	

ENGLISH LITERATURE

Through a broad selection of literary texts which include representative works from various genres and periods, the Literature programme aims to:

- Nurture students to be Readers for Life who can appreciate different genres of Literature and its contribution to the human civilisation
- Groom students to be proficient in understanding various literary forms and its features in achieving specific desired ends
- Facilitate students to form perceptive thought and original ideas towards what they read
- Guide students towards an objective, conscious and critical discussion reflective of both emotional and intellectual awareness of themes, characters, settings and contexts
- Develop students to be able communicate and present effectively and convincingly with proper analysis and evaluation in both the written and spoken mode

Foundational Literature is incorporated into the Year 1 and 2's English Language modules, EL1108 and EL2108. These foundational modules are pre-requisites for optional higher-level modules offered in the subject. Students can opt for Literature as their choice of Humanities in Yea3 and 4, and as their 4th major in Year 5 and 6.

Years 3 and 4 will form the developing stage to the 3 main genres of Literature – Prose, Poetry and Play. For Prose, students will actively engage in the study of Fiction in both the form a Novel and Short Fiction. For Poetry, students will experience a broad selection of poetry from different cultures and eras. Students will also explore both local and international theatre in their study of Play. Each module will be grounded within a over-arching theme as a focal point of exploration for both breadth and depth.

Years 5 and 6 will progress students from developed students of Literature to being advanced students with a richer and more diverse experience of Literature whilst simultaneously rooting them deeper into the study of specific ideas of critical reading and thinking. Students will have to read extensively and intensively representative works of recognised literary merit spanning across different eras, movements and genres. The modules will be categorised according to periods and topics. Their study will culminate in an independent research programme which will take the form of an extended essay. The extended essay will be an investigation into the transformation of literary works either across genres/periods.

Level	Sem	Module Code	Module Type	Module Title	Description	Modular Credits (MC)	Pre-requisites	Preclusions	Co-requisites	Hrs/ wk	Remarks
3	1 and 2	EN3110	Core	The Novel and Play I	This is a year-long module that will expose students to the literary stylistics of the novel and play. Students will study the novel "To Kill A Mockingbird" by Harper Lee and learn about the themes of Prejudice & Discrimination, Fear, Choices and Belonging. They will also consider the bildungsroman aspect of which will deal with ideas of Coming of Age and Change. The module will also introduce students to the world of Shakespearean theatre through Romeo and Juliet where they will immerse themselves in the beauty of Elizabethan language and consider themes such as Love, Loyalty and Trust amongst others. On top of the novel and play, students will also be enriched through a diverse range of poetry and short story excerpts.	4	EL2108			2	Year long module
4	1 and 2	EN4110	Core	The Novel and Play II	This module will explore the evolution of Man in relation to progress, civilisation and technology through the lens of Utopian vs Dystopian theories. Students will study the novel of Brave New World by Aldous Huxley but are encouraged to foray into relevant Utopian and/or Dystopian works of a comparative/contrastive nature for the fulfillment of their module project. In addition, students will engage with two esteemable plays – Arthur Miller's The Crucible and David Auburn's Proof in exploring the self in conflict both within and beyond. Students will continue to develop their skills in handling the Unseen Poetry which will also serve to further reinforce their understanding and appreciation of the module themes.	4	EN3110			2	Year long module
5	1	EN5108	Core (Major)	Shakespearean Tragedy and Comedy	In this module, students will compare and contrast the elements of Tragedy and Comedy in Shakespearean Theatre by studying Macbeth and Twelfth Night. Through a rich and engaging interaction with these plays, they will gain insight into quintessential Elizabethan philosophies such as the Great Chain of Being, Destiny vs Free Will as well as gain insight into social/class hierarchies and gender roles of the time.	2	Year 3 - 4 Literature			3	
5	2	EN5109	Core (Major)	19th Century British Literature	In this module, students will look at elements that defined 19th century British Literature by reading Great Expectations by Charles Dickens and Jekyll and Hyde by Robert Louis Stevenson. Through a rigorous and immersive engagement with both texts, students will delve into themes such as Crime & Punishment, Family & Kinship, Science & Progress, Doubling, Good vs Evil as well as gain insight into social/class hierarchies and gender roles of the time.	2	Year 3 - 4 Literature			3	
6	2	EN6104	Core (Major)	Postcolonial Literature	In this module, students will experience postcolonial literature and its concerns through reading The God of Small Things by Arundhati Roy as well as a carefully curated selection of short stories ranging from George Orwell, Doris Lessing to Khin Myo Chit and Helen Garner to name a few.	2	Year 3 - 4 Literature			3	

					Students will acquire knowledge of theories such as Humanism, Essentialism, Binaries and Ecocriticism to explore the heritage inherited by postcolonial nations from their colonial masters. Additionally, students will also compare and contrast the effects of Colonialism vs Globalisation.						
6	1	EN6105	Core (Major)	20th Century American Literature	In this module, students will experience two of the foremost American Literature novels that emerged in the 20th century. Each text expresses some of the most distinctive American literary voices that have come to stand the test of time; starting with The Great Gatsby by F.Scott Fitzgerald and culminating with the Catcher in the Rye by J.D Salinger. Students will delve deeply into the defining qualities of the American Dream and appreciate its ensuing values as well critique its aspirations by looking at themes such as Disillusionment, Displacement, Gender as well as study the figure of the anti-hero.	2	Year 3 - 4 Literature			3	
5	1	EN5208	Elective	Shakespearean Tragedy and Comedy	In this module, students will compare and contrast the elements of Tragedy and Comedy in Shakespearean Theatre by studying Macbeth and Twelfth Night. Through a rich and engaging interaction with these plays, they will gain insight into quintessential Elizabethan philosophies such as the Great Chain of Being, Destiny vs Free Will as well as gain insight into social/class hierarchies and gender roles of the time.	2	Year 3 - 4 Literature			3	
5	2	EN5209	Elective	19th Century British Literature	In this module, students will look at elements that defined 19th century British Literature by reading Great Expectations by Charles Dickens and Jekyll and Hyde by Robert Louis Stevenson. Through a rigorous and immersive engagement with both texts, students will delve into themes such as Crime & Punishment, Family & Kinship, Science & Progress, Doubling, Good vs Evil as well as gain insight into social/class hierarchies and gender roles of the time.	2	Year 3 - 4 Literature			3	
6	2	EN6204	Elective	Postcolonial Literature	In this module, students will experience postcolonial literature and its concerns through reading The God of Small Things by Arundhati Roy as well as a carefully curated selection of short stories ranging from George Orwell, Doris Lessing to Khin Myo Chit and Helen Garner to name a few. Students will acquire knowledge of theories such as Humanism, Essentialism, Binaries and Ecocriticism to explore the heritage inherited by postcolonial nations from their colonial masters. Additionally, students will also compare and contrast the effects of Colonialism vs Globalisation.	2	Year 3 - 4 Literature			3	
6	1	EN6205	Elective	20th Century American Literature	In this module, students will experience two of the foremost American Literature novels that emerged in the 20th century. Each text expresses some of the most distinctive American literary voices that have come to stand the test of time; starting with The Great Gatsby by F.Scott Fitzgerald and culminating with the Catcher in the Rye by J.D Salinger. Students will delve deeply into the defining qualities of the American Dream and appreciate its ensuing values as well critique its aspirations by looking at themes such as Disillusionment, Displacement, Gender as well as study the figure of the anti-hero.	2	Year 3 - 4 Literature			3	

6	1 and 2	EN6111	Core (Major)	Advanced Research in Literature	This is an independent research in literature module that fulfills part of the overall requirement for all literature students majoring in the subject. Students will have to embark on a rigorous research topic of their choice and conduct a thorough literature review. By the end of the module, students will demonstrate a balanced, sound and well-researched evaluation of their selected literary topic/text presented in both the written and oral form.	4	Year 3 - 4 Literature			Year long	Year long module - students will only submit their completed research essay and oral presentation in Semester 2.

Mother Tongue and Foreign Languages

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, namely French, Japanese, Malay as Third Language and Chinese as Third Language are offered as elective modules. The enrichment modules offered are the Mother Tongue Syllabus B for Chinese, Malay and Tamil.

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

The Mother Tongue Policy
(MT Requirements for Admission to Local Universities)

The Mother Tongues (MT) officially refer to Chinese, Malay and Tamil. Under the Mother Tongue Policy, it is compulsory for NUS High students to fulfill either *ONE* of the following MT requirements for admission to the local universities (NUS, NTU, SMU & SUTD):
- 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 will sit for the GCE O Level Higher MT Examination in Year 4.
- Mother Tongue will sit for GCE A Level H1 MT Examination in Year 5.
- Mother Tongue Syllabus B will sit for GCE A Level MT Syllabus B Examination in Year 5.

Students will 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, Punjabi or Urdu.
- Returning Singaporeans who have stayed overseas for an extended period of time can apply to take an Asian Language (Arabic, Burmese or Thai) or a Foreign Language (French, German or Japanese).

If students take Mother Tongue in-lieu, the MOE-approved subject will be considered as the Mother Tongue language subject.

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 under-graduate 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.

MOTHER TONGUE MODULES (CHINESE/ MALAY/ TAMIL)

Mother Tongue language modules are offered to students as Core Modules. These core modules are parked under Higher Mother Tongue Language (HMTL) course and Mother Tongue Language (MTL) course, which is a four-year and five-year course respectively. Students will opt for either the Higher Mother Tongue or the Mother Tongue course, based on their eligibility and suitability. Both courses progressively equip students with Mother Tongue proficiency in four main aspects, namely listening, speaking, reading and writing. Upon completion of the four-year Higher Mother Tongue course or the five-year 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. Upon completion of either course, students are required to sit for the GCE 'O' Level HMTL Exam at end of Year 4 or GCE 'A' Level H1 MTL Exam at end of Year 5.

With approval from MOE, students who offer a Mother Tongue in-lieu at one of the MOE-approved centres will be deemed to have offered the Mother Tongue in-lieu concerned as a core module in our school. For such modules, 'M' is indicated at the end of the module code. For example, BG1101M denotes the module code for Bengali 1A (Semester 1) in the case of students taking the Bengali (Non-Tamil Indian Language) module conducted at a MOE-approved centre.

For students who have difficulties coping with MTL modules, they can opt to take up MTL Syllabus 'B' modules instead. However, approval must be sought from the school before opting for MTL Syllabus 'B' modules and the opting can only be carried out at appropriate stages. MTL Syllabus 'B' modules are offered to students as Enrichment Modules. Upon taking up the MTL Syllabus 'B' course, students are to complete this course and pass the GCE A Level MTL 'B" Exam at end of Year 5.

In order to further develop in students the capacity and interest for Mother Tongue languages, the school also offers elective modules to students taking MTL or HMTL course. Elective modules, such as Appreciation of Chinese Language and Culture, Basic Translation Skills, The Math and Science Achievements of Ancient China and Learning Math and Science in Chinese, aim to strengthen the language acquisition of students and develop in them the ability to apprehend the culture associated with the language.

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

The school offers French, Japanese, Chinese as 3rd Lang and Malay as 3rd Lang as Elective Modules. These modules are offered to the following categories of students:
(1) Having the interest to study a Third Language on top of their Mother Tongue
(2) Opting to study French or Japanese as MTL-in-lieu (with approval from MOE)
(3) Having the interest to study one of these languages purely for interest, even if they are exempted from MTL (this applies to some of the foreign students)

The four-year French and Japanese courses prepare students for DELF (Diploma in French Studies) & JLPT (Japanese Language Proficiency Test) respectively. The four-year Chinese as 3rd Lang and Malay as 3rd Lang courses equip students with language competencies required for sitting for GCE 'O' Level Chinese/Malay Special Programme even though some of them may not be eligible to sit for these exams.

Upon completion of any of the 4 third language courses mentioned above, 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 advancement to the next level of learning.

Level	Sem	Module Code	Module Type	Module Title	Description	Modular Credits (MC)	Pre-requisites	Preclusions	Co-requisites	Hrs/wk	Remarks
1	1 and 2	CH1103	Core	Higher Chinese Level 1	This module focuses on equipping students with structural guidelines and rhetorics that will enable them to develop narrative and descriptive writing skills at the Intermediate level. Under the section of interactive writing, students will learn how to write informal emails, discuss current affairs and share personal experiences. Students will acquire browsing and close reading skills that will equip them with the correct answering techniques in reading and comprehension. Through class discussions and group work, students will develop active listening skills and acquire oral and presentation skills.	6	None			3	Year long module
1	1 and 2	CL1103	Core	Chinese Level 1	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. Much emphasis will be given to the acquisition of oral and listening skills, other than the learning of narrative writing skills at the intermediate level. Under the section of functional writing, students will learn how to write informal emails with reference to daily life.	6	None			3	Year long module
1	1 and 2	MH1103	Core	Higher Malay Level 1	This module aims to equip students with strong communication skills, acquire and disseminate information effectively and generate ideas through the use of the Malay language. It also aims to deepen students' understanding and appreciation of the Malay language, history and culture. There will be emphasis on building strong communication skills, critical-thinking and problem-solving; and more lesson time will be allocated to oral presentations and debate sessions.	6	None			3	Year long module
1	1 and 2	ML1103	Core	Malay Level 1	This module aims to equip students with effective communication skills, acquire and disseminate information and generate ideas through the use of the Malay language as well as appreciate and understand various forms of Malay cultures. Much emphasis will be given to the acquisition of oral and listening skills. Under the section of functional writing, students will learn how to write personal emails with reference to daily life.	6	None			3	Year long module
1	1 and 2	TH1103	Core	Higher Tamil Level 1	This module helps to develop students reading, writing, listening and speaking skills needed to become effective users of the Tamil language. This module enhances students' vocabulary through quizzes, marabhuthodargal, enaimozhigal, uvamaiththodargal and proverbs. Students will learn to write informal emails, descriptive and narrative essays. Students will deepen their understanding of their culture through doing project work.	6	None			3	Year long module

1	1 and 2	TL1103	Core	Tamil Level 1	This module aims to develop students' reading, writing listening and speaking skills that are needed to become effective users of the Tamil language. Through marabhuthodargal and enaimozhigal students will learn and understand the language in depth. This module will also equip students with narrative writing skills at the intermediate level. Students will learn to write informal emails with reference to daily life.	6	None			3	Year long module
2	1 and 2	CH2103	Core	Higher Chinese Level 2	In this module, students will build on their existing knowledge and skills. Under writing, they will further develop and enhance their skills in descriptive and narrative writing, as well as acquire relevant skills in expository writing. Argumentative writing will also be introduced to hone the students' critical thinking skills. While brushing up on informal emails, they will be introduced to formal emails. Through reading more complex narrative passages, students will learn how to interpret underlying meanings. Through class discussions and group work, students will develop active listening skills and acquire oral and presentation skills. Various platforms will be provided for students to reinforce their oral skills.	6	None			3	Year long module
2	1 and 2	CL2103	Core	Chinese Level 2	This module focuses on equipping students with narrative and descriptive writing skills at the intermediate level. Continued emphasis will be given to the acquisition of oral and listening skills. Under the section of functional writing, other than continuing with informal emails that pertain to daily life, students will also learn to discuss and analyse current affairs via emails. More platforms will be provided for students to hone their presentation skills.	6	None			3	Year long module
2	1 and 2	MH2103	Core	Higher Malay Level 2	In this module, students will be exposed to literature, which include poetry, plays, essays, biography, and autobiography. This module focuses on the development of skills in expository and persuasive writing.	6	None			3	Year long module
2	1 and 2	ML2103	Core	Malay Level 2	This module emphasizes on honing the students' grammar skills. Students will be exposed to developing figurative and evaluative language, developing the noun group using adjectival phrases as well the noun-verb relationship: subject-verb agreement. Continued emphasis will be given to the acquisition of oral and listening skills. Under the section of functional writing, other than continuing with personal emails that pertain to daily life, students will also learn to discuss and analyse current affairs via emails. More platforms will be provided for students to hone their presentation skills.	6	None			3	Year long module
2	1 and 2	TH2103	Core	Higher Tamil Level 2	This module helps to strengthen the students' communication skills. Students will learn to write formal emails and comments in the web forum. They will further develop and enhance their descriptive and narrative writing skills. Argumentative writing will also be introduced to hone the students' critical thinking skills. Through classroom discussions and group work, students will develop active listening skills and acquire	6	None			3	Year long module

					oral and presentation skills. Various platforms will be provided for students to reinforce their oral skills.						
2	1 and 2	TL2103	Core	Tamil Level 2	This module aims to help the students develop their reading, writing, listening and speaking skills needed to become effective users of the Tamil language. Through marabhuthodargal, enaimozhigal, uvamaiththodargal and proverbs, students will learn and understand the language in depth. This module develops and further enriches students with narrative and descriptive writing skills. They will also learn to write emails with reference to current affairs.	6	None			3	Year long module
3	1 and 2	CH3103	Core	Higher Chinese Level 3	The module focuses on equipping students with more advanced writing skills. More emphasis will be given to argumentative writing. In addition, they will also be taught skills in speech writing. Under the section of functional writing, students will continue to brush up on the writing of emails, both formal and informal. In addition, they will be introduced to the writing of blogs and forums, which require critical thinking and analytical skills in response to current affairs. In preparation for national exams, students will be taught summary writing skills as well as correction of ungrammatical sentences. More lesson time will be allocated to oral presentations which will prepare students for their oral report in the exams. Interactive learning will continue to be an important feature of the classroom climate.	6	None			3	Year long module
3	1 and 2	CL3103	Core	Chinese Level 3	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, other than informal emails, students will learn to write formal emails. To prepare students for national exams, there will be a greater emphasis on training of oral presentation skills on top of the teaching of writing skills. Reading and comprehension will take precedence over rote learning of words and phrases.	6	None			3	Year long module
3	1 and 2	MH3103	Core	Higher Malay Level 3	This module aims to equip students with a higher order of critical thinking skills. As such, language skills acquisition at this level will be deeply based on students' reasoning skills. More lesson time will be allocated to oral presentations which will prepare students for their oral report in the exams. Interactive learning will continue to be an important feature of the classroom climate.	6	None			3	Year long module
3	1 and 2	ML3103	Core	Malay Level 3	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, other than informal emails, students will learn to pen formal emails. To prepare students for national exams, there will be a greater emphasis on training of oral presentation skills, on top of the teaching of writing skills.	6	None			3	Year long module
3	1 and 2	TH3103	Core	Higher Tamil Level 3	This module focuses on equipping students with more advanced writing skills. More emphasis will be given to argumentative and expository writing. This module emphasis is more on summary writing, and	6	None			3	Year long module

					comprehension writing skills; and more practice will be given on cloze passage and text editing. Students will also learn through various modes of instructions such as classroom discussions, debates, project presentations and peer critiques.						
3	1 and 2	TL3103	Core	Tamil Level 3	This module focuses on equipping students with more advanced writing skills, such as argumentative and expository writing. Along with email writing, students will learn to write their comments or opinions in the web forum. There will be more practice on cloze passages and sentence completions. Students will be given opportunities to develop their public speaking skills through oral presentations in the classroom.	6	None			3	Year long module
4	1 and 2	CH4103	Core	Higher Chinese Level 4	In this module, there will be a continued emphasis on the training of advanced writing skills, with more reference to current affairs. In preparation for national exams at the second half of the year, more time will be allocated to the drilling of summary writing, correction of ungrammatical sentences, answering techniques in comprehension and presentation skills required in oral reports based on video clips.	6	None			3	Year long module
4	1 and 2	CL4103	Core	Chinese Level 4	In this module, the training of argumentative and expository writing skills will continue to be the main focus. To equip students for national exams, more lesson time will be allocated to oral 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. Students will also be introduced to basic summary skills to prepare them for H1 Chinese in Year 5.	6	None			3	Year long module
4	1 and 2	MH4103	Core	Higher Malay Level 4	This module continues to equip students with language acquisition skills through the use of critical thinking skills. There will be a continued emphasis on the training of advanced writing skills, with more reference to current affairs and controversial topics. In preparation for national exams in the second half of the year, more time will be allocated to the drilling of summary writing, the correction of ungrammatical sentences, answering techniques in comprehension and presentation skills required in oral reports based on video clips.	6	None			3	Year long module
4	1 and 2	ML4103	Core	Malay Level 4	This module aims to develop students' writing skills at a more advanced level. Students will also be further exposed to critical thinking skills in both oral and writing assessments. To equip students for their national exams, more lesson time will be allocated to oral presentations based on video clips and debate sessions. Interactive learning will continue to be an important feature of the classroom climate.	6	None			3	Year long module
4	1 and 2	TH4103	Core	Higher Tamil Level 4	This module will further refine students' comprehension and summary writing skills. The overall aim of this module is to reinforce students' speaking, reading, listening and writing skills. More practice will be given based on the exam components. At the end of the module, students should be proficient in Tamil language skills involving speaking, reading, listening and writing.	6	None			3	Year long module

4	1 and 2	TL4103	Core	Tamil Level 4	This module focuses more on sharpening the students' writing skills. This module helps to develop students' argumentative and expository writing skills at the advanced level. Under functional writing, students will have more practice on email writing and forum writing. Students will be given opportunities to develop their public speaking skills through the oral presentation in class. More practice will be given to prepare the students for the national examination.	6	None			3	Year long module
5	1 and 2	CL5103	Core	Chinese Level 5	This module will equip students with the necessary skills to prepare for their oral report during the national exams. Other than honing oral presentation skills, students will develop more advanced reading skills so as to have a deeper understanding of the text. In addition, students will be taught how to write complex narrative and argumentative essays to further develop their competency in writing.	6	None			3	Year long module
5	1 and 2	ML5103	Core	Malay Level 5	This module focuses on enhancing students' knowledge and grasping broader concepts of current issues as the curriculum covers a wide range of topics which require students' depth of knowledge in these issues. Focus will be on exposing students to concepts through analysis of newspaper and magazine articles, as well as through social media. Various platforms will be provided for students to reinforce their oral skills.	6	None			3	Year long module
5	1 and 2	TL5103	Core	Tamil Level 5	This module aims to improve the students' communication skills through in-class presentations, debates and discussions on essays topics. Students will be taught to write complex narrative and argumentative essays to further develop their writing skills. They will learn the command of the language in more depth through the more advanced marabhuthodargal, enaimozhigal and uvamaiththodargal. They will also learn sorpunarchi.	6	None			3	Year long module
1	1	CL1201	Elective	The Culture behind Chinese Philology	This course introduces the evolvement and distinct features of the Chinese characters, painting and calligraphy. The culture and customs behind the characters will also be covered in this course. The objective is to give students better grasp of Chinese Characters, understand Chinese Culture and appreciate the beauty of the language and hence arouse their interest in Chinese Language.	1	None			2	
1	1	CL1202	Elective	The Math and Science Achievements of Ancient China	This module provides insights to the Chinese culture from the achievements through Math and Science. The teacher introduces Math & Science achievements as a context to gain a deeper appreciation of Chinese culture. The lessons cover various Math & Science topics, such as Permutation and Combination, Positional Notation and Non-Euclidean Space. Students are required to access the Chinese online resources to aid in their learning with the guidance of the teacher.	1	None			2	
1	1	CL1221	Elective	Chinese as 3rd Lang 1A	This module is opened to students who have no prior Chinese language background. This module touches on the basics, such as an overview of the evolution of Chinese characters and an introduction to phonetics	3	None			3	*Pre-requisites refer to students having to pass the module by attaining at least 50% (overall) in

					(the Hanyu Pinyin system). More emphasis will be given to the oral and listening components.						order to advance to the next level. For example, students will be required to attain at least 50% for CL1221 in order to advance to CL1222.
1	1	FR1201	Elective	French Level 1 Part A	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). 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 strategies for language learning and language use. Audio and video materials are used. The course provides an insight into French culture. Sessions are interactive.	3	None			3	*Pre-requisites refer to students having to pass the module by attaining at least 50% (overall) in order to advance to the next level. For example, students will be required to attain at least 50% for FR1201 in order to advance to FR1202. **For students taking French as Mother Tongue in lieu, this module will be regarded as a core module. As such, the module code will be reflected as FR1101 (and not FR1201) and FR1102 (and not FR1202) in the case of French Level 1.
1	1	JP1201	Elective	Japanese Level 1 Part A	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). 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.	3	None			3	*Pre-requisites refer to students having to pass the module by attaining at least 50% (overall) in order to advance to the next level. For example, students will be required to attain at least 50% for JP1201 in order to advance to JP1202. **For students taking Japanese as Mother Tongue in lieu, this module will be regarded as a core module. As such, the module code will be reflected as JP1101 (and not JP1201)

											and JP1102 (and not JP1202) in the case of Japanese Level 1.
1	1	ML1201	Elective	Malay as 3rd Lang 1A	This module is opened to students who have no prior Malay language background. This module aims to equip pupils with the skills of understanding standardised spoken Malay language. At the end of the programme (i.e. at the 4th 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.	3	None			3	
1	2	CL1204	Elective	Learning Math and Science in Chinese	This module aims to promote the use of Chinese as an everyday language. The teacher guides the students to discuss and articulate various Math & Science concepts, which they have learned from Math & Science lessons. Students are required to access the Chinese online resources through NUS E-database to aid in their learning. Students could also be engaged in online discussion with students from other countries.	1	None			2	
1	2	CL1222	Elective	Chinese as 3rd Lang 1B	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 description for CL1221.	3	CL1221			3	
1	2	FR1202	Elective	French Level 1 Part B	The course fee per month is $100 and charged for the WHOLE Semester (Jul - Dec). This module is a continuation of FR1201. Please refer to description for FR1201.	3	FR1201			3	
1	2	JP1202	Elective	Japanese Level 1 Part B	The course fee per month is $100 and charged for the WHOLE Semester (Jul - Dec). This module is a continuation of JP1201. Please refer to description for JP1201.	3	JP1201			3	
1	2	ML1202	Elective	Malay as 3rd Lang 1B	This module is a continuation of the skills developed in Semester One. Oral and listening skills will continue to be emphasised in this module. Communicative skills will be garnered through various forms, such as role-plays, skits, short speeches, etc. Reading and writing skills will be exposed to them as well. Grammar aspects will continue to be taught through interactive approach.	3	ML1201			3	
2	1	CL2221	Elective	Chinese as 3rd Lang 2A	This module is a continuation of CL1222 and it is meant only for students who have completed and passed CL1222. The module emphasises the learning of new vocabularies, the constructing of simple sentences and writing of short compositions. The module also aims to equip pupils with comprehension and conversational skills in Chinese.	3	CL1222			3	
2	1	FR2201	Elective	French Level 2 Part A	The course fee per month is $100 and charged for the WHOLE Semester (Jan - Jun).	3	FR1202			3	

					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 strategies for language learning and language use. Audio and video materials are used. The course provides an insight into French culture. Sessions are interactive.						
2	1	JP2201	Elective	Japanese Level 2 Part A	The course fee per month is $100 and charged for the WHOLE Semester (Jan - Jun). 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.	3	JP1202			3	
2	1	ML2201	Elective	Malay as 3rd Lang 2A	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 various 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.	3	ML1202			3	
2	2	CL2222	Elective	Chinese as 3rd Lang 2B	This module is a continuation of CL2221. Please refer to description for CL2221.	3	CL2221			3	
2	2	FR2202	Elective	French Level 2 Part B	The course fee per month is $100 and charged for the WHOLE Semester (Jul - Dec). This module is a continuation of FR2201. Please refer to description for FR2201.	3	FR2201			3	
2	2	JP2202	Elective	Japanese Level 2 Part B	The course fee per month is $100 and charged for the WHOLE Semester (Jul - Dec). This module is a continuation of JP2201. Please refer to description for JP2201.	3	JP2201			3	
2	2	ML2202	Elective	Malay as 3rd Lang 2B	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.	3	ML2201			3	
3	1	CL3202	Elective	Appreciation of Chinese Language and culture (I)	Drama and Debate training; Watching and studying various debate competition involving different teams as part of the debate training; Literature appreciation; Cultural visiting and Exchange Programme; Enhancing creativity	2	None			2	

3	1	CL3221	Elective	Chinese as 3rd Lang 3A	This module is a continuation of Chinese as 3rd Lang Level 2 and it is meant only for students who have completed and passed CL2221 and CL2222. The module will equip students with stronger conversational and writing skills. Comprehension skills will be enhanced with the grasp of Chinese vocabularies. This will be an important preparatory stage for students who intend to sit for the GCE 'O' Level Chinese Special Programme Examination upon completion of the 4 year programme.	3	CL2222			3	
3	1	FR3201	Elective	French Level 3 Part A	The course fee per month is $100 and charged for the WHOLE Semester (Jan - Jun). 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.	3	FR2202			3	
3	1	JP3201	Elective	Japanese Level 3 Part A	The course fee per month is $100 and charged for the WHOLE Semester (Jan - Jun). Building upon the basis of Japanese Level 2 (JP2201 & 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 able to understand and write simple and short essays.	3	JP2202			3	
3	1	ML3201	Elective	Malay as 3rd Lang 3A	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 an understanding and awareness of the traditions and cultures of the Malay community which will help the students appreciate the learning of the language.	3	ML2202			3	
3	2	CL3204	Elective	Appreciation of Chinese Language and Culture (II)	This module is a continuation of CL3202. It will continue to provide students with the relevant platforms of learning and necessary guidance. Consolidation of learning will take place so as to ensure learning objectives can be met.	2	None			2	
3	2	CL3222	Elective	Chinese as 3rd Lang 3B	This module is a continuation of CL3221. Please refer to description for CL3221.	3	CL3221			3	
3	2	FR3202	Elective	French Level 3 Part B	The course fee per month is $100 and charged for the WHOLE Semester (Jul - Dec). This module is a continuation of FR3201. Please refer to description for FR3201.	3	FR3201			3	

3	2	JP3202	Elective	Japanese Level 3 Part B	The course fee per month is $100 and charged for the WHOLE Semester (Jul - Dec). This module is a continuation of JP3201. Please refer to description for JP3201.	3	JP3201			3	
3	2	ML3202	Elective	Malay as 3rd Lang 3B	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.	3	ML3201			3	
4	1	CL4221	Elective	Chinese as 3rd Lang 4A	This module is a continuation of Chinese as 3rd Lang Level 3 and it is meant only for students who have completed and passed CL3221 and CL3222. The module will serve to enhance students' conversational and writing skills, comparable to the standards required for the year-end GCE 'O' Level Chinese Special Programme Exam.	3	CL3222			3	
4	1	FR4201	Elective	French Level 4 Part A	The course fee per month is $100 and charged for the WHOLE Semester (Jan - Jun). This module is a continuation of French as Foreign Language Level 3 and it is meant only for students who have completed and passed FR3201 and FR3202. This is the end of the four-year programme. At the end of this module or at the end of the academic year, students should be able to sit for the DELF A2 Examination. And with more self-preparation, students could even perhaps sit for the DELF B1 Examination. 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 optimise their learning by teaching strategies for language learning and language use. The course provides an insight into French culture. Sessions are interactive.	3	FR3202			3	
4	1	JP4201	Elective	Japanese Level 4 Part A	The course fee per month is $100 and charged for the WHOLE Semester (Jan - Jun). 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 kanji and 200 kanji-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	3	JP3202			3	

					foundation to progress to intermediate and advance levels of Japanese studies.						
4	1	ML4201	Elective	Malay as 3rd Lang 4A	This module is critical in enhancing holistic learning for the pupils. A more rigorous and comprehensive approach will be adopted throughout the whole semester. At this stage, pupils are expected to have a sound mastery of the four language skills of listening, speaking, reading and writing. Applying all of these language skills at a higher level in their presentations and projects are among the pre-requisites of this module.	3	ML3202			3	
4	2	CL4222	Elective	Chinese as 3rd Lang 4B	This module is a continuation of CL4221. Please refer to description for CL4221. Completing this module marks the completion of the entire programme (level 1 to level 4).	3	CL4221			3	
4	2	FR4202	Elective	French Level 4 Part B	The course fee per month is $100 and charged for the WHOLE Semester (Jul – Dec). This module is a continuation of FR4201. Please refer to description for FR4201. Completing this module marks the completion of the entire programme (level 1 to level 4).	3	FR4201			3	
4	2	JP4202	Elective	Japanese Level 4 Part B	The course fee per month is $100 and charged for the WHOLE Semester (Jul - Dec). This module is a continuation of JP4201. Please refer to description for JP4201. Completing this module marks the completion of the entire programme (level 1 to level 4).	3	JP4201			3	
4	2	ML4202	Elective	Malay as 3rd Lang 4B	As the final module of the 4-year programme, pupils will be further equipped with all the essential skills that are required for higher learning. They are further exposed to various tools of communication, both formal and informal. Understanding the culture and society goes beyond speaking the language but immersing oneself in it and appreciating the culture as a whole. At this stage, pupils will gain more exposure into the language, culture and lifestyle of the Malay community, local and beyond for further insights. Completing this module marks the completion of the entire programme (level 1 to level 4).	3	ML4201			3	
5	1	CL5201	Elective	Topics on Chinese Literature	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.	1	None			2	
5	2	CL5202	Elective	Basic Translation Skills	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.	1	None			2	
1	1 and 2	CL1313	Enrichment	Basic Chinese Level 1	This module aims primarily to develop oral communication and listening skills through pictorial conversations and audiovisual clips. In addition, students will be taught basic reading skills through short passages.	6	None			3	Year long module
1	1 and 2	ML1313	Enrichment	Basic Malay Level 1	This module focuses on contextual learning of words and phrases, which form the basics of language acquisition. Reading and comprehension	6	None			3	Year long module

					will go hand in hand with the learning of words and phrases. Much emphasis will be given to the acquisition of oral and listening skills.						
1	1 and 2	TL1313	Enrichment	Basic Tamil Level 1	This module aims to develop students' reading, listening and speaking skills that are needed to become effective users of the Tamil language. Students will learn to write informal emails and provide their comments or opinions in the web forum. Students will deepen their understanding of their culture through doing project work.	6	None			3	Year long module
2	1 and 2	CL2313	Enrichment	Basic Chinese Level 2	At this level of learning, students will continue to develop their oral communication skills through structural analysis of a conversational topic. Writing skills will be developed further through using common phrases and idioms in pictorial composition as well as sentence construction. Writing of emails will also be introduced.	6	None			3	Year long module
2	1 and 2	ML2313	Enrichment	Basic Malay Level 2	This module focuses on expanding the use of vocabulary words through oral presentations, group work and individual assessments. There will also be an active use of mobile technology to enhance and encourage students' acquisition of the language skills. Students will continue to be exposed to various forms of media to enhance their current knowledge on the Malay language and culture.	6	None			3	Year long module
2	1 and 2	TL2313	Enrichment	Basic Tamil Level 2	This module helps to strengthen the students' communication skills. Students will further develop their speaking and listening skills. They will continue to work on improving their writing skills pertaining to informal email and web forum comments. Through classroom discussions and group work, students will develop active listening skills and acquire oral and presentation skills.	6	None			3	Year long module
3	1 and 2	CL3313	Enrichment	Basic Chinese Level 3	At this level of learning, students will strengthen their oral communication skills by listening to narrated stories and learning how to infer and draw conclusions from them. Comprehension skills will also be enhanced through learning how to process and organise information. The ability to write complex sentences with phrases and idioms will be developed. The writing of narrative essays and emails will be taught in greater depth.	6	None			3	Year long module
3	1 and 2	ML3313	Enrichment	Basic Malay Level 3	This module aims to give more emphasis in developing students' functional writing skills. Various forms of reading and writing materials will be introduced to the students. Students will be guided to work on their writing skills, to understand, analyze and be able to develop substantial reasoning in their work.	6	None			3	Year long module
3	1 and 2	TL3313	Enrichment	Basic Tamil Level 3	This module focuses on equipping students with more advanced oral skills. More emphasis will be given to listening and speaking skills. In this module, more practice will be given on cloze passages and reading comprehension. Students will also learn through various modes of instructions such as classroom discussions, project presentations and peer critiques. Email writing and giving comments in the web forum will be taught in greater depth. Students will be given opportunities to develop their public speaking skills through oral presentation.	6	None			3	Year long module

4	1 and 2	CL4313	Enrichment	Basic Chinese Level 4	At this level of learning, students will be taught 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. The scope of emails will also include current affairs, hence requiring students to be objective and analytical.	6	None			3	Year long module
4	1 and 2	ML4313	Enrichment	Basic Malay Level 4	This module aims to enhance the students' proficiency in their essential language skills. They should be able to articulate in 'Bahasa Baku' (standard Malay), with much clarity and fluency. At this stage, students will continue to develop their writing skills, and be prepared for the national examination.	6	None			3	Year long module
4	1 and 2	TL4313	Enrichment	Basic Tamil Level 4	This module will further refine students' speaking and listening skills. More practice will be given based on the exam components. Under functional writing, students will have more practice on email writing and web forum writing. More practice will be given to prepare the students to sit for the national examination.	6	None			3	Year long module
5	1 and 2	CL5313	Enrichment	Basic Chinese Level 5	To better prepare students for the oral presentation segment in the national exams, students will be taught critical thinking skills at a higher order. This will be useful in conversations that require reasoning and analytical skills. The writing of argumentative essays will be the focus for developing writing skills.	6	None			3	Year long module
5	1 and 2	ML5313	Enrichment	Basic Malay Level 5	This module aims to further develop students' language skills as they are now more exposed to the various language genres. This module will introduce students to current issues, Students will be given the opportunity to work on their language skills through various forms of assessments, such as peer-critic, group work as well as individual project presentations. This module will also continue to expose students to the Malay culture and arts.	6	None			3	Year long module
5	1 and 2	TL5313	Enrichment	Basic Tamil Level 5	This module aims to improve the students' students' reading, writing, listening and speaking skills needed to become effective users of the Tamil language. Students will be drilled on their oral presentation skills, writing skills and the use of technology to better prepare them for the national examination.	6	None			3	Year long module

Humanities

The Humanities Curriculum at NUS High School aims to nurture our students into world-ready learners with humanitarian values. Students will have an appreciation and sustained interest in the world around them. They will also be adept at thinking critically and inventively, inspiring multiple and varied possibilities for the betterment of our community and society.

The Department offers a choice of three subject disciplines – History, Geography and Economics. Students will gain an introduction to the three independent disciplines during the Foundation Years by means of an Integrated Humanities course of study. They shall then have the option of pursuing either History, Geography or Economics during the Advancement and Specialisation Years.

Integrated Humanities

The Integrated Humanities curriculum serves to lay the foundation for the three Humanities disciplines taught by the Department. Concepts and skills fundamental to the respective disciplines are imparted to prepare students holistically to manage the subjects at higher levels.

Students will examine the development of different cultures, and the contributions of the various communities in fostering our cultural identities. They also study Singapore's road to independence, and are introduced to the different systems of governance in the world. The Singapore Story of nation building – the trials and triumphs, and her arduous journey of economic, industrial and urban development, demographic transition and evolving challenges will also be discussed. Students will also be examining the role of the community and local organizations in uniting people from culturally diverse backgrounds, and be introduced to global issues of economic competitiveness, international relations, and current challenges of environmental sustainability and terrorism.

History

The History curriculum at NUS High School aims to provide students with a broader worldview and a better understanding of present global trends and international relations through a contemporary study of regional and international developments in the twentieth century. It highlights the importance of understanding and interpreting history in all its complexity – its people, events, developments and issues are explored in a historical context and examined from a range of perspectives. It enables students to better understand how the world they live in is shaped by the historical forces of the recent past.

The curriculum adopts a multi-faceted approach, and is designed around knowledge that is enduring and is organised around key themes and concepts or the "Big Ideas" that will guide students' thinking and the learning outcomes. Constructivist teaching is emphasized which focuses on developing students to be active learners, as they engage in the learning to construct their own meanings.

Geography

The Geography curriculum is designed to manifest the dynamism of the subject as students study the interactions between man and the environment over time and space at the local,

regional and global scales. It integrates both physical and human geography, and provides for the acquisition of scientific and socio-economic methodologies.

The curriculum focuses on the study and investigation of cause-effect relationships between man and the environment through the identification of trends and patterns, and the processes behind them. This is followed by the subsequent investigation into the adaptations, measures and management strategies meant to cope and deal with these interactions. Through the use of relevant named examples and case studies, the curriculum ensures that the consideration of varied perspectives, ideas and views is inherent in the curriculum. The Geography curriculum thus aims to develop in our students the values and attitudes of responsible citizens of an increasingly interconnected world. It will also strive to motivate them to reach a level of personal commitment to resolve the issues at different scales.

Economics

The study of Economics aims to provide students a broad understanding of national and international economic issues and challenges them to think critically through experiential learning and research. It aims to challenge students to investigate the economic issues on strategies of firms, efficiency, market failure and macroeconomic developments in the regional and international economies. Students will examine real world case studies; provide economic insights and conduct research and explore alternatives to achieve key economic goals.

Economics as a social science will broaden students' thinking as they examine human behaviour in response to changes and the way decisions are being made. Economics has a vital role to play in promoting international cooperation and mutual understanding because of its focus on global issues. To achieve this understanding, students will need to learn to consider economic theories, ideas, and events from the points of view of different stakeholders in the world economy.

Level	Sem	Module Code	Module Type	Module Title	Description	Modular Credits (MC)	Pre-requisites	Preclusions	Co-requisites	Hrs/ wk	Remarks
1	1	HY1222	Elective	From Aristotle to the Atom: Scientific Discoveries that changed the World	In this elective, students learn about the discoveries of some important scientific thinkers, to evaluate the impact these ideas had on the society within which they were developed and the long-term importance of these discoveries. The emphasis is on the discoveries and their effects on men, women and children at the time and later	2	None			2	
1	2	HY1221	Elective	From Hippocrates to Pasteur – Early History of European Medicine and Health	This module is a development study of how medicine and health in the Europe changed over a long period; from the times of ancient Greece to late 19th century. Students will find out how different factors have affected the development of medical and health knowledge. These factors include religion, war, governments, individuals, technology, communications and even chance.	2	None			2	
1	1 and 2	IH1103	Core	Identities, Histories and Societies	This module looks at the development of different cultures in Singapore, and the contributions of the various communities in fostering our cultural identities. Students also study Singapore's road to independence, and are introduced to the different systems of governance in the world. The module also focuses on the Singapore Story of nation building – the trials and triumphs, and her arduous journey of economic, industrial and urban development, demographic transition and evolving challenges. Students will also examine the role of the community and local organizations in uniting people from culturally diverse backgrounds.	4	None			2	Year-long module
2	1 and 2	GE2102	Core	Fundamental Geography	This module aims to build a strong foundation in the understanding and appreciation of the interrelationships between man and the environment. Students 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. It focuses on the study of Physical Geography topics such as weather and climatic variations, denudational processes, lithospheric and fluvial processes as well as the related landforms. Strong emphasis would be placed on the teaching of essential skills such as map reading and interpretation, diagram illustration, photo interpretation, statistical analysis and the citing of relevant named examples.	2	None			1	
2	1 and 2	IH2103	Core	Conflict, Cooperation & Globalisation	This module studies the conflict, cooperation and globalisation of the world economy. It provides an introduction to international relations and new challenges (e.g. terrorism, environmental sustainability and economic competitiveness) facing a nation. Key issues are examined in relation to past and present events, for examples role of United Nations (UN), Kyoto Protocol, Free Trade Agreements (FTAs) and	2	IH1103			1	Year-long module

					World Trade Organization (WTO). Causes and consequences of conflicts driven by forces of divisiveness among individuals, societies and countries will be discussed in this module. Students will understand that conflict resolution requires communication and co-operation among people and countries. This module also examines the dynamics of globalization in promoting international interconnectedness and the need for nations to continually review their strategies and responses.						
3	1	EC3101	Core	Introduction to Economics	This module aims to provide an introduction to the nature of economics and build a foundation of the skills required for economics. The module introduces the central problem of economics and equips students with the necessary theories to analysis markets. It focuses on how consumers, producers and governments make decisions about the choices they face, and evaluate these decisions' effects on society.	2	IH2103			2	
3	1	GE3104	Core	Man and Environment II: Lithospheric Processes and Hazards	This module examines the forces that have helped shape our planet. It explains geographical phenomenon resulting from tectonic activity, and 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. This module also 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.	2	GE2102			2	
3	1	HY3101	Core	History of Southeast Asia: from European Dominance Expansion to Independence	This module focuses on the themes of colonialism, nationalism and independence in Southeast Asia between the 19th 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.	2	IH2103			2	
3	2	EC3102	Core	Foundation Microeconomics	This module aims to provide an analysis in the field of market failure - how the free market fails to allocate resources efficiently due to the existence of public goods, externalities, market dominance and market imperfections. The module explores the reasons why market fails, explains and evaluates the effectiveness of government intervention. Building upon the knowledge and skills in Introduction to Economics, this module will further equip students with economic reasoning skills to apply key economic concepts to the analysis of real world economic issues such as pollution and national defence.	2	EC3101			2	
3	2	GE3101	Core	Geographies of Global Flows	This module covers four human geography topics – international transport systems, health and diseases, tourism and geographies of food. The module is designed to help students appreciate the global	2	GE2102			2	

					patterns of global flows and the role of space-shrinking and time-compressing technologies enabling these flows at the global scale. The topics are unified conceptually through place, space and power. Students get to examine how human interactions located in space and places are influenced by these global flows, particularly how power, gender and place/space affects globalisation. Students are expected to engage in fieldwork investigation and data analysis. They are expected to learn through enquiry-based learning approaches like scenario-based learning and problem-based learning.						
3	2	HY3102	Core	World History: Study of 20th Century World History	This module focuses on the following themes: revolution, nationalism, imperialism, authoritarianism and war through the study of twentieth century world history. Students will examine questions such as "Why do nations go to war?", "How does war change society", and "What lessons can man draw from the impact and consequences of wars?" The module will provide students with a global perspective of the complexities of international relations with the onset of the forces of change at the turn of the twentieth century.	2	IH2103			2	
4	1	EC4101	Core	Foundation Macroeconomics	This module introduces students to Macroeconomics, which deals with the economy as a whole. Students will be equipped with the tools which economists use to describe and explain the macro-economy and familiarise themselves with commonly used macroeconomics terms (e.g. Consumer Price Index, real and nominal Gross Domestic Product). Students will investigate the reasons behind macroeconomic problems (e.g. recession, inflation) and explain the policies governments conduct to resolve these policies.	2	EC3102			2	
4	1	GE4101	Core	Man and Environment I : Fluvial & Coastal Geomorphology and Management	This module focuses on the interactions between man and the environment in the study of river and coastal systems. Fluvial and coastal processes of erosion, transportation and deposition are explored and the factors influencing these processes are examined. More importantly, the module stresses on the impacts of man's modification of these natural environments and his attempts to control the forces of nature through the construction of river and coastal defences. Students explore and reflect on the necessity and the effectiveness of such efforts. Relevant named examples are cited to provide real-life context to the issues dealt with in the module.	2	GE2102			2	
4	1	HY4101	Core	International History I	This module focuses on a new era of international relations, particularly between the two superpowers, the USA and the USSR after the end of World War II. The module examines the issues of conflicts after the second World War and traces the events/causes and development of the Cold War. The module further examines the issues and events leading to the collapse of communism in Eastern Europe and the Soviet Union. The problems of the ailing Soviet economy under communism, the catalyst that led to its demise under	2	IH2103			2	

					Mikhail Gorbachev and its eventual breakup and the setting up of the Commonwealth of Independent States will be covered.						
4	2	EC4103	Core	International and Development Economics	This module introduces students to the International and Development Economy. The module equips students with a broad understanding of international economics and how exchange rates and balance of payment account work. They will also explore the reasons for trade, and why countries still adopt protectionism. Students will analyse the effects of protectionism and explore whether Singapore adopts these methods. Students will contrast the difference between economic growth and development and explore the factors that affect economic development.	2	EC4101			2	
4	2	GE4102	Core	Dynamics of Population and Urban Development	This module examines the changing patterns of global distribution of population, population growth and age structures. Students will examine changes in the spatial patterns, and fertility/mortality trends in different countries. Issues related to migration and labour movements in the world economy will also be discussed. The effects on population structures and socio-economic fabric of the country concerned, as well as the political and environmental implications, are explored. This module also looks into how cities develop and change, and how urban development is affected by human actions, and in turn, affects our everyday behaviour. Students will look at various examples of cities that face urban problems, particularly in the area of housing and transport, and the measures put in place to manage these challenges. Students will realise how there is no one-size-fits-all solution for any city's urban challenges, and appreciate the importance of considering unique characteristics of each country and city in order to manage urban issues with greater effectiveness.	2	GE2102			2	
4	2	HY4102	Core	International History II	This module traces the birth of the ideas on peace in the post-WWII context and how these eventually led to the important collective security role of the UN as the new agent of peace and security. The module examines and discusses the role and extent of powers of the UN in these areas: collective security pertaining to peacekeeping, peace enforcement and peacemaking, international law – particularly with regard to human rights, covenant and law on genocide, and the social and economic role of the UN with regard to the environment and population. Students will develop perspectives on why the UN was unable to solve many of the problems of international relations, particularly during the Cold War era. Students will examine the future path of the UN in terms of how it frames and influences discourses about global and security issues and ascertain its relevance in the 21st century and beyond.	2	IH2103			2	
5	1	EC5105	Core (Major)	Industrial Economics	This module aims to provide the foundation of the theory of the firms and the spectrum of market competition. Students will learn the terminology and the principles underpinning the operation of the	2	EC4103			3	This core module may be taken by selected non-Major students as an

					firms. Students will apply various theories to analyse the behaviour of firms in different market structures and explore the effects of these behaviour on efficiencies and society's welfare. The module will also provide opportunities to conduct investigative work on the behaviour of firms in Singapore.						elective, upon department approval.
5	1	GE5102	Core (Major)	Atmospheric Systems, Hazards and Management	This module begins with an introduction of the structure and composition of the Earth's atmosphere and its energy budget and radiation balance. Following it, we examine the factors that influence atmospheric circulation, and how surface wind belts and pressure belts are developed. With the understanding of these atmospheric processes, we explore the Earth's climatic zones, and examine the factors which produce these climatic variations. Local climatic patterns (microclimates) and their modification by human activities are also examined. Particular attention is paid to the effects of urban areas and vegetation on microclimates, and the urban heat island effect.	2	Y3&Y4 GE modules			3	This core module may be taken by selected non-Major students as an elective, upon department approval.
5	1	HY5101	Core (Major)	Contemporary History I	This module examines contemporary issues of the post-Cold War era which are of immediate relevance to the modern world. Critical perspectives on the new challenges facing US-Russian relations beyond the Cold War will be covered. The role of the US will be analysed in the broader context of other factors that shaped the growth and development of the contemporary world economy. This module will also examine the resurgence of new forces in the East with the growth and transformation of the Asian economies, particularly China, Japan and India and their implications.	2	Y3&Y4 HY modules			3	This core module may be taken by selected non-Major students as an elective, upon department approval.
5	2	EC5106	Core (Major)	National Economics	This module equips students with further tools to analyse the macro-economy. Building upon the knowledge and skills in Foundation Macroeconomics, students will examine the various causes of macroeconomic problems and discuss the effectiveness of governments in resolving these problems. The module will focus on the Singapore economy, and explore the existing use of policies to resolve problems and the effectiveness of these policies in continuing to achieve Singapore's aims in light of changing economic and social conditions.	2	EC5105			3	This core module may be taken by selected non-Major students as an elective, upon department approval.
5	2	GE5101	Core (Major)	Globalisation of Economic Activities	This module examines the uneven development of the global economy and the issue of economic globalization. Students study the trends of production and trade and seek to gain insight into the evolving global map of economic activities. Particular attention is paid to the impacts of globalization on the developed countries, less developed countries and newly industrialised economies. Students study and discuss the economic development of the newly industrialised economies, identifying their unique characteristics and strengths, as well as predicting potential challenges to continual economic development. This module also examines the	2	Y3&Y4 GE modules			3	This core module may be taken by selected non-Major students as an elective, upon department approval.

					interrelationship between transnational corporations (TNCs) and regional development in an era of global economic restructuring.						
5	2	HY5102	Core (Major)	Contemporary History II	This module examines the challenges faced by Southeast Asian states during the contemporary period. Cross-comparative studies of independent countries in the Southeast Asian region will be done through selected case studies to provide a critical analysis of the historical developments and challenges of this region. Issues of interstate tensions till the present and its effects on regional cooperation and security will be examined. The role of ASEAN in promoting the regional peace and security of Southeast Asia and its regional identity will be analysed.	2	Y3&Y4 HY modules			3	This core module may be taken by selected non-Major students as an elective, upon department approval.
6	1	EC6105	Core (Major)	Topics in Microeconomics	The module provides a deepening of Microeconomics concepts mastered in the earlier modules. The module will introduce students to the different dimensions of efficiency and explore in greater details the competitive, collusive and entry deterrence strategies of the firm. Students will also apply game theory to the behaviour of firms. The module also discusses concepts such as tragedy of commons, property rights, Coase theorem and asymmetric information; and analyse their role in the field of market failure.	2	EC5106			3	This core module may be taken by selected non-Major students as an elective, upon department approval.
6	1	GE6101	Core (Major)	Geographic Information System I	This module explores the use of Geographical Information System (GIS) technology in dealing with real-world issues. Students will be trained in the basic skills to utilise GIS technology to explore and solve social, economic and/or environmental issues. They will be introduced to the history, concepts and principles of GIS. They will also be introduced to basic cartographic skills and other essential elements to complete a spatial map individually. Students will be engaged in a variety of activities/assessments such as hands-on laboratory sessions, report writing, formative assessments and a project.	2	Y3&Y4 GE modules			3	This core module may be taken by selected non-Major students as an elective, upon department approval.
6	1	HY6101	Core (Major)	World Affairs I	This module focuses on the development of the global economy and offers a challenging study drawing on perspectives from a multidisciplinary orientation. Students will examine the growth, opportunities and the challenges of the global economy affecting countries. Key issues such as oil crisis, protectionism versus free trade, trade imbalances and debt crisis which affect the globalising world will be critically examined. Issues of conflict and cooperation, centering on causes and impact of religious fundamentalism on world security and problems in the Middle East and South Asia will also be analysed. The collective security role of the United Nations within the context of the changing international world situations and systems will also be studied.	2	Y3&Y4 HY modules			3	This core module may be taken by selected non-Major students as an elective, upon department approval.
6	2	EC6106	Core (Major)	Topics in Macroeconomics	The module provides a deepening of Macroeconomics concepts mastered in the earlier modules. The module will introduce students to further techniques in analysing the macro-economy and the use of	2	EC6105			3	This core module may be taken by selected non-Major students as an

					these techniques to explain and analyse macroeconomic issues and policies. Students will also explore the various trade theories and further evaluate trade policies. Finally, students will examine and evaluate the economic effects of globalisation on various economies.						elective, upon department approval.
6	2	GE6102	Core (Major)	Geographic Information System II	This module continues from the GIS module in Semester 1 with in-depth appreciation of the GIS technology and its application to real-world issues. Students will be given opportunities to discuss and work on project design and implementation, as well as ethical issues in the planning, data collection and implementation stages. In the process, students construct and analyse their own data, and suggest possible solutions to the issues presented. They are required to present the results on spatial map(s) using the essential cartographic skills they have learnt in Semester 1. With regard to the assessment of performance in this module, students are expected to participate in lab sessions, and complete written reports, formative assessments and submit a module portfolio.	2	GE6101			3	This core module may be taken by selected non-Major students as an elective, upon department approval.
6	2	HY6102	Core (Major)	World Affairs II	This module focuses on issues of conflict and cooperation, centering on the rise and impact of religious fundamentalism on world and regional security. Students will also examine the causes and consequences of conflict and instability in the Middle East and South Asia. The collective efforts of the world community through the United Nations to address the rise of religious militancy and the Middle East problem will be analysed within the context of the changing international world situations and systems.	2	Y3&Y4 HY modules			3	This core module may be taken by selected non-Major students as an elective, upon department approval.
6	1 and 2	EC6111	Core (Major)	Humanities Research Paper - Economics	This is a year-long module. It aims to hone students' skills in economic inquiry through a sustained and rigorous research process and investigation of an economic question or issue. Students will complete a Research Paper for submission to demonstrate evidence of independent learning, critical analysis and sound interpretations of economic knowledge.	4	Y3&Y4 EC modules			Year long	Year long module with teacher consultation sessions
6	1 and 2	GE6111	Core (Major)	Humanities Research Paper - Geography	This is a year-long module. Students will be engaged in a rigorous process of individual investigation of a geographical issue/topic to complete a Research Paper for submission. The purpose of the Paper is to reinforce and extend the learning of principal geographical concepts and skills. It challenges students to conduct an in-depth study into a specific geographical issue/topic, and to think critically about different perspectives. In the process, students develop the ability to formulate informed opinions about the chosen geographical issue in the real world.	4	Y3&Y4 GE modules			Year long	Year long module with teacher consultation sessions
6	1 and 2	HY6111	Core (Major)	Humanities Research Paper - History	This is a year-long module. This module aims to hone students' skills in historical inquiry through a sustained and rigorous research process and investigation of a historical question or issue. Students will complete a Research Paper for submission to demonstrate	4	Y3&Y4 HY modules			Year long	Year long module with teacher consultation sessions

				evidence of independent learning, critical analysis and sound interpretations of historical knowledge.						

Music

Welcome to the NUS High School Music Programme

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 programme that is an integral part of the entire education as well as a reflection of a well-balanced education experience. School and community resources are used to facilitate the exploration of music in a manner both meaningful and relevant to students. Students majoring in music—upon recommendation—will also enjoy the collaboration opportunities with the NUS Yong Siew Toh Conservatory of Music. The music programme will enhance students' learning through the acquisition of

- Music Knowledge
- Music Reading, Listening and Analysis
- Music Composition and Performance

The music programme aims to develop students in achieving these competencies and to strive for excellence within the limits of their individual capabilities in three areas: Skill Development, Musical Understanding, and Attitude Development.

Expected Requirements

Applied Instrument:
Students majoring in Music must try to attain at least a Grade 8 standard of the Associated Board of Royal School of Music (ABRSM) or beyond for the first musical instrument and a Grade 5 standard ABRSM 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 ABRSM and *Trinity College London* (TCL). Each level grows from those experiences previously presented.

Performing Opportunities: Senior Recital and CCA Performing Arts:
Aside from fulfilling the applied instruments requirement, music majors are also required to:

- present a Senior Recital in Year 6
- participate in one of the CCA Performing Arts group: School Orchestra or Chinese Orchestra or Choir (based on their 1st instrument)

We hope to provide music majors the opportunities to explore in and out of school music activities and the study of an orchestra instrument during his or her high school education.

Design of Curriculum

The High School Music Programme is designed as a developmental and sequential approach to music instruction within a six-year programme (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.

We acknowledge 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. the majority will be the mass audience for the culture of their times.

Students aiming to choose Music as a 4th major will need to complete a total of **22 CORE** modular credits. These **CORE Modules** offer students a broad-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 for the fundamental concepts and principles of music. Core module grades are counted toward the Cumulative Average Point (CAP).

ENRICHMENT Modules are offered to students who are interested to learn a new instrument or skill in the performing area of the music study. Students will co-pay for the lessons only if the course is conducted by an external vendor. Modules are graded with a Pass, Merit, or Distinction.

Assessment

The programme will explore various modes of assessment: *Authentic* (skill demonstration, performance-based and task-oriented); *Formative* (*For* learning: what new insights have students brought to their music making during this lesson or unit of work-carried out throughout a course or project—process); *Summative* (*Of* learning—record the overall achievement of a student-end of a course or project—measures learning outcomes) and *Ipsative* (Of the Self—how students have performed in relation to their own previous efforts and promotes independent learning).

The assessment ranges 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 ABRSM, 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 Programme promotes awareness of music through the development of musical skills, knowledge and perception that contributes to the total development of the individual as well as contributing to the development of 21st century competencies and the MOE's Desired Outcomes (Confident Person, Self-Directed Learner, Active Contributor, Concerned Citizen). 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, passed external ABRSM Grade 8 Practical and Music Theory (ABRSM Grade 5 for the 2nd Instrument), 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 and respect music of different cultures
2. a sense of pride in one's ability as an analytical and astute listener, a confident performer and a creative composer
3. an increased confidence in musical judgments
4. emotional satisfaction and expression; and
5. as advocators and supporters of music education and local arts scene.

Level	Sem	Module Code	Module Type	Module Title	Description	Modular Credits (MC)	Pre-requisites	Preclusions	Co-requisites	Hrs/ wk	Remarks
2	1 and 2	MU2101	Core	Basic Musicianship	This module is a fun and yet challenging course 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 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. It is highly desirable that ALL students be encouraged to have completed at least this minimum level of music education before graduation.	2	None			2	
3	1	MU3101	Core	Music: The Extravagant Art	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 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 we experience while listening to great music is our emotional reward for an intellectual effort well made. By the end of the semester, the student would have a better knowledge of music and should be able to LISTEN intelligently to music performed by a variety of musical groups of the past and present. They will also describe and explain the organization and expression of musical styles; making comparison between compositions of a given type of music; and the scope of music from "Popular" forms (Rock, jazz, rhythm, and blues, country western, folk and traditional) to non-western music and to the classical component (orchestral, choral, concerto, opera, symphony, chamber works, etc).	2	MU2101			2	
3	2	MU3102 *	Core	Elements of Music Theory	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 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 and beyond. All students must sit for the external examination: ABRSM Music Theory Grade 5 paper.	2	MU3101			2	Students have at least attained ABRSM Grade 3 / 4 Theory. Students who have already obtained ABRSM Music Theory Grade 5 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 fulfilment but no grades will be added to

											the overall CAP. Compulsory for majoring students.
4	1	MU4101	Core	Ear-Training & Sight Singing	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. The exercises consist of study and practice in 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. By the end of the semester, students will be required to sing as an ensemble in various parts.	2	None			2	Open to students with good learning attitude and a plus to have basic keyboard and music theory skills
4	2	MU4102	Core	Chamber Music	Chamber Music is defined as music for small ensembles in which players perform one to a part, generally without a conductor. In the past, the term chamber music was restricted to Western classical music for small ensembles, such as the string quartet or piano quintet. However in NUS High School, chamber music may comprise of different musical styles and mix of available instrumentations and skills. At the heart of this art form is a spirit of collaboration. Democratic in essence, chamber music demands that each individual engage in a close musical dialogue with the other performers. Their collective musical instinct, experience, knowledge, and talent guide the process of interpreting, rehearsing, and performing. Students are required to present a Chamber Recital - consist of 50-60 minutes of music - by end of the Semester.	2	None			2	
5	1	MU5101	Core (Major)	Melody & Harmony	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 without the certificate must sit for the external examination: ABRSM Grade 8 Music Theory.	3	MU4102			3	Students must have attained a certificate of ABRSM Grade 5 Music Theory (Merit & above).
5	2	MU5102	Core (Major)	Orchestration & Music Composition	This module looks into the principles of composition and instrumentations; and aims to develop student's inventive ability with guided writings in various forms of musical composition. Two parts: (1) Instrumentation deals with the ranges, techniques, and timbres of each of the orchestra instruments; (2) Orchestration deals with major scoring problems as well as techniques of transcribing piano, chamber, band music for orchestra, and explores the ranges and transpositions of voices. Students will work on these characteristics and basic techniques in arranging, transcribing and	3	MU5101			3	Students must have attained a certificate of ABRSM Grade 8 Music Theory.

| 6 | 1 | MU6101 | Core (Major) | Performance Practice | Performing Practice is about the performance of music—stylistically and technical aspects—of how the music should be played on instruments corresponding to the period (Baroque, Classical, Romantic, Contemporary) of the piece. This module looks not only the playing techniques of specific genres or eras, but also into the notated/written scores—score reading, techniques of embellishments & ornamentations; concepts & styles, much listening of musical works—it also looks into the tradition & philosophy, integrated learning—which values respect and represents our culturally diverse population. The module also focuses on the fundamental issues that will affect the teaching and learning of music- functions of music education to its social, psychological and pedagogical aspects. More practical topics are also given equal coverage such as cultural pluralism, innovative approaches in teaching & assessment, accountability, and critical thinking. Students are required to research on the biographies of various composers, prepare programme notes, music analyses and comparisons of subject matters through representative recordings of literature and multimedia. | 3 | MU5102 | | | 3 | |
| 6 | 2 | MU6102 | Core (Major) | Senior Recital | Music performance is an integral part of every student's music education. As such, students specializing in music are required to perform a full recital of 45-50 minutes in the final year of NUS High music education: primary instrument (35 minutes) and secondary instrument (10 minutes). Students are to adhere to the recital guidelines. Prior to the recital, majoring students are to fulfill the following: 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, participate in a music competition – be it ensemble/ solo, play for at least one master-class, present at least 2 mini-performances for experience (solo or joined and a lecture recital), and pass the jury a month prior to the recital. Majoring students are required to check with the Department Head on the procedures and bookings, recital repertoires; and the after recital reception (optional) with their parents. | 3 | MU6101 | | | 3 | Students must have attained a minimum standard of ABRSM Grade 8 or equivalent for the 1st musical instrument and ABRSM Grade 5 or equivalent for the 2nd instrument. |

(Continued from previous page, first cell) scoring for chorus, orchestra, band and ensembles from pre-existing scores to original compositions. Students will be equipped with music technology skills where they learn music notation software (Finale) and basic knowledge of MIDI sequencing (garage band) to create and compose music.

Art

Welcome to the NUS High School Art Programme

The Art programme in NUS High School aims to cultivate the student's interest and curiosity in all fields of art study. Students can put into practice what they have learnt in the art classroom to enhance skills required in Math and Science modules: 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. The programme will enhance students' learning through:

- **Aesthetic Perception:** Students will learn to perceive the aesthetic value in nature and will be able to articulate with a language specific to the visual arts in their immediate surroundings.
- **Artistic Expression:** Through the process of art making, students will learn to express themselves and the art of visual communication through various forms.
- **Historical and Cultural Context:** Students will understand historic contributions and cultural context in the visual arts. They will analyse the role of visual art in the development of human cultures all around the world.
- **Critical Analysis:** Students will learn to analyse aesthetic principles and verbalize their understanding of the issues through constructive criticism of other students' work.
- **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.

Four Aspects of Visual Arts Education

- **2 Dimensional (2D) studies**: include Drawing, Painting, Printmaking, Photography, Textiles, Collage and Illustration
- **3 Dimensional (3D) studies**: Sculpture, Ceramics, Multi-media work and Installation Art.
- **Design:** Fashion Design, Jewelry Design, Product Design, Interior and Furniture Design.
- **Art History**: 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.

The Art Programme is designed as a developmental and sequential approach to art instruction within a six-year programme (Foundation - Years 1 & 2; Advancement - Years 3 & 4; Specialization - Years 5 & 6).

Enrichment modules offer to students who are interested in ceramics or other art skills. Students will co-pay for the lessons only if the course is conducted by an external vendor. Modules are graded with a Pass, Merit, or Distinction.

Expected Requirements

Majoring students are required to

1. submit for AP Studio Art (2D-Design or Drawing portfolio)
2. present an Art Grad Show by Year 6
3. be a member of Art or Media Club

Students may graduate with a NUS High School Diploma with a Major in Art 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 two portfolio areas: 2-D Design or Drawing. Students will have to consult the subject teacher 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 Art will be equipped with the skills and knowledge to submit an AP Studio Art Portfolio in Year 6 of their studies.

Level	Sem	Module Code	Module Type	Module Title	Description	Modular Credits (MC)	Pre-requisites	Preclusions	Co-requisites	Hrs/wk	Remarks
2	1 and 2	AR2101	Core	Art Fundamentals	Art Fundamentals introduces art in theory and practice. Students will learn the elements and principles of 2D art in relation to the history of their uses. They will equip themselves with terminology that will facilitate art appreciation. Students will also uncover these 'fun'damentals in the practice of art through drawing and painting. They will explore the varied basic parts that form an art work using different medium. The module will provide students with an environment for inquiry, imagination and self-expression through art criticism, discussion and art making.	2	None			2	
3	1	AR3101	Core	Art Intermediate I	In this intermediate module, students will continue the practice of art & design through drawing and painting. They will continue to develop their skills in these areas and begin to explore mixed media. Students will be challenged in the faculties of representations and conception. Relevant art history, movements and aesthetic theories will be introduced to challenge perceptions. Students will begin to build a portfolio based on their practice and explorations in this module. The module will provide students with an environment for problem solving, critical analysis and art making. It will also provide them with communication and discussion through using Feldman's art criticism model DAIE (Describe, Analyze, Interpret and Evaluate).	2	AR2101			2	
3	2	AR3102	Core	Art Intermediate II	In this intermediate module, students will continue the practice of art through 2D and partial 3D techniques. Students will be challenged in the faculties of representations and conception. Relevant art history, movements and aesthetic theories will be introduced to challenge perceptions. The module will provide students with an environment for problem solving, critical analysis and art making. It will also provide them with communication and discussion using Feldman's art criticism model DAIE (Describe, Analyze, Interpret and Evaluate) to describe and analyze.	2	AR3101			2	
4	1	AR4101	Core	Art Advanced I	This module continues to teach students advanced skills in drawing, painting, and mixed media. In-depth techniques with pencil, ink, acrylic, and others will be conducted with first hand observations. Specific art history topics will be introduced through the first three aspects of Feldman's criticism model DAIE (Description, Analysis, Interpretation and Evaluation). Students continue to learn more terms on the Elements of Art & Design (EOAD) and Principles of Art & Design (POAD). Students will see a project through the drawing board to its final product. Skills in creative thinking as well as practical applications of art and design will be put to use. Students will work on 2D portfolio for AP Studio Art from this course.	2	AR3102			2	
4	2	AR4102	Core	Art Advanced II	Students in this module will be trained to draw, paint and construct in mixed media. Students will be challenged to demonstrate their understanding of art and design principles as they relate them to the elements of art and design.	2	AR4101			2	

					Critical to the portfolio, students will also learn the presentation aspect of works for documentation and viewing. Relevant art history, movements and aesthetic theories will be introduced through the fourth aspect (evaluation) of Feldman's criticism model DAIE (Description, Analysis, Interpretation and Evaluation). Majoring students will gain confidence in furthering their portfolio for AP Studio Art from this course. Students are also required to organize their choice artworks for a group showcase. Students have to conceptualize and execute the presentation within an appropriate and creative context so that the various approaches in their artworks will interact well and create the right dynamics in the exhibition.					
5	1	AR5111	Core (Major)	Studio Art I	Studio Art I is designed for highly motivated students seriously interested in art-making. There will not be a written exam; instead, students submit portfolios for evaluation at the end of the semester in preparation for AP Studio Art. Students will work on building a portfolio in one of two portfolio areas: 2-D Design OR Drawing. Students will have to consult the Teacher-in-Charge 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. This course will also introduce students to the art-making approaches of western art from the 18th Century to Postmodernism. The Studio component will be supported by a theoretical framework covering Realism, Formalism, Expressionism, Contextualism & Postmodernism tracing the phenomenal evolution of the visual image and its ideas. Students will begin to understand the transition of the role of art as recorder of history to being the grounds of expression to pluralism.	3	AR4102			3	Student must have at least a subject CAP of 4
5	2	AR5112	Core (Major)	Studio Art II	Studio Art II is a continuation of Studio Art I. This course 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 the semester in preparation for AP Studio Art. Students will work on building a portfolio in one of two portfolio areas: 2-D Design and Drawing. Students will have to consult the Teacher-in-charge 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. The Studio component will be supported by a theoretical framework covering dominant aesthetic theories and the application of visual cultural theories in the Postmodernist approaches to making art. Students will explore processes and practices of postmodern strategies used by artists and relate them to their own motivations and ideas in their studio practice.	3	AR5111			3	
6	1	AR6113	Core (Major)	Studio Art III	Studio Art III is a continuation of Studio Art II. There will not be a written exam; instead, students prepare and submit portfolios for AP Studio Art in one of 2 portfolio areas: 2-D Design and Drawing. Students will have to consult the	3	AR5112			3	

| | | | | | Teacher-in-charge 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. Relevant aesthetic & critical theories for contextual studies will be incorporated into the module to support the Studio component in order to allow students to understand & locate their art-making process within a wider historical and cultural context. Art Majors have to submit their portfolio for AP Art. | | | | | |
| 6 | 2 | AR6114 | Core (Major) | Art Grad Show | The Art Graduation Show module is a compulsory requirement for the Year 6 art majors. In this module, the student-artists will go through a rigorous process of planning, conceptualizing and presenting a show that is a culmination of their artistic learning journey at NUS High School. The Graduation Show module is created as an authentic learning experience for the student-artists and thus form an integral part of their art education. The best of each student's past and current artworks will be designated an individual space for a solo presentation. Collectively and thematically, the students will exhibit either in the school premise or an external venue. Close mentorship and supervision will be given by the art teacher-in-charge and HOD to students to guide them in curating, budgeting and executing the show. | 3 | AR6113 | | | 3 | |

Da Vinci

The 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 aims to develop skills for research, innovation and enterprise in multiple disciplines. Students undergo a series of structured programmes in the first four years in order to prepare them to carry out a research project in their senior years.

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 polymaths in this fast-changing world. We strive to help students stay at the frontier of research and innovation. We want to inculcate the observation, communication and thinking skills vital for research and innovation.

NUS High School is fortunate to have many organizations supporting the Da Vinci programme. In particular, many schools and faculties in NUS provide research opportunities for our students through expert guidance and mentorship. Our key partners include Science Centre Singapore, DSO National Laboratories, Defence Science and Technology Agency (DSTA), the Agency for Science, Technology and Research (A*STAR) and the Nanyang Technological University.

All students will present their research at our annual NUS High School Research Congress. They are also encouraged to interact with their peers locally and internationally, exchange ideas through oral and poster presentations at local and overseas science fairs and conferences.

All Da Vinci Programme Modules will be awarded *Excellent, Merit, Satisfactory* or *Unsatisfactory* according to performance (no Grade Points are given).

Level	Sem	Module Code	Module Type	Module Title	Description	Modular Credits (MC)	Pre-requisites	Preclusions	Co-requisites	Hrs/ wk	Remarks
1	1	DV1101	Core	Da Vinci Foundation	This semester-long module aims to inculcate essential habits of the scientific mind; and to develop the competencies, skills and ethics for research, innovation and enterprise. We aim to have students thinking creatively and solving problems innovatively in order for them to have a sense of excitement for the future. The programme will equip students with a basic set of idea generation tools, and introduce the technical skills needed to execute their ideas. Students will also be brought on fieldtrips to widen their perspective. Another focus will be to encourage interdisciplinary thinking. Much innovation and excitement can be found at the boundaries between traditional subject silos. Activities will provide students with a broad perspective of the multi- and inter-disciplinary nature of things in the real world.	0	None			3	
2	2	DV2104	Core	Junior Innovator	In this module, students will apply what they have learnt over the first three semesters to conceptualize, design and built an innovative product or solution. They will work in groups to identify the problem they wish to solve, craft the solution, develop the prototype and present it to their peers.	0	None			3	
2	2	DV2105	Core	Junior Science Research	In this module, students will be taught the scientific method, its merits and limitations and how to systematically make enquiry into science. Students will propose a research topic of their own choice which will be reviewed and approved by their teachers. They will design, structure and carry out the in small teams and deliver a report and presentation at the end of their project.	0	None			3	
2	2	DV2106	Core	Junior Math Research	In this module, students will be taught mathematics problem-solving skills and how to apply them in a mathematics project. Students are also taught the use of Latex to produce professional looking reports. Students will propose a research topic of their own choice which will be reviewed and approved by their teachers. They will design, structure and carry out the in small teams and deliver a report and presentation at the end of their project.	0	None			3	
3	1	DV3201	Elective	Advanced Design and Engineering	This elective module aims to extend students' understanding of engineering design process through the application of math, science, and technology to create devices and systems that meet human needs. Students will learn about engineering through realistic, hands-on problem-solving experiences. This module will teach advanced skills that will enable the student to design and implement customized automation and data acquisition solutions to meet research and engineering goals.	0	DV2102			1.5	

3	2	DV3101	Core	Research Methodology	In this module, students will undergo training in scientific methodology and learn the basics of research and the techniques required to unravel the mystery of their research question. Students will also pick up the skills like literature review, scientific writing, how to conduct a proper experiment and result analysis.	0	None			3	Students will take DV3101 either in Semester 1 or 2
4	1 and 2	IRP	Elective	Independent Research Project	During the Foundation and Advancement Years, students who have the aptitude and passion for research in any field can embark on the Independent Research Project (IRP) as an individual or in a team. These projects may also be linked to external programmes like the Science Mentorship Programme, Nanyang Research Programme, the Young Defence Scientists' Programme and the National Weather Study Project. Students can also partner an external research organization for their project.	0	DV3101			0	Research Projects are not assigned a module code but will be reflected in the student's research transcript
1 or 2	1 or 2	DV2101	Core	Design & Engineering	This semester-long module aims to give students the intermediate skills they need to turn their ideas into reality. This module will build on the skills taught in DV1101. Students will learn to work with wood and plastics, as well as basic electronics. They will also be introduced to computer-aided design software	0	None			2	Students will take either DV2101 or DV2103 in Year 1 Sem 2 or Year 2 Sem 1
1 or 2	1 or 2	DV2102	Core	Creative Problem Solving	Problem solving is applied thinking, an integral part of all learning for students today. This semester-long programme is a platform where students, working in teams, learn to apply a wide range of techniques to generate creative solutions to existing or future problems contained within complex social contexts. Besides equipping students with the skills and strategies of solving problems, basic research skills and oral presentations skills will be highlighted as well. One of the frameworks used will be that of the Future Problem Solving Programme (FPSP), a cohesive and sequential process that emphasizes teamwork and ethical thinking in anticipating future challenges.	0	None			2	
1 or 2	1 or 2	DV2103	Core	Science Presentations	Scientists, engineers and mathematicians need specific presentation skills. It is essential that scientists are able to communicate effectively with each other as well as with general public. This module will aim to allow students to acquire basic scientific presentation skills and practise them on their peers. By listening to each other's presentations, students will get exposed to a variety of presentation skills as well as get to learn interesting facts from each other. Students will also be encouraged to ask and think about critical questions pertaining to the research process.	0	None			2	Students will take either DV2101 or DV2103 in Year 1 Sem 2 or Year 2 Sem 1
3 or 4	2	DV3202	Elective	Innovation and Enterprise	This module will focus on the conceptualisation, design and development of technology orientated products and services. Students will learn about innovation, design thinking, and marketing. Students will have to work in groups to identify a problem, identify customer needs, establish product/service specifications, then design, plan and prototype a product. Students will need to be able to work	0	None			1.5	

5 and 6	1 and 2	ARP	Core	Advanced Research Project	in teams, be comfortable with presentations, and have a strong interest in design and innovation. There can also be guest lectures by entrepreneurs and founders of various start-ups. The module will also cover intellectual property and financial analysis.						
					During the Specialization Years, all students must embark on their Advanced Research Project (ARP) in the field of mathematics, science or engineering. Successful completion of the ARP is one of the graduation requirements for our students. Students can do their ARP as individual or in a team of not more than three members.	0	DV3101			0	Research Projects are not assigned a module code but will be reflected in the student's research transcript

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